Repower and Regear Musings 1/24/2012

George T. Galyon (redvdub1@aol.com)

Repair and Regear is a forum currently (1/2020) hosted on groups.io web services site. The current moderator is Kenneth Clark a long time model locomotive repair and rebuild guru. I have gleaned what I think were some interesting “threads” and collected them in this document so as to post them on other web sites including that of my club...the Olde Newburgh Model Railroad Club. The list is by no means finished and will be updated from time to time. There is no particular order to the topics and the reader will have to just scan through the discussions and postings randomly. This will be quicker than browsing the forum itself and can serve as a sort of snapshot peek at what’s in the forum.

The repower and regear forum has a good search function which can be used to find items by author and/or bo

Don,
The good news is that it may not be the mechanism. That leaves the universal drive and the flywheel/motor package. When I start a remotor project, I select a motor first, based on the space available, over half of my locos have a 2032 round can motor (definitely reduces the spare parts inventory); my 2-10-2s have 2236 can motors. I then test run the motor held in my fingers, it should be quiet and almost completely free of vibrations. Next I install the flywheel and then test run the motor again. If the flywheel is out of balance or poorly installed the motor vibration and noise noticeably increases . Next I move onto the gearbox. *On a properly assembled KTM gearbox you can put the worm shaft into a Dremel and bring the tool up to full RPM and the gearbox will move from a 6 o'clock position to about a 9 o'clock position, but will not revolve with the worm shaft. Gearboxes with ball bearings on the worm shaft will barely budge from the 6 o'clock position. Most NWSL non-ball bearing gearboxes will move to about 10 o'clock and be on the verge of rotating with the worm shaft. The really bad gearboxes will rotate on the worm shaft like a propeller and a couple of times have achieved lift-off.* I call this my "propeller" test of gearboxes. Almost all of my universal drive installations use Hobbytown parts, either the standard diesel universal or the "short" universal from the switcher drive. The Hobbytown drives allow for some movement along the drive shaft without binding and are quiet. The same cannot be said for other drives. If you like the sliding, keyed shaft drive that Athearn has used, Overland markets a "diesel" universal drive that has a longer shaft and is quieter than Athearn's. I use it to connect the front and rear engines of articulateds. On many of them the drive train stays coupled even if the front engine drops down when the engine is picked up (a frequent occurrence on some models, normally requiring partial disassembly). You're making progress in finding the problem, keep chugging.

--Ken Clark

Don,

I don't know what type of motor your using, but on some of the Sagami's (NWSL) you occasionally get a motor that has some noise because the bearings aren't quite seated right.

I read a tip somewhere in the past that if you grasp the motor and lightly tap each end of the motor shaft on a hard surface this helps to seat things and it will quiet down. It doesn't always work but it has helped on a few occasions.

Also apply a drop of Labelle #108 oil to each of the motors bearings if you haven't done so already.

I hope that helps,

Mark

 Ken Clark

11/02/09 #6052

I use a convection oven which I can dial in much more accurately than a conventional oven. For a Conventional oven try 225F, during the cycling process the oven will heat to over 225F and then drop. Most of the CerroSafe, CerroBend, Tempflow, Bear Metal alloys melt below 212F. The CerroBend will drip down out of the model into the pie pan where it can be reused. After it has been removed, go ahead and resolder those bad solder joints. I only add CerroSafe,

etc... after the model is painted, after all repairs and modifications have been made.

Ken (Clark)

Some years ago, I weighted a locomotive with Cerro Bend. The locomotive was not a paragon of the brass art, even though it was a PFM model. Some part fell off, and I resoldered it back on. I believe this happened a couple more times. The last time, when I resoldered the part, the locomotive started falling apart. The solder had amalgamated with the Cerro Bend, thus causing much of the locomotive to be soldered together with low temperature solder - which it wasn't originally.

Re-assembling the boiler required melting and scraping off the old solder and Cerro Bend, hoping I got enough off that new solder would hold, which it did. Someday maybe I will finish it.

I have gotten real fond of No. 9 lead shot from my local gun shop, and sheet lead from a roofing supply store, held in place with very slightly thinned Elmer's white glue. The glue holds in the lead just fine. Removing the lead is not too difficult in a pan of warm water, and after drying the lead off, it can be re-used. Yes, it isn't as heavy as depleted uranium. I like to double head locomotives, anyway.

Good luck with the Cerro Bend.

Pat Egan

Denny Anspach

01/29/16 #14081

Like others so reporting, I have had a very good experience with silicone motor mounts, in fact all motor replacements that I have done over the past 25 years (I am still working off the same freezer-kept tube of GE clear silicone caulking that I purchased in 1992). I simply create a very simple new sheet brass motor mount, sometimes no more than a cm. wide, secure the new mount to the locomotive, most often with the OEM screws, set the new can motor on the mount on a line of caulking, align the motor (preferably with drive line in place), adjust to order and to eye and let set overnight. It does not take much caulking at all, and if some squeezes out, I scoop it off with the rounded end of a coffee stirrer. If I remove the motor, I simply unscrew the mount. None have failed, none, and in the few instances where I have had to replace or remove the motors from the mounts, I have been able -with some effort, admittedly- to cleanly peel the caulk off the motor.

In this age where quiet operation becomes less of a luxury and more of an imperative, the quiet operation afforded by this cushion of silicone under the motors has been a godsend.

The Silastic fuel-tubing that we currently use for coupling does not take the set the old Neoprene did, and it surely can work well in so many instances. However, I have heeded Ken Clark’s warning that when the unsupported tubing also has to serve as a torque arm, it also defacto robs a lot of power, and high lights all of the noises emanating from motor and gear box end play. So, when possible and/or important to do so, I am also now adding torque support as well when I can do so.

Over the years, I have also used the ball-bearing or drive-shaft-section in the tubing trick, beginning back in the ‘60s; but IMHO to little noticeable effect, except at times to actually add non-concentricity -increasing drive shaft noise and vibration (visualize a snake after swallowing a rat).

One of the most vexing but most important problems that I face in addressing these issues are the torque

arms, i.e. holding the gear box and motor in a steady relationship, the only motion allowed being some single plane vertical gear box flexibility. Traditional soldering gear box keepers has its own problems, some aesthetic, some impossible without severe collateral structural/paint damage, and some not allowing adjustments to accommodate box replacement, etc. The ideal (for me) is to have an actual armature bridging motor and gear box. This latter is commonly easier said than done because of the absolute

difficulties in securing the arm a) to the motor; and b) to the gear box sufficiently to withstand the torque efforts (more than you might imagine!) and to not transmit sound in the process.

Most gear boxes do not have enough meat to tap and drill new holes in places, or to use screws already in place, or where there are no clearance problems. NWSL's current efforts to address this issue are noted.

Some motors have accessible unused mount holes for torque arm fastening, but most of the time they are not in usable locations, or they have none.

These torque arms have an added increasingly valuable role to play as we move steadily into a new world of DCC sound made up of tiny speakers and ever-smaller decoders, both together, along with all the wires, now being preferably installed within the locomotive alone. Keeping the wires out of the driveline becomes a frontline issue, and the torque arm serves this purpose very well indeed.

Denny (Anspach)

To: Manfred (Lorenz)
Seems to me that many years ago there was a model locomotive traction study that seemed to indicate that a big adhesion factor in our models was the "bite" of flanges on curves. Unlike the prototype, where curvature of the track reduces rated tractive effort much like a grade; with our sharper than prototype curves, our models actually pull more on curves than on straight track. Increasing the number of flanges actually increases the model tractive effort in curves. I did observe when operating on a club layout with many curves (nice 48" radius) and a constant 2% grade, that many steam engines (and those other kinds, too) would pull a train thru a curve and then lose traction and start slipping when the engine was on a straight track, but the train was still in a curve. The engines would appear to lose traction coming out of the curve. The one loop in particular I remember well was single track at each end with a passing siding on the curve. The siding was long enough for an eighteen car full length passenger train with double headed steam engines. The test was would the engines be able to keep pulling the train when they emerged past the siding on a straight stretch. As more cars entered the tangent track the engines struggled less. Sometimes you could coax a struggling engine, slipping drivers, until a few cars would enter onto the straight track and the train would 'grab and go'. In any event, our very sharp curves should have an effect on pulling power like doubling the slope of our grades, and it just doesn't happen like it does on the prototype.

Ken Clark

in the "smoky" far south and west

Re: Super Power river quartering follies.

 Ken Clark

02/15/12 #8793

Alan,
There is probably not a best answer on OEM springs. I have a KTM Mikado that after adding weight compresses the working springs. The same springs in a KTM Mallet do not compress at all. I use lighter springs on center drivers. Sometimes OEM springs on the end drivers work well, other times they need to be replaced. Most OEM springs are much stiffer than any of the NWSL springs. In some cases when the center drivers have lighter springs, the OEM springs on the outside drivers actually compress and the model no longer has a rigid frame. That is the goal. The typical problem is that the center axle (typically with a gearbox) doesn't compress and will lift other drivers off the rail. On models negotiating vertical curves, retaining wheel contact at the top of a grade, when the full train is still on the grade, is the important goal. It is a compromise, and in a vertical curve at the bottom of a grade the resulting loss of full wheel contact isn't a problem. As for the car analogy restated, each axle should have the same springs/shocks/equalization (except maybe in NASCAR), but those same springs/shocks/equalization will be different on another axle. The typical OEM stiff springs on all axles in our models is a less than optimum solution and a good model tune-up should include adjusting springs so that they are slightly compressed at rest. Each time weight is added or removed, the springs should be examined and adjusted if necessary.

Ken,
Are you saying that the outside drivers should retain original heavy springs(making these drivers rigid) and only the inner drivers have light springs or the outer drivers should have lighter springs allowing some movement and inner springs lighter still,especially geared(even lighter spring here?)I had planned to put the light .008 springs on all drivers providing drivers don't bottom out with loco weight that is.I will make sure that lead and trailing trucks are sprung light enough and have cearance to prevent them from lifting weight from drivers,I ran across a brass loco that had an intermittent short on right curves fellow club member could not find I took a look at it for him,it turned out there was no short rather driver was being lifted off rails losing electrical pickup to rails due to pilot screw being too long with overly strong spring holding pilot wheel against screw head lifting drivers,it took awhile to find and repair the non-existent short. As for the analogy I'm a journeyman mechanic with suspension and evolution of experience on vehicles ranging from 1937 to present,shocks should be changed on both sides of axle regardless of suspension type at same time for proper weight distribution which is what my analogy and you are referring to.
Thanks,
Alan

02/12/12 #8779

Denny Anspach
While I work out the details of a new motor and drive on my Ken Kidder KTM LS&MS 4-6-0, I will mention my adventures with re-quartering the drivers. As a background note, I have removed, replaced, and re-quartered locomotive drivers for about 30 years- not a great many over that period, but enough to only get in trouble once in a while. My tools over those years have been NWSL's original Quarterer (no Roman numeral I or II) of the '70s, and the Autoquarterer, a gorgeously-machined near-Rube Goldberg brass tour de force with seven pages of instructions from the '80s (by the time I get that latter set up, I will have already grabbed the handy-dandy NWSL tool, quartered all the drivers, and put the tool back in its box).

I am now and have been a subscriber to Ken Clark's feeling that most locomotives drivers, once removed, do not need re-quartering, but retain sufficient "memory" that, given half a chance, when pressed back on their axles, they will seek the exact same position as they held originally. Once in awhile they will not, and although sometimes the day can be saved with feeler gauges, that is also when one is most likely to require a quartering tool to perform the required re-quartering of all drivers.

All the driving wheels on this locomotive were felt to out of quarter to some extent, enough to cause a definitely visible and audible "hitch" that hampered performance significantly. . One wheel was noticeably crooked, which did not help.

All the rod screws -including the main rods- had the dread 16-W Whitworth thread, of which I know no current source of replacement- anywhere (unless something has changed in the past year or so. Each screw was guarded and secured as a family jewel -on draft tape- and placed in a plastic bag. Fortunately, all of the NWSL quartering tools includes locating pins with the 16-W threads.

The amount of "out of quarter" of each driver was small, but definite, each slightly different. Gauge was under. When each non-insulated driving wheel was removed -not easy- noted was that each axle end was seen to have been prominently and purposefully "upset" ex factory so as to secure the driver firmly in place. Well, this distortion of the steel axle ends caused a mirrored distortion to the shape of the bore through the hub of cast alloy drivers, and because the change required to correct was small, this absolutely prevented the drivers from being remounted into anything except their original position.

In an attempt to restore a concentric bore, I precision hand-reamed the 3mm hub of the removed driver (it removed a lot of material), and also lightly turned the axle with a file to take the tops off the upset marks- all to no avail. Both axle and bore were still so distorted that I simply could not force the driving wheel back on in its new position. So, judging that it would be the easiest route, I discarded the old axle, cut a new axle, and then simply press-fit-mounted both drivers on the smooth ends of this new axle, now fully quartered.
IIt worked. Although the wheel seemed now securely square in place, I added some ACC.

It was pure music to my ears and mind that when I reassembled the wheels and rods, for the first time this graceful assemblage of Georgian-like rods and great spindly drivers turned and rolled silently, smoothly, without hitch or click.

Denny

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Ken Clark and others have urged the use of Hobbytown universals for some time, one of the attributes of which is claimed that they are much more quiet than the NWSL universals that we more commonly use (and have been more commonly available).

As I mentioned this past week, I intended to use Hobbytown universals (for the first time) on my next driveline replacement, and I have. My initial reaction is that they may indeed be significantly quiet than the NWSL universals- , both subjectively alone and in caparison with my last locomotive install with NWSL universals earlier in the week :-).

The two locomotives were similar: the first was a PFM Milwaukee Baltic 4-6-4 of 1968, and the second was a NWSL Fujiyama Milwaukee S2 4-8-4 of 1967. Both had similar drives, and identical 1:27 very tight good quality Zamac gear boxes also identical to those currently yet listed in the PSC catalog. Both underwent driveline and can motor replacements- the former with a 16M NWSL 2032 motor, and the latter with a 11M Sagami 2036 motor.

As you recall, it took me several runs at it to reduce the noise in my NWSL driveline, and I did succeed to a point- but not to my satisfaction- thus the try with the Hobbytown universals on the 4-8-4. I note that with Hobbytown universal ball has a net fit within a slightly hollowed-out portion of the cup, which allows the ball to be captured by the cup. The ball can then neither bottom out (at all), nor come out of the cup not without some difficulty. Of the two balls on any dog-bone or cardan shaft, one ball has only a slip fit for the shaft- thus allowing longitudinal movement. In any universal of this construction, no two unworn parts are able to clatter- thus the quiet operation.

Torque arms: I have used varieties of torque arms for some years, but for the first time I tried Mark Shutzer's top-mounted arm reaching from the top of the gearbox to the top of the motor. This design has attracted me for some time for a variety of reasons, but principally because of its potential for also serving as a scaffold for mounting a decoder, and keeping wiring from the harness and lighting out of the driveline. My quick take is that I like the concept, and I intend to do more of them. However, as is usual in any project where alterations are being made in a machine that was not designed originally for them, I ran into some unexpected issues that may be of note.

Fastening the arm (a flat piece of .016" brass .250 wide) to the gear box was not easy. While the replacement acetal NWSL gear boxes have enough meat on their tops to easily handle a drill and tap (1.4 mm or 00-90), a significant number of the OEM Zamac boxes do not. I had to loop the arm over to the lower front of the box to find enough thickness- and then I had to dodge the existing fastenings holding the box and its lid together. Then, the applied screw head would not clear the frame without some vigorous filing.

This model of single shaft Sagami motor had only a single mounting screw hole on the opposite end, requiring the arm to reach all the way to the back of the motor. I fastened it with a 2mm screw and fibre washer and tested the mechanism. It worked fine, but I felt that the arm was transmitting too much vibration from the motor, and vibration (to me) means noise. After some rumination, I soundproofed the connection by slicing off a thin piece (c. 2-3 mm) of silicone rubber (silastic) R/C fueling tubing that had an ID just larger than the 2mm screw. I then reamed out the hole in the torque arm just large enough to be a "squeeze fit" for the tubing, and I squeezed this silicone rubber "washer" into the hole, slipped the 2 mm screw through the center and fastened the arm down again to the motor. I tightened the screw just enough that the washer mushroomed both above and below the arm- thus completely isolating the motor (the motor is in a bed of clear GE Silicone caulking). I tested it again, and the difference in reduced vibrations/sound was striking to say the very least.
Now, we will see how this stands up in prolonged use.

This type of top arm also reduces the available space between the top of the motor and top of the boiler/firebox- the place that I count on for decoder placement.

I fabricate a very similar motor mount to that depicted by Mark Shutzer at his excellent web site, but mine

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I fabricate a very similar motor mount to that depicted by Mark Shutzer at his excellent web site, but mine, in its lack of elegance, is also somewhat lower- thus allowing slightly more head room to accommodate to this change. During one of my tests, however, I managed to trap/impale a lighting resistor between the decoder and boiler top. The resistor heated up and burned through the decoder wrap creating a lot of bad smells, a hot spot on the boiler, and a lot of bad language. Fortunately, I had another decoder in the wings.

My take is that the drive line and motor noises that we have tolerated and thought normal for so long, are not so well tolerated any more. The change is that we now have SOUND, and we cannot have sound if it is being drowned out by machinery clatter. This is challenge for all of us who are trying to ever improve the operations of our old and valued equipment.

Pretty challenging and interesting work!

Denny (Anspach)

In a message dated 4/1/2007 9:36:40 P.M. Pacific Daylight Time,
danspach@... writes:

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From Ken Clark to Denny Anspach
Denny, something sounds wrong here. On all the Sagami single end motors I have used, the end mounts are on the single end side, the far end is the insulated cap and it is not the best location for a mounting screw. Personally I never use the end screw mounting holes as motor mounts, using them tend to be very noisy. I attach the motor at the bottom of the can, either with mounting screws or epoxy. I have done upside down mounts (from the top) rarely, but now just fabricate a bottom mount. These were in a variety of HOn3 engines where the original large open frame motor necessitated removal of most of the frame underneath the new motor. Most of the failed top mounted motor installations I have repaired used silicon sealer. Generally a pain to get all that goop out of the way to solder in a proper mount. By the way when I use epoxy, I use it to bond the motor to a flat piece of brass that is then attached with screws to the frame. I've done the same with silicone sealer, but it is way too slow by comparison to five minute epoxy and much messier and not nearly as strong as cast metal gearboxes like the KTM are by far the easiest to attach a torque arm. It is fairly easily done without drilling and tapping new holes in the gearbox, all that is needed is longer screws to assemble the gearbox and solder. I place small pieces of K&S angle on the end of the gearbox where the motor mount is to be attached. I then drill holes in the brass angle matching the holes assembling the gearbox. I then run screws into these holes thru the angle into the gearbox. The original screws are not long enough and have to be replaced. This provides a nice brass end to the gearbox to which I solder a torque arm from the motor. I use resistance soldering tools and have been always able to solder on the torque arm to the assembled gearbox without damaging the gears inside.

In my experience end mounted motors, while common on Korean imports, tend to vibrate, loosen and become noisy over time. A secure bottom mount replacement it typically the best and easiest quieting method in such cases.

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From Denny Anspach to Ken Clark
Ken, you are both right and wrong, and my wording was not clear. The single (yes- "1") mounting screw hole is on the rear top-side of the can adjacent to the brushes of this Sagami 2037 single shaft motor (the shaft projects from the non-brush end). There are no mounting holes on the brush cap itself.

I have two of these motors in service- NWSL #920370-9- and they seem to serve quite well.

With deep respect for your own adverse experience with silicone caulking motor mounting, that has not been my experience at all- but then I only deal with my own work :-); and I am careful in handling my locomotives (but truly no more than most others, I would believe). IMHO, these motors will not commonly undergo truly stressful events sufficient to hazard their mounts. I first did this in about 1997 or 8, and not once yet has any motor come loose.

Before applying the caulk, to eliminate any possibility of oil (or paint, for the matter) I first cleanse the motor case and the mount thoroughly with either 90% alcohol or lacquer thinner, wiping them clean with a second cloth or tissue. The great advantage to the clear silicone caulk is that it apparently cures to a form of silicone rubber (silastic)- providing a reliable great bed of resilient sound deadening between motor and frame. Motors are relatively easy to remove from the caulking bed, and peeling away the caulking can be a bit time consuming- but always successful.

My mounts are very simple pieces of .016" brass bent ad hoc into a cradle. I then fabricate and solder to this the simplest possible added piece(s) so that I can then fasten the bed securely to the locomotive frame with the original screw mount (commonly 4-40).

Unlike epoxy, which is a true adhesive, the clear silicone caulk is *not*, however- a cautionary note for those who have been routinely using it for other modeling chores- i.e. "cementing" heavy weights into their soon-to-be-sealed fine freight and passenger cars (read the label- it will not even hold paint!). However, we handle our rolling stock a lot more cavalierly than we do our locomotives, and I always have figured that the caulk succeeds in hanging on to the motor case simply by its outstanding ability prior to cure to sneak into every single possible microscopic nook and cranny on the apposing metal surfaces sufficient that the accumulated total of weak mechanical holds adds up to something sufficient to actually hold it all together.

I am a great respecter of epoxy as a true world class adhesive (I have used gallons of different varieties over the past 30 years in restoring antique wood boats and railroad motor cars), but it too has limitations that can be very cautionary to the modeler: There is not a solvent alive available to just about any of us that will dissolve cured epoxy, leaving only mechanical means for removal. It is tough and resilient, but not enough for any sound deadening function (IMHO). I have used the 5 minute variety of epoxy as my modeling choice for some time, but I recently have all but stopped. It is relatively weak (I have had a surprising number of joint failures), and I also have found on occasion that the joint has "crystallized" (for lack of a better term)- also resulting in failure.

Unfortunately, strong epoxies take time to cure, and- there is no free lunch!

Denny (Anspach)

JOHN MARSHALL

12/03/15 #13908

Back when I was working in aerospace at Systron Donner we were building small rate gyros for military aircraft. While going thru some old documents from 1987-86 to throw out I came upon my notes about DC motors. Back then the Air Force and Navy wanted us to make the smallest possible rate gyros and a great amount of money and time were spent on the project. The result was a tiny open frame motor 1" long and ¼"wide and about 5/16" tall. Our spec for motors required operation of 12,000 RPM on 3VDC with a life of 8-10 years. The motor looked like a miniature Pittman DC60 and It used a permanent magnet.

Our previous motors were a bit smaller than the DC60 but were only required to run at 9,000 RPM built for us by Pittman. Most of the time we got motors that just barely met the spec. The magnets that Pittman was using were an Alnico 5 grade. We finally convinced them to use an Alnico 7 grade material and with higher grade magnet we consistently hot 9,000+.

The manufacturer [I suspect it was Pittman] of the micro motor used an Alnico 9 material magnet. With that magnet we almost hit the 11,000 spec. Apparently there was too much drag on the rotating armature. One day when reviewing this with the engineers on the project one of then mentioned that brush drag might be the culprit. He and I went out to the test area and he cut a piece 38AWG Teflon wire and stripped the insulation. He then cut piece a little bit longer than the brush holder and slipped them over the spring contact and under the brush holder. We then tested the motor and it ran at 13,000 RPM! The test data for the motor when we received it showed repeated runs at 10,500+. We did the same for about 6 more motors and RPM's increased on all of them was 13,500+. And reduced stall characteristics as well.

We also tested this approach on the larger motors in stock and they all went up to 11,000 RPM. We decided to do this fix on our standard motors and sell the larger unit to the commercial air frame builders. I ordered 10,000 micro spacers made from 1/16th inch Teflon rod material. The bore hole was under 1/64". I also purchased a much smaller tube for the miniature motor to fit over the #30 wire of that brush holder. The miniature unit was restricted to only military applications. I still have a small quantity of the ones used the larger motor and have used them with Pittman DC60 I was installing decoders. It worked, Old Pittman and Varney motors ran better and faster. Some KTM Japanese motors did too.

I checked this out a few years back and found that the stall amps were generally within the 1.5 specified by Digitrax. I also recharged the magnets by putting a Neodymium magnet above and below om the steel frames over the Alnico magnet and ran the motor for about twenty minutes and everything was even better. The old magnets held the recharge. By now I am sure that Neodymium magnets to fit between the motor plate are even available.
John

 Ken Clark

03/14/09 #5574

Len,

Sorry to be late to this discussion. If I have room to install an idler gearbox and the axle gear is being changed. I always use an idler gearbox.

I find many advantages to idler gearboxes. First they usually allow closer mounting of the motor to the

gearbox (no frame interference as with worm on axle gear drives), this allows for longer motors or in my case, flywheels. The increased distance (height) between the worm shaft and frame allows for larger, quieter, slower motors in the model.? Finally it is much easier to align an idler gearbox to the motor and maintain alignment; to maintain constant spacing (gearbox to motor) in a sprung model, the gearbox must move parallel to the front of the motor. Most non-idler gearboxes result in motors mounted an an angle (20-30 degrees) to the frame, however the bearing slots in a sprung model are 90 degrees to the frame and the gearbox cannot move parallel to the front of the motor. If you use flexible tubing, the tubing has to bend or put pressure on the bearings in the gearbox and/or motor to move laterally, all this causes noise and wear. On rigid frame models this is not a problem. Putting stiff springs in a sprung model to convert it into a rigid frame model is an option. Finally when I have installed idler gearboxes, the models typically have lower current draw than similar models with non-idler gearboxes. Since I have found that flexible tubing between slightly misaligned shafts can increase current draw 25% compared to a smooth universal drive, this may be due to the alignment problems of non-idler gearboxes. A torque arm motor mount on a non-idler gearbox would be another cure but that is much harder than installing an idler gearbox.

"Gear" noise in our models is from High speed gears, poor gear mesh(or alignment), gear materials, and bad bearings. In an idler gearbox there is one high speed gear, the worm; the same is true for non-idler gearboxes. Some worm/worm gear non-idler 'gearboxes' do not have hearings on both end of the worm which frequently results in poor gear mesh(or alignment) and bearing wear (and noise). Many PFM models used fiber gears that frankly are noisy. Many of these models run very smoothly, changing gearboxes in these models does not improve operation, but can quiet the models. Most idler gearboxes are fully enclosed. Fully enclosed gearboxes are typically quieter than open gearboxes, using an open axle gear cover (in place of a closed one) can make any gearbox noisier. But it is necessary when clearances due to small driver size require it.

Kenneth R. Clark
P.O. Box 127054
San Diego, CA 92112

NIGELMISSO

01/25/19 #19510

Good catch Ken (Clark)

> I tested with MRC Tech II Loco Motion 2500 which was apparently causing the noise; but oddly it was always in one specific direction of motor rotation. Reversing polarity, exchanging terminals on power pack, and reversing loco on test track made no difference. Could it be generating some sort of pulse power?
>
> I just now hooked up 9V battery directly to the motor pick ups and got smooth running in both directions with no appreciable motor noise in either direction, even with complete drive mechanism installed. I have to dig out my meter to do a bit more testing using pure DC, but I'm encouraged. I may be good to go with installing DCC & sound. (Tsunami II in this case).
>
> Best Regards
>
> Dave Spritke

"I’m not familar with the moisture properties of moden “engineering” plastics."

I am familiar with current engineering plastic molding process, designing tooling and parts for use with "modern" engineering plastics. It is one of the things I do for a living.

It doesn't matter if the plastic absorbs water or not, there will be a moisture layer on the surface of the pellets that needs to be removed by drying. Heat and/or desiccants are used for drying the pellets before they go into the molding machine. The resin manufacturer provided detailed process recommendations for each of their products.

If the moisture layer is not removed, the water gets thoroughly mixed in the plastic resin in the barrel, then when the part is ejected from the mold, the steam escapes thru the part, leaving microscopic voids and channels throughout. This greatly weakens the part, and makes it less ductile.

Like any every business, molders try to save money be cheating on the processes. Sometimes they are caught-like the early P2K gears, sometimes not. A strong SQE team will make sure that there are controls in place, but a small business such as Life Like or Walthers have a hard time paying for a strong SQE team with plastics knowledge. There are many companies that purchase plastic parts that have no knowledge or understanding of what it takes to make a good part. And many molders don't help them.

Plasticizers have nothing to do with the gear cracking issue-and generally not used with POM or PA. PVC is the only plastic that almost always has added plasticizers.

Nigel Misso

From: RepowerAndRegear@groups.io [mailto:RepowerAndRegear@groups.io] **On Behalf Of** ronhigh44@...
Sent: Friday, January 25, 2019 8:28 AM
To: RepowerAndRegear@groups.io
Subject: [RepowerAndRegear] The old Proto gear problem more discussion?

I know this is an old topic ,however I would like to add a little more on what I have found .I have done this on 20 or more 4 axle diesels both Proto models and Athearn RS-3s Sometimes it is easy enough to see the crack and sometimes not. If you can easily spin the wheels in the axle it is a problem. A couple of times in the process I mixed up old and new and had to sort them out. After this momentary mix up, I decided that the best way to keep them straight is to use a pair of pliers to crush the bad axle gears. I have found that the old bad gears disintegrate easily with only a little pressure. A new gear has a lot of give and bends and distorts. Don't ask how I know. This brings up a question about the quality of the plastic used on the bad gears it would seem to me that it is less shrinking plastic and more about poor plastic quality. In the end it makes no difference. As a practice you should replace all the gears and crush the old gears as you remove them. Any thoughts on this?
Ron High

Philip Floyd

05/03/19 #20096

Hi Chris,

There have been a number of suggestions so far which 'can work'. Here are a couple more ideas which I use regularly to solve this particular problem.

The first is to 'ID' the short zone if possible. Then I look for metal filings, flakes, any signs of Neo-lube usage and anything that does not look normal. Depending on what you find or don't find will suggest various remedies. At this point I always go to an ultrasonic cleaner with a good cleaning solution in it and

clean the axle/wheels for upwards of 2-3 cycles of 3 minutes each. Let the wheels dry for at least a few hours. I put mine in a paint booth for an hour or so. That way I know that there is absolutely no water between the tire and wheel interface. If there is dampness between the two a short may occur leading you to believe (incorrectly) that the short has not been removed.

The reason you do this is that all wheel insulation is not the same. Some is solid plastic, myriads of Delrin combinations, tapes of various makings some plasticized and some not, paper and other cellulose based products and more. Basically, some are water/solvent proof and others aren't so some techniques work better on some insulations than others. Many times the ultrasonic cleaner alone will 'repair' the short.

If I decide that the tire comes off the wheel... off goes the tire. The wheel and tire surfaces are then closely inspected under magnification for any deformities such as metal slivers, dents etc. All is cleaned in the ultrasonic cleaner and rinsed in distilled water. Once dry, the entire wheel edge which mates with the tire is coated with a thin coat of regular 'Gorilla Glue'. The tire is then slipped on and the two are then positioned on the outer edge of the wheel/tire combination. The axle will protrude into a hole in the support surface. The reason 'Gorilla Glue' is used is that it expands around the wheel pushing outward equally in all directions. It is the easiest and quickest way to self center the wheel to the tire permanently. Once cured, any extruded glue can be easily cleaned up and removed. 'Gorilla Glue is not conductive, that is one reason why it works so well here. Do not use 'Gorilla Glue' on an axle/wheel/tire interface which is conductive for the obvious reason. Use instead a conductive type epoxy or such. Hope this helps a bit... take care and be well!

Ken Robbins

02/13/12 #8782

I thoroughly enjoyed your quartering story, Denny. I've been through similar experiences myself over the years. While I've always eventually managed to find ways to reassemble the drivers back in quarter, there is one other thing that frustrates me to no end when I run up against it. That is: crankpin threads that are either crooked (not perpendicular to the driver face) or that are at varying distances from the axle hole. This little gremlin becomes apparent when you have the drivers remounted in perfect quarter and yet there is still a hitch or binding when the rods are attached. It seems to be the result of sloppy fixturing during the manufacturing of the drivers.

For me, the simplest remedy has been to enlarge the offending crankpin hole in the side rod, which in itself can be a challenge to pinpoint, but open it too much and you end up with a chassis that has a lurching gait.

Ideally, one would first determine the exact crankpin radius to match the rest of the drivers, then drill out the offending thread and solder in a bushing, followed by drilling and tapping a new hole at precisely the correct distance. This is something I've never attempted, especially with old Zamac drivers. I usually just try to locate a replacement driver and hope for the best!

I wonder if others on this list have run across this crankpin problem while fine-tuning their steam locomotives.

Ken Robbins
Hancock, NH


Ken Clark

02/14/12 #8785

Ken,
I've repaired a few models where the misaligned crankpin broke the driver hub threaded hole. I used J B Weld and some brass tubing to repair the damage with excellent results.
Kenneth R. Clark

In a message dated Sat, 24 Aug 2002 7:40:03 AM Eastern Standard Time, dougcoffey1950@... writes:

After tearing all my "state of the art" work apart, I shortened my flywheel/couplers up so I could use the horned ball type universal drives.Voila.....smooth creepy slow speed running.

With NWSL making flywheels with a recess at one end, about half the length of the Hobbytown "SHORT" universal drive fits in the recess, so the overall length is not great. I have never said that Hobbytown Universals are perfect, concentric, etc... What I meant to emphasize is that when installed they are as quiet and smooth as anything I have seen or tested in these models and in most instances I can't justify using other drives. It is very easy to make an acceptable 2mm-2.4mm bushing using 3/32nd K&S tubing and a NWSL 2mm hand reamer. using the hand reamer all my bushings have been better than the ones NWSL formerly produced and this allows me to use the Hobbytown universals on 2mm shafts; it is worth the effort.

Ken Clark

To: Ken (Starr) and Doug (Coffey)

A lazy alternative to reaming 3/32 brass tubing, is to just simply buy the bushings from Hobbytown, and/or NWSL. Works great! Inexpensive! Just buy a bunch and stock them.

Bill Flood
Milwaukee and Monon in the basement

 SP4149

04/23/18 #18248

Ken Starr

That is why I use the gearbox brackets to prevent the gearbox trying to rotate with the axle. The smoothest universal sets allow limited freedom of motion in all three axes. Having both the motor and gearbox fixed allows the smoothest operations. Last year I had a major fail where the PFM motor bracket allowed the motor to rotate and jam the universal set. Maintaining a relative constant distance between motor and gearbox prevents such bindng, the gearbox brackets do that very well.

Ken Clark : **www.shastasprings.com**

mechanical solutions to mechanical problems/electrical solutions to electrical problems

All

I have used Ken's bracket method several times with good results and is especially useful when there is limited space to work with.
Personally I prefer the full torque arm method when there is space. To me it's easier to keep everything aligned.
It also seems in the case of your project it may be an easier way to reduce/eliminate the "End load" effects as the motor and gear box are essentially "locked" together.
Just my 2 cents...FWIW.

Pete (Suhmann)

Rod,
Many of the early gearboxes were nothing more than two pairs of brass sheets soldered together in a jig. Holes were drilled for idler shafts, axle shafts, and in the end sheets the worm shaft. Most of the time the high speed worm shaft got separate bearings that were inserted in oversize holes and soldered into place. The die cast gearboxes like those from KTM improved both the quality of the gearbox and the speed of it's assembly and provided some standardization. The early Samhongsa idler gearboxes were a somewhat inferior copy of the KTM gearbox, gears appear interchangeable but the real problem was the quality of the die cast gearbox itself although the use of the plastic gear on the driver axle was more failure-prone than the brass axle gears used by KTM. For some reason the Koreans seem to prefer putting nylon or engineering plastic gears on the driver axle: NWSL has offered many replacement gears to correct the tendency of these gears to split. I've never had a brass gear split, but even if it slips on the axle I can still solder it to the axle and not have to pull the driver apart to install a new gear.

...in the far south and west...
.....Ken Clark ...…

Denny Anspach

07/04/18 #18571

My experience: There is no solution short of complete new drive replacement. The exposed gears are inherently noisy, not helped by lapping, high-grade gear replacement, plastic gears-molded or machined-

etc. Even replacement of gear shafting and bearings with new high grade precision materials, ditto.

Now, noise for some is a relative thing, i.e. gear splitting, irritating, annoying, "white noise", or faux "diesel sound" for a lost of modelers. For me, gear sounds competing with, drowning out, or simply interfering with the sounds of a chosen DCC sound decoder is enough to retire the locomotive for a better day. Yet others enjoy the gear noise as-is as audible evidence that the locomotive is indeed doing its thing.

I do recall well Raoul Martin at NWSL (Seattle) some years ago telling me directly that it was a fool's errand to attempt to silence the open geared drives (this told while I was competing the purchase of >$100 worth of replacement gears, etc. In this same fruitless pursuit. He was right (and $100 richer) and I was wrong (and paid $100 for the privilege).

Denny (Anspach)

 Daniel A. Mitchell

07/05/18 #18583

Agree. Some brass models do have enclosed gear cases made from Zamac or other “pot-metal”. They do run quieter, but still growl. I have made machined brass gear cases, and they do help … but only slightly! Simple sheet metal or plastic cases either do nothing or resonate (bad!). However, such simple cases do help keep lubricant from flying all over inside the shell, so are probably desirable if they DON’T resonate.

And I do run my brass models, often for many hours at a time, on our local group’s (MMRHS) display layout. I have brass (and other) models with hundreds of hours of operation on them. I have yet to wear one out, though minor repairs are common. Aside from split plastic gears all have their original gearing, except for a few I’ve replaced the entire drive-line on, … like the big Lima center cab I mentioned earlier in this thread.

My next such project will be replacing most of the chassis on an Alco “Jawn Henry”. The problem here is that they only "drove” one truck in each span-bolster (typical spur-gear-tower). The other truck was connected to the worm-gear shaft in the driven truck by a stupid spring “u-joint” since there was no space for any other type flex-coupling between the trucks. It does NOT work. It is not sufficiently compliant to allow the loco to traverse a #6 switch, yet is so feeble that any torque build-up (like trying to pull even a short train) causes the spring to either unwind or twist into a knot. Truly awful (one of only two brass locos I’ve purchased that simply do NOT run!) ! I intend to use the same ‘fix” I used on the Lima, with Bowser trucks (nearly correct... just need to move the brake cylinders). Unfortunately I’ll need to make a new loco frame and two new span bolsters to do this. FUN!

Dan Mitchell
Denny,
I recall in the late '70s early 80's some importers experimented with stainless steel alloys. I had a SP AC-7 that reportedly had SS tires and it was extremely slippery, and I worked on a couple of WM 4-6-6-4s that couldn't pull themselves up a 2% grade, even with weight added. Unfortunately there are several SS alloys, NWSL may have chosen better than the builders of 40 years ago. Other scales have successfully used mild steel for wheels, maybe we don't treat our HO models with enough care compared to modelers in other scales.

Ken Clark

Denny Anspach

08/03/19 #20650

The deteriorating foam can and will commonly eat directly in to the paint, and in this regard, carefully brushing off the foam, and then with soap and water or previously tested-alcohol can be attempted to minimize the damage (none done without faint heart). The use of bubble wrap has also been cautioned because of a ubiquitous coating that will commonly imprint on the paint.

Basically, to be safe, wrap any of brass in clear plastic over tissue. To be really safe, wrap them in Tyvek archival paper (the routine that California State Railroad Museum does with its massive brass collection).

Denny S. Anspach, MD
Sacramento, CA 95864

 SP4149

08/03/19 #20651

At a minimum, I use Zip Lok Gallon size freezer bags opened into a long sheet, as items for food storage are required to have less remaining solvents (the problem with bubble wrap) after production. Tyvek paper is also used by USPS for some of their large Priority Mailing envelopes, and by modelers requiring working hinges.

Ken Clark

continued….

Re: Electrical Pickup on 0-4-0 Steam Switchers...?

 SP4149

Ken Clark 07/25/19 #20540

Another suggestion that worked for me in the past:

It was a very small HOn3 side rod 0-4-0 diesel that nosed, wobbled badly. It had a very poor running vertical motor/ worm to worm gear mechanism. I went whole hog and replaced the entire mechanism with a cast gearbox connected by a solid shaft to an auxiliary gearbox. The end result was that all axles were geared and the siderods no longer transmitted power, creating a hitch in the mechanism. Even though the drivers were very small (33") compared to most model 0-4-0s, the elimination of the siderods in the power train, greatly reduced the nosing, wobble in the loco.

FWIW The smaller the loco the more important that the drivers are 'square' to the axles This effects tracking as well as introducing a siderod 'hitch'

Ken Clark

In a message dated 12/22/2005 12:25:28 PM Central Standard Time, danspach@... writes:

Ken Clark's use of two sided PCB tie segments as anchors for phosphor bronze wire wipers really works, and works well. My method only differs from his in that I more commonly use epoxy or ACC to fasten the PCB rather than solder.

I also use the Grandt Line pickups #7005 to create both R & L electrical pickup on steam locomotives. They very handy, and they can commonly be fastened rapidly in place just using the one or more of the retention screws already holding in place the plate on the bottom of our brass locomotives. From there it is simply a matter of bending and trimming the phosphor bronze whiskers to measure so that they reliably ride on the insulated wheel tires.

Just keep in mind that the pickups are there to efficiently transmit current, not act as brake shoes!

Denny (Anspach)

To Denny Anspach

Since I have re-motored my models they don't get as dirty they did with open frame motors (due to the greatly reduced current draw). I don't run pickup wipers on the wheel tread or the railhead surface if I can avoid them. Instead I run the wiper on the back side of the flanges. I find wipers on wheel tread get quickly dirty, much faster than the wheels on the non-insulated side. Also I find it much easier to clean just wheel treads, than wipers on wheel treads, and wipers are better hidden on the inside.

Ken Clark

Hi Ken (Clark):

Thanks for that. Looked at your article and saved it with diagrams for later reference.

I like the idea of off loading the deflection force on the motor bearings (plain bearings-bushings really?) that the typical worm on motor shaft angled to spur gear on axle often creates. You must hate the idea of a "Wormfly" I'm sure you can deduce that w/o description.....

I'm a novice in gearing, but have some basic machine shop experience. I own a couple of Unimats and look forward to learning gear cutting. :)

-Gareth

Ken Clark to Gareth:

> Gareth,
> My comment was meant to be 'Use a universal drive to connect the motor to the drive train (gearbox), when installing small diameter motors" Most 2.4mm shaft motors had strong enough bearings to allow direct mounting of gears, etc... Smaller shaft diameter motors with smaller bearings are more delicate. To protect them, install a universal drive between the motor and drive train (gearbox). Sometimes, as in the case of PFM geared engines, this means installing a new bearing in the gearbox so that the motor shaft does not support the upper worm. The universal then connects the motor to the gearbox. I've used this setup with small coreless motors with excellent results. If you notice in my PFM re-motoring guides (http://shastasprings.com/), a good sized flywheel can be supported by the gearbox drive shaft; a flywheel that would overload a small coreless motor's bearings.
>
> Ken

Re: The Holy Grail: Pursuit of reduced drive line noise.

I have appreciated the recent responses, particularly the opinion that to a great degree, the effort is largely that of art rather than science (sigh!).

This past month, I performed a complete drive train and motor replacement on an Akane USRA Heavy Mikado (NWSL gear box and 2032 motor). The first drive line connection (2.0mm<--> 2.4 mm)was straight. The noise was terrible. I replaced the gearbox drive shaft with a longer shaft and instead used a single cup (gearbox shaft) and a horned ball (motor shaft). Dramatic reduction in sound, sufficient that when I then installed Soundtraxx DSD sound (same project), I now actually became completely unaware altogether of any further motor/driveline sounds. The ordinary sweet noise of clanking of rods, etc. can still be heard, however. Success! (BTW, I used a sound cam on the rear drive wheel axle- the only way to go!).

Pennsylvania1954

Hi Denny (Anspach) —Indeed it is an art form with several successful solutions to the problem. Several years ago, pre-DCC, here in Pensacola two modelers, Bob Box and Ron Strachan, found one path to success in their methods. Both have passed on now, but I know there is at least one other list member who can attest to their craftsmanship. Bob was a UP modeler; his Big Boys, Challengers, and 4-12-2 were so quiet all you could hear was the sound of wheels on the rails. They were amazing. Ron was a transplanted Brit who loved almost anything steam, but most of his engines were PRR. After much trial and error, here is what they came up with. Always using an idler gearbox, their favorites were the metal KTM/Precision Scale gearboxes which have now evolved to PSC #4018 (27:1) and #4018.1 (37:1). Both have 3 mm axle shaft and 2.4 mm drive shaft. Their motor of choice was usually the Sagami 2032, or larger if it would fit, although some Canon motors were used too. They never mounted the motor on the frame. Two mounting methods were used. First was a torque arm attached to the gearbox. (This was one reason for preferring the metal KTM/PSC gearbox over the plastic NWSL.) The motor was firmly attached to the torque arm; drive was thru two Hobbytown U-joints, using either the sliding Cardan joint or the "switcher" "dumbbell" pair. At the time NWSL u-joints were not used because of cracking of the balls in t the shaft hole. The second method involved using a long shaft motor, and pressing the worm gear right on the end of the shaft; the torque arm and u-joints were not necessary. In both cases the entire driver/gearbox/motor assembly was completely free to move up, down, and rock. This motion was limited (but not completely constrained) by either a light spring under the torque arm or a coiled wire attached from the long shaft motor to the engine frame; in the latter case this also served to react the motor torque. Flywheels were looked down upon as unnecessary, band aids to mask some drive train or electrical problem. When I came along, I went to school on everything they could teach me. My brass Consolidations, Pacifics, Mikados, Mountains, and Decapods continue to outperform any of the newer offerings. And they do it quietly in both directions.

Steve Hoxie
Pensacola FL

Denny Anspach
I do not hold much respect for the majority of current mass produced HO plastic steam locomotives, but I do respect the general quietness of their drives- some of them seemingly almost silent (to my ears). This just raises the general frustration level as for the most part I fruitlessly pursue the same levels of low noise in the drive lines of my brass locomotives as they arrive on the workbench for motor and drive line upgrades as a part of DCC conversion.

I am very much aware of the general causes of noise, e.g. worm gear end play, shaft misalignment, rubber connectors (esp. neoprene), eccentric components in general, solid motor mounts, and how to reduce or eliminate them, but a general frustration continues: continued noise from the commonly-available universal joints- meaning for me NWSL. I do have a stash of Hobbytown universal parts (cups, and both red and white balls), but the balls will fit only a square cardan shaft- rendering a system of that configuration not usable for me (did Hobbytown make balls for round shafting?). This topic was discussed several years ago, and I am reopening it again in hopes that more wisdom in this regard may have surfaced in the meantime. Are there any demonstrably-better universals newly available (Hobbytown is a non-starter because they are out of business),

Has anyone used either the A-Line or Overland universal sets in a steam locomotive drive (both for 2 mm. shafting, I believe)? For those of you who have been trying the new ball bearing gear boxes, have you noticed any noise reduction from that quarter? Another possible and potential source of noise are torque arms, which effectively provides a solid connection between the motor and the locomotive frame. Over the years, I have usually addressed the gear box torque issues by anchoring the gearbox with a simple piece of bent wire usually fastened to the closest topside frame screw- usually that fastening the valve gear hanger- but recently I have been trying a true torque mount tying the gearbox directly to the motor itself (in an effort to further restrict potential longitudinal

Denny Anspach <danspach@...>

03/28/07 #4244

Well, since my last post to this list, and since reading all of your helpful comments, I have also engaged Raul Martin at NWSL in the conversation. Without any prior reference to either Ken's or Mark's advice to only use a dogbone or cardan shaft between two cups, he also firmly advised this very same route- despite my prior distinctly-bad experience in this regard. - So I did just that with NWSL parts on hand. The resulting shafts alignment was close to perfect and the dogbone did not bottom out in the cups. The operating result: a qualified success. The sound was reduced dramatically, but (BUT) not to the level it should be. For the moment I will probably live with it (grumble).

I compared it (PFM MIlw 4-6-4) to the same locomotive also produced a few years ago by PSC- and the PSC ran away in terms of quiet running. Other performance parameters were comparable, taking into account that the PSC had not yet been DCC converted.

I have re-motored and replaced the drive lines in about ten brass locomotives over the past 8-10 years, and to now, I have not have excessive noise problems with the single universals, and some are downright silent. Presuming it has been luck, I will probably change to the double-cup pattern from here on out. The next locomotive up will get the Hobbytown universals, and I will report further.

Denny
Denny S. Anspach, MD
Sacramento

Victor Bitleris

03/29/07 #4250

Hi Denny,
I sincerely hope you will be able to use the Hobbytown setups. I have used them and love em. The problem is that Hobbytown is out of business and looking for a buyer. I really hope someone does buy them, because they really do have great running gear, especially for the mechanical hackers. But, in the event we do need to use the NWSL dogbones. I noticed that the pins on the balls are aligned in parallel, whereas on Hobbytown stuff, they are perpendicular to each other. The pins being parallel would seem to me that they should be aligned as close as possible as if they were a straight shaft. I also know from experience that if you align the Hobbytown universals like that, they are noisier and have a tendency to bind when flexing or on curves, but when aligned perpendicular to each other they work great. Am I missing something here? Are the two items that different?
Thanks and regards, Vic Bitleris
Raleigh, NC

----Original Message Follows----
From: Denny Anspach <danspach@...>
Reply-To: repowerandregear@...
To: repowerandregear@...
Subject: [repowerandregear] Re: The Holy Grail: Pursuit of reduced drive line noise.
Date: Wed, 28 Mar 2007 18:02:32 -0700

Well, since my last post to this list, and since reading all of your helpful comments, I have also engaged Raul Martin at NWSL in the conversation. Without any prior reference to either Ken's or Mark's advice to only use a dogbone or cardan shaft between two cups, he also firmly advised this very same route- despite my prior distinctly-bad experience in this regard. - So I did just that with NWSL parts on hand. The resulting shafts alignment was close to perfect and the dogbone did not bottom out in the cups. The operating result: a qualified success. The sound was reduced dramatically, but (BUT) not to the level it should be. For the moment I will probably live with it (grumble).

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Denny
--
Denny S. Anspach, MD
Sacramento

continued...

Re: Questions about re-powering a Westside Locomotive

tomfratello @dslextreme.com

Bill,
I re-powered one of these recently. I took a simple approach because I wanted to get it done quickly so I could do a sound installation and get it all done in reasonable amount of time. I replaced the open frame motor with a Sagami 16-30 can motor. The motor was attached to the locomotive frame with a bead of silicone sealant. the motor shaft was aligned vertically and horizontally with the worm shaft. The connection was a straight piece of silicone surgical tubing. My motor had a 2.4mm shaft the same as the worm shaft. You may have to use a 2.0mm to 2.4mm connector if your motor has a 2mm shaft. Once the silicone sealant was allowed to harden overnight, the loco ran smoothly and quietly. This is not the Orthodox way of doing this as it does not use a torque arm and a universal joint. But it worked.
You will have to look at the idea of using a different tender. The 9000 gal. Vanderbilt style tender that came with the loco is not easy to open up and install a sound decoder. I used a 7300 gal Whaleback tender which has a wide flat bottom that holds a sound decoder comfortably. You could also use a 9000 gal. rectangular tender that came from a Pr-1 2-6-2 like the SP did. This can be a whole area of fun research finding photos of a loco that had what you want to model.

Finally, I recommend you get a copy of Ken Clark's re-powering guide. (See previous reply) I got a copy and then went to a clinic that Ken gave at the 1986 NMRA Convention in Eugene Oregon. I have been re-powering and re-gearing and repainting locomotives ever since. I encourage you to try it.

Martin Feldwick

05/19/19 #20144

I always use silicone sealer to stick my motors down, since the 70's .I often make a saddle from black epoxy putty to get the exact location and set up and then after its all dry remove it all and then stick down motor to saddle and saddle to chassis with silicone .It works a treat .So far nothing has ever come adrift in use but if it did I would just stick it all back. I have just dome my tiniest remotor so fa ,on a Roco 0-6-0 h0n30 diesel, using the same method though I had to ream the worm gear out to 1.5 mm for the motor shaft sleeve. The motor is a specially produced coreless. It completely transforms the running from creaky and noisy to smooth and slow.

 peterebherron

05/20/19 #20146

Bill,

Eldon Shirey, the man behind MicroLocoMotion known as “The Motorman” passed away a few months ago. His kids decided not to continue the business and it’s not clear if they are looking for a buyer or not. He was a good guy and I must have bought over 20 high end motors from him over the past 10 years. Motors are available on eBay and other sources but Eldon knew the specs, rpm, amp draw, torque, etc, very helpful as I am in O Scale and want all my motors to draw less than an amp so I can use HO decoders. He will be

missed.

Peter

Locos I re motored video

Terry Humerickhouse

2/06/18 #17441

Locos that i have re motored and installed Wow sound decoders in
https://www.youtube.com/watch?v=SBq9ZcQooyo
Terry
Visit My Web site@ http://conewriversubdivision.yolasite.com/

Gear Box Stabliziers

gary laakso

7/28/18 #18825

At the dawn of Korean brass imports, brass straps were soldered on either side of the gear box to keep it in-place. At about that time, a tip in MR suggested using dense foam strips on either side of the gear box to stabilize it. It was a cheap and I found effective way to improve operation of brass. I followed that up with can motors attached with silicone.

Gary Laakso

Ed Weldon

New research, worth a read Could this explain why the old practice of pin vise hand drilling is aided by beeswax?
https://phys.org/news/2018-07-metal-gummy-sharpie-science.html
I'm thinking copper, zamac and other zinc die casting alloys and possibly stainless steel.
Ed Weldon

Daniel A. Mitchell to Ed Weldon
Possibly, but as I read the article it applies to a thin linear cut peeling a long chip off a flat object. While the geometry of most all cutting tools is the same at the actual point of contact, the macro-geometry of the part being machined varies widely. When drilling the motion is rotary, and confined inside a hole. To make this work in the typical pin-vise (or other) drilling situation you'd need to extends a micro-sharpie down the hole and "mark" the metal just in front of the cutting edges of the drill … good luck with THAT! Each rotation removes the lubricant in front of the next cutting edge. To work in holes you'd need a liquid flood injected down the hole … possible, but really messy with INK. There may be some similarity in the use of beeswax (or commercial machining wax) for this purpose, as the wax is a solid at first, but melts in the hole due to the frictional heat of cutting (yes, even with tiny drills turned by hand, microscopically at the cutting edge).

Dan Mitchell

Pete Suhmann

Beeswax is a "dry" lubricant until friction melts it. Sticky metals get gummy and hang on to mills and drill. The beeswax reduces the ticking. I use wd40 because it is a dissolved wax.

Pete Suhmann

Gerald Eckl
A plain bar of soap worked well for me when drilling cast frames (for example). Have it handy and drill in the soap now and then.

 SP4149

9/28/18 #19068

All,

This is a Hobbytown universal set installed nearly 35 years ago.

The two white end cups at each end are pressed onto 2.4mm (3/32nd") shafts from the motor and/or gearbox. They have slots in them for the pins of the pinned balls. The pinned balls are a snug fit in the end cups (which have a slight recess to hold the pinned balls).

NOTICE that the pinned balls are different colors, this is important. Connecting the pinned balls is a piece of 2.2mm square brass rod.

The **red pinned ball is a PRESS-FIT** onto the square brass shaft. The white pinned balls is a SLIP-FIT on the square shaft. It is important that the end of the square shaft fitting into the white ball be smooth, free of nicks and bumps, to allow the shaft to slip smoothly inside the white ball.

Many similar, but inferior, universals use a fixed length dogbone with pinned balls at each end that fit loosely into slotted cups. This allows the pinned ball ends of the dogbone to rattle inside the cups, generating noise, sometimes excessive depending on the materials.

NOTE: the gearbox is held in alignment by gearbox brackets. The rear one is visible as the brass "L", soldered to the top of the frame against the rear of the gearbox. When painted the gearbox bracket is nearly invisible. I scraped the paint off this bracket so that it would show up better in the photo. These

brackets prevent the gearbox from rotating with the axle rotation but allow the springs in this 3 pound engine to easily move vertically over rough track.

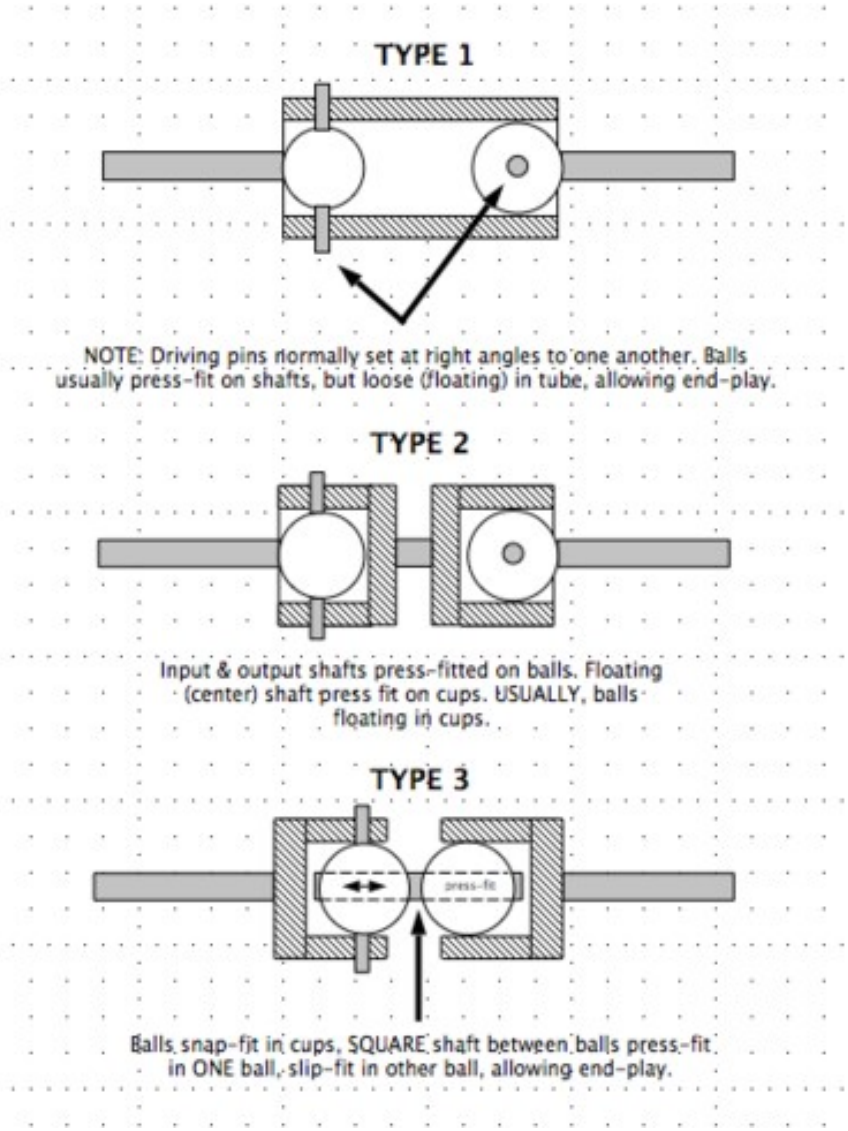
HINT the ends of the 2.2 mm square brass shaft are smooth and chamfered, ready to use in the WHITE SLIP-FIT pinned ball. When I cut the square shaft to length; I cut at the end where the **RED BALL** is a PRESS-FIT

Daniel A. Mitchell

I'll have a "go" at this (see drawing below) …re Universal Joints There are three varieties of Hobbytown (and most other) hobby universal joints. There are also a few other types that are functionally the same (splines, hex, rubber, etc.), but configured differently (fork & yoke, Grant-Line hex, etc.). All U-joint sets **MUST** allow for BOTH angular misalignment AND some longitudinal motion. A single joint allows for ONLY angular misalignment. A suitably coupled pair of joints allows for BOTH types or misalignment. The absolute NEED for a PAIR of joints is what many overlook in designing small power couplings. Generally...**BOTH** basic types start with a "ball" fixed on the inward ends of the two shafts to be connected. We'll call these the "driving" and "driven" balls/shafts. These balls have small pins or horns (2 or 4) extending at right angles to the shafts. Most often these "balls" are held in place by press-fits on the shafts.**TYPE 1** has a hollow tube placed between the balls, and long enough to extend just past the balls at both ends. The outer ends of the tube have slots to engage the pins on the balls. Thus, as the driving ball rotates, the tube is forced to rotate, and this in turn drives the other ball on the driven shaft. The tube needs to be a slip-fit over the balls, but not be loose or vibration will occur. This type universal offers the shortest configuration possible.**TYPE 2** has a (usually) short shaft running between the balls instead of a tube. Each end of this shaft has a hollow "cup" extending over the mating ball. The cup, like the tube (above) has slots to engage the pins on the ball. Also as above, the cup needs to fit closely, but not tightly, over the ball. So, once again, as the driving ball rotates the cup and shaft is forced to rotate, in turn rotating the driven ball and shaft. The shaft between the two cups can be as long as needed. **TYPE 3** is much like **TYPE 2**, but exchanges the positions of the balls and cups. Each end of this shaft has carries a ball. The cups are affixed to the shafts. Also as above, the cups needs to fit closely, but not tightly, over the balls. So, once again, as the driving cup rotates the ball and the shaft is forced to rotate, in turn rotating the driven cup and shaft. The shaft between the two balls can be as long as needed. While **TYPE 1** can also be made long, the larger tube adds weight and creates balance problems. **TYPES 2 & 3** on the other hand have lower rotating mass and are better suited to elongated couplings. Hobbytown makes parts that can be used to make all three type couplings. The "ball" portions are the same on both "1" and "2", but different on **TYPE 3** (having square holes). What is slightly different with most of the Hobbytown U-joints is that the cups "snap" over the balls at each end, holding them in place. The balls can swivel inside the cups, but cannot slide longitudinally as in most other makes. Thus some other means must be used to allow some end-play in the completed universal joint. Hobbytown does this by using a SQUARE shaft to connect the joints. On

the Hobbytown joints of **TYPE 3** the connecting shaft is **SQUARE** in cross section, and is a press-fit on the (usually) driving ball (which has a SQUARE hole). The driven ball has a slightly larger square hole allowing the square shaft to slide back and forth longitudinally inside the ball.

continued...


TYPE 1
NOTE: Driving pins normally set at right angles to one another. Balls usually press-fit on shafts, but loose (floating) in tube, allowing end-play.
TYPE 2
Input & output shafts press-fitted on balls. Floating (center) shaft press fit on cups. USUALLY, balls floating in cups.
TYPE 3
press-fit
Balls snap-fit in cups, SQUARE shaft between balls press-fit in ONE ball, slip-fit in other ball, allowing end-play.

continued...

Dan Mitchell

t
Mare

Daniel A. Mitchell

9/29/18 #19074

l To muddy the waters further …
e

Most common U-joints can correct for only ONE type of misalignment … either angular **OR** off axis. In most power transmission applications BOTH types of misalignment are present. It thus takes TWO U-joints (as previously documented) to (almost) fully eliminate binding in the drive-line.

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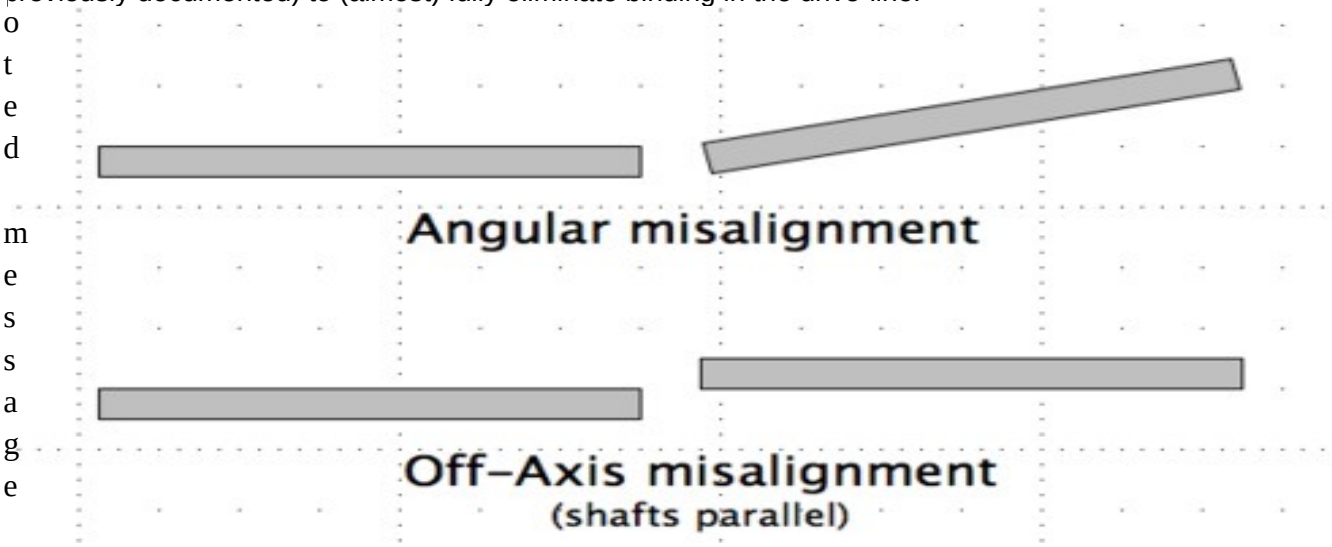

In general, any of the common U-joints can function with about a 15-degree MAXIMUM angular misalignment. Less is better... much better. All U-joints induce some friction in the drive-line … the greater the angle of misalignment the greater the added friction.

What is less well understood is that common U-joints also introduce an oscillation in the rotational motion of the driven shaft. The rotation is no longer “smooth” ... this contributes to NOISE (“growl", etc.). The greater the angular misalignment, the more oscillation is introduced. Such action is at it’s worst with the common fork-and-yoke type U-joints as used in most automobile drive lines. The greater the angle of shaft misalignment, the greater the induced oscillation.

One should always make an effort to get the best possible alignment of the two shafts, and NOT just rely on the U-joints to solve the drive-line problems. They should be your LAST "line of defense”.

More sophisticated U-joints called “Constant-Velocity” joints eliminate the oscillation problem, but are not

normally in use on model railroad applications. They are complicated and expensive to produce. Their most common application is the steering-joints in many front-wheel-drive autos.

The ball-and-cup joints commonly used in model railroad applications have some of the properties of constant-velocity joints, but are usually so sloppy and crude as to mask any favorable effects. The close fitting snap-together Hobbytown joints are about the best of this type, but they introduce more friction than most others (thus the need to minimize any angular misalignment).
The simplest connection for misaligned shafts remains a flexible tube, but such almost always results in "wow" … another oscillation in the rotational motion of the driven shaft. This results from the tube having some residual curve, or uneven wall thickness, that make it bend more easily in some directions than others. It's cheap and quiet, but usually not very satisfactory.

A variation of the ball-and-cup U-joints are those using a hex "ball" to engage a hollow hex-shaped "cup". Grandt-Line uses these in some of their power-transmission products, and AHM/Rivarossi and others have used them as well. Grant-Line has a **TYPE-1** (previous document) dual-hex-U-joint coupling that is the shortest I am aware of for model railroad applications. It works well, is only about a half-inch long, and corrects both angular and off-axis misalignment.

There are many other types of joints and couplings that correct various misalignment, some truly odd. Fortunately, these are rarely, if ever, encountered in model railroad applications.

Dan Mitchell

Sprockets/Chains

 clint watkins

1/07/19 #19402

Here is a link to Serve-O-Link for Sprockets / Chains
https://servolink.com/prices.htm
For Light Control and DC regulators I have these Adjustable Regulators
and they are Awesome for lots of stuff and Priced right..!!!!
https://shourtline.swl4.com
For Belt Drives and Chain Drives check this Link
http://shop.sdp-si.com

Please delete **your browser cache and refresh your browser page.** This may fix whatever problem(s) you are experiencing and it is what we ask customers to try first in our troubleshooting protocol.

You can get in touch with us by calling (800) 819-8900 at anytime between the hours of 9 AM to 5PM (EST) or fill out our eStore technical support form (below)
From the Bench of: Lol
Clint Watkins (I am new to this Group and have a lot of Locomotives that need updated systems.)
Casa Grande , AZ**.**
Email: acw345@**...**

Replacing 2mm shafting in Canon En-22 motors.

Denny Anspach

4/10/18 #18079

I have recently learned from a respected local Sacramento modeler of his success in the replacement of EN-22 motor shafts. He reports attempts with 40 motors with 90% success (4 failures -damage to windings). He uses a simple jig made up of basically built around 3/32" tubing, and a Pana or similar vise. He uses hardened steel motor shafting purchased from Roundbell, In this regard, I am hesitant to try the more commonly-available shafting from NWSL. I will inquire.

I am no place at the moment to try this, but….it is certainly worth trying with my cache of very short-single-shafted such motors.

Denny S. Anspach, MD
307 Stanton Road
Quarryville, PA
17566

Pdsteam <pdsteam@...>

4/10/18 #18080

Denny
I have done this process with the older open frame motors using standard steel shafting from NWSL. Although I have not done this with any can motors I can't imagine it not working on them.
I have quite a few Mashima flat can motors with 2mm shafting that I may try to do this on this weekend.

Pete (Suhmann)

 SP4149

4/10/18 #18083

Ken Clark
Denny,

I remember Whit Towers pressing the motor shafts on double end Sagamis to make them into singe ended motors. It required disassembly of the motor. The Canon motors aren't as forgiving as the Sagamis to dismantling. Does the procedure involve pushing the shaft through an assembled motor?

Since so many of the Canon motors on the market are 9 volt or 6 volt motors, I have switched to better motors and stronger ones, I had several OEM Canon CN2231s that failed under the load of a weighted operational model. My best successes were in HOn3 locos where I shoe horned them in.

Ken Clark

www.shastasprings.com

Shapeways gearbox

George Pierson

4/03/18 #17963

Hi, all,

While cruising Shapeways recently (a very rewarding activity) I ran across an offering for a 3D printed replacement gearbox for the NWSL single idler gearbox. The exact model is on the site. The creator states that he has had problems with the recent NWSL gearboxes being no longer sufficiently precise (a problem that I too recently had) and his 3D replacement is better. I plan to try this out myself. This

involves using the shaft, worm and gears from the NWSL set but with the 3D gearbox.

https://www.shapeways.com/product/ZV28Q78E5/ho-gearbox-case-0-3-mod-idlr-3mm-axle?optionId=64428172&li=marketplace

George Pierson

continued…

Interesting experiences about pulling power ...

 Jim Betz

1/05/18 #17083

Hi,

Since we've been talking about pulling power today I thought I'd share some experiences that I've had when doing actual pulling power testing. Let me start by telling you about how I test pulling power. I start by measuring the number of grams of draw bar pull using a Micro Mark pull meter. It measures to the tenth of a gram. I put the loco on level straight track, hook the meter to the coupler on the tender, and bring up the power until the drivers are slipping at the highest value it will hit on the meter (usually requires about 75% or more throttle). Then I take some actual cars and test the loco on the ruling grade of a particular layout. That grade is also on a curve (about 36" radius?) and the top of the grade where it ends has what most guys would call a "vertical kink" (it does not go to full level but there is a significant and rapid reduction to about half of the curved part). That grade measures 2.4% before the curve and 1.6% after the "kink". The approach to that curve+grade is level for the length of about fifteen 40' cars. When I'm done I record all the details of the weight of the loco, number of drivers, draw bar pull, and number of cars up that ruling grade. I currently have about 100 different locos that I've tested and recorded the results.

I have tested this particular grade -many- times with many different trains and/or locomotives -both diesels and steam. In addition-ALL of the tests I've done have been using locos with BEMF decoders installed and running on DCC. But I'm limiting my experiences to steam for this discussion. We all know that the number of drivers, the metallurgy of the drivers and rail, the weight of the loco, the size of the drivers, the kind of motor, the size of the motor, and how well the loco runs (smoothness of the drive) affect the pulling power.

However-my measurements have made it clear that only two of those variables produce significant differences... and it's the obvious ones-the weight of the loco and the number of drivers. I'm not ready-yet to state a direct relationship between the weight and the number of cars...but usually if I know the weight and the number of drivers I can predict that the loco will pull a certain number of cars (before it slips). It would be nice to be able to say "if you increase the weight of the loco by N ounces it will pull this many more cars up the ruling grade". So far the best I can say is that "if it is heavier it is more likely to pull more cars" (but I can't tell you/predict how many more) and that there is a fairly direct relationship between the draw bar pull and the number of cars it will pull up the ruling grade (for the same number of drivers). No surprise.

One thing that I can not fully explain is why diesels with "the same" weight and draw bar pull measurement will pull more cars up the ruling grade. Yes, of course it is related to the driver size, but not by as much as you might think (really small drivered steamers do not pull significantly better than larger drivers for the same

weight). Wh
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I am certain
and the kink

- Jim Betz

Denny Anspach

1/10/18 #17099

The issues of pulling power are as much art as science.

I am late to this thread, but Jim Best is absolutely correct that the most effective variables (not the ONLY variables) are numbers of drivers flat on the rails, and -most importantly- weight on drivers. The number of drivers simply takes advantage of more points of adhesion, multiplied by the effective factors of adhesion between tread and rail head. Like him, I have never had any locomotive stall dead on any grade, the wheels not spinning first.

There are so many other factors that add to the above, many of which are not easily explained nor understood.

A Ken Kidder (KTM) rigid frame 4-6-0 that pulls a 9 car train of LaBelle cars up a long c. 1.75% grade;

A 2-lb. NWSL Fujiyama 4-8-4 that simply is unable to pull its expected payload (slips, slides, etc.);

A 1.7 lb. Tenshodo rigid frame 4-8-4 that pulls a 12 car train of heavy passenger cars up and around a similar heavy grade with super-elevated curvature.

A built-up 1.5 lb. brass 4-6-4 that disappointingly would not pull much, but now routinely pulls nine brass cars up dale and down.

I have given up trying to figure the first two.

The third I think is due to the early slab driving wheel wheel flanges digging into the gauge sides of the curving rails. The last certainly has to do with the improved factors of adhesion related to the plating wearing off the wheel treads.

I have measured pulling power (ozs.)for some time using an eccentric-weighted wheel gadget produced at one time for this very purpose by a cottage outfit in Texas. The resulting figures are pretty broad, but enough to inform me of broad capabilities, and to satisfy curiosity.

Denny

 George Galyon (redvdub1)

1/12/18 #17105

Like Mr. Betz I measure locomotive pull force using a spring gauge but it is an industrial quality analog gauge. So far I have measured over two dozen HO locomotives (steam and diesel) and have found all my pull measurements are less than 10 ozs. except for a couple of engines with traction tires. While weight is a primary factor I find very little correlation between locomotives re weight which I think is due to the great variations in friction. Using slip test results I find my kinetic coefficients of friction vary between 0.08 and 0.18. The same engine on different layouts will vary in pull force by as much as 0.5 ozs...all because of the variability in wheel-rail friction...I think. What we don't know about friction is quite a lot. For example, are the coefficients of friction (static and dynamic) between wheel and railhead constant or do they vary with the weight on the wheel-railhead interface? How does the slip coefficient of friction vary with wheel rotational velocity? What effects do railhead hardness and chemical composition have. etc.

I am a bit queasy about some of the assumptions I see posted. I would suggest that the number of locomotive wheels (for a given weight) does not affect pull force as long as all the wheels are "coupled". Neither does weight balance affect the ultimate pull force...as long as all the wheels are coupled. I started testing a Bowser E-6 re pull force and found that when I uncoupled the drivers it wouldn't pull itself which I attributed to most of the weight being on the front (ungeared) drivers. When coupled up the E-6 pulled almost 3 ozs. which is fairly good for a steamer. I do think (but have not yet experimentally verified) that balancing the locomotive weight over the center of gravity will optimize the starting voltage significantly (with no increase in pull force). I also think that starting voltage (or speed step setting) decreases with an increasing number of drivers for a given total weight on drivers. It seems to me that if one driver set is holding up more weight than the other/s it will be harder to "break free" from the static friction. I think "real railroads" add driver sets so that they can increase total locomotive weight without exceeding the "crush" limit for each wheel. I don't think modelers are anywhere near the "crush" limit but whether our friction coefficients significantly vary with the weight per driver is an open question.

I haven't tested enough diesels (yet) to say whether they pull better than steamers for an equivalent weight on drivers...I do think they tend to start well perhaps due to better balance...maybe. What would be nice is to get an old-fashioned 4-2-0 steamer with plenty of room for additional weights and use this engine as an experimental test bed. Dream on.

Slipping Eccentric Crank

 Jim Betz

11/28/17 #16879

I have an HO Sunset/Samhongsa 2-8-2 (GN O-4) that has a slipping eccentric crank.

There is a set screw that's setting as tight as I can get it -it only grips but doesn't hold it's position on the crank pin. Of course it is one of the super small brass set screws-with a slotted hole in it. The eccentric crank itself is a slotted piece... but the set screw doesn't go thru the two ends that stick out past the crank pin. It goes thru where it is centered on the crank pin.

I have tried really reefing on the set screw. No Joy.

I have tried applying extra tightness by using a small set of pliers and gripping the head of the set screw. No Joy.

I have tried CA- hitch held better than both of the above, but let go within just a few feet of running (with no load on flat track). No Joy.

===> So what would you try next?
Replace the set screw with a new one? A longer one (it seems to go all the way to where the shoulder is coming in contact with the crank)?

Solder the crank on the end of the crank pin shaft?

File/other wise 'distress' the pin so that the set screw can hold the crank from turning on the end of the shaft (this shaft/pin goes thru all of the rods/etc. and is screwed into the driver)?

Other ideas?

- Jim B.

 Ken Clark

11/28/17 #16880

The soft brass used in most Korean models of eccentric cranks renders the set screw useless. Tighten the main pin in place without the crank and then solder the crank in the correct place and then cut off the over sized screw head. All that ACC and other hold tite compounds used will turn black when soldered if not completely removed first. KTM proved you didn't need the set screws to have an excellent mechanism and they are butt ugly to boot. Another advantage of solder is that it is much easier to adjust the crank to the correct angle on the main pin. I use resistance soldering tweezers so for me this is a 2 minute fix.

When you think outside the box,
You are out of the loop.
Kenneth R. Clark

From Rshimer to Ed Weldon

12/01/06 #3965

You seem to be expecting ball bearings to act a device to control the thrust from the worm gear set. In theory that is something that they are not good at. Special bearings are need to control thrust and rotational forces in one design. Those two forces are totally different in the way they are dealt with.....
Rshimer

From Ed Weldon to Rshimer

I disagree with you on this subject. The thrust loads in these small gearboxes are relatively low and so are the speeds and the expected life cycles. I suspect your commentary derives from experience with an engineering application where the thrust loading was too high for conventional (Conrad) ball bearings.

While these ball bearings (so called "Conrad" style) are not rated as high for thrust loads as other special types like angular contact bearings they can and do handle thrust loads in combination with radial loads. Otherwise many common types of machinery like ball bearing electric motors would not be able to use them without elaborate and expensive additional design features and manufacturing precision.

During the early 1940's A. B. Jones of the General Motors New Departure Bearing Division compiled the

first rigorous mathematical formulas for thrust load calculations and preloads of ball bearings. General Motors published his work in 1946 and it remains today as an authoritative reference source to the entire anti-friction bearing industry. I have a rare copy of this book, which I have used frequently in my engineering career for design calculations on a variety of high speed ball bearing applications including centrifuges, industrial pumps, disk drive spindles and semiconductor equipment mechanisms. So I know what I'm talking about here. I should add that all mainstream ball bearing manufacturers publish thrust load ratings and calculation methods for various speed/load applications of these types of products under different combinations or radial and axial (thrust) loading. Without even knowing exactly what bearings NWSL is using I feel fairly confident that they can handle worm drive thrust loads in our models.

I wonder if the guys at NWSL have designed any bearing preload into the gearboxes. This would completely eliminate axial movement of the shaft. Looking at their photos I don't see any preload springs. But often in small mechanisms this function is accomplished by a combination of tolerance control or shims and flexibility of the bearing mounts. That's asking a lot of injection moldings used for the gearbox parts, though.

Ed Weldon

Denny Anspach

10/05/16 #15318

There is a lot of good replicable information in this thread, and i cannot help adding my bit.

Jim Betz' and others' comment that one really needs to know what relative pulling powers might be is absolutely true, making the choice of how one measures this power an easier one. This Model Railroader used a simple mechanical postal scale for many, many years to measure and record estimated pulling power on their new product review locomotives, and perhaps they still do. Like Jim Betz, for many years I kept informal track of pulling power by noting how long a train/how many cars given locomotives might successfully pull around my layout (with long 1.5-2.0% grades). More lately I have been using a Tractometer, a device -long ignored- measuring pull in ounces made for this purpose in Texas about 20 years ago (the principle based upon rotating an eccentrically-weighted wheel). It is a little awkward, but pretty accurate, its only Achilles heel being that it red-lines at 6 oz., and too many of my locomotives exceed this. I have avoided the Micro Mark device, because I generally avoid Micro Mark.

One of the most poorly controlled variables are the effects of Factor of Adhesion, the ability of a driving wheel tread under power to adhere, i.e. not slip, to the rail surface. If driving wheels had treads of ice, there would be no adherence to the rail surface. If treads had teeth like gears that fit with teeth on the rails, adherence would be perfect. In between, we have everything else. The best have been steel treads on steel rails, an O gauge standard of years ago (still?). Brass on brass was and is very, very good; nickel on nickel (our current standard) is not very good at all. Combinations work pretty well, i.e. nickel on steel or brass, brass on nickel, etc. We also skip over these problems and use traction tires, i.e. studded snow tires on an icy road.

My predilection on these issues is to hope and pray that the nickel plating on my brass drivers wears out quickly, because when it does, the pulling power of that locomotive improves dramatically (and I can observe it doing so along the way). I do not sniff at traction tires, because they can and do work, but…..they do not last forever, both wearing out (they are forced to slip on curves) and -more commonly- become loose. Lastly, the contract Chinese maker of the replacement tires that you need is long gone.

As Manfred has pointed out eloquently, physics dictates that for a given weight, the theoretical pulling power of a single drivered locomotive is the same as that with twelve drivers. Where this breaks down is that the accumulated effects of factors of adhesion are additive, the more driving wheels that are actually hitting the rails. This can vary all over the place, but as a pragmatic general expectation, for given weight

and power, a locomotive with more driving wheels squarely on the rails will pull more than one with less wheels.

There is a fluid on the market with a repulsive name that when applied to driving wheel treads is supposed to improve traction. What few reports i have read have not been very positive.

Weights: For years I have used in the brass locomotives that I favor sheet lead that I have rolled, molded, cut to fit, etc. and secured with GOO (years past) and BARGE Cement (years recent). These contact cements really work well tying down the weighting to the common irregular surfaces of the locomotive interiors. They retain flexibility and cure in place with minutes to hours. I have had occasion (some quite recently) to remove weights applied in the seventies with GOO, and with care and deliberation I could so so mechanically , i.e. prying, without collateral damage. I usually pack lead around the cylindrical engine weight, fitting brass or aluminum tubing in place as conduits for lighting. I also pay a lot of attention to balancing, sometimes packing cab roofs and the frames to attain the balance I want.

Torque arms: These are probably one of the most important parts of the efficient drive lines that we all favor in our model steam locomotives, i.e. keeping a steady relationship between a fixed motor and a universal connection with a moving driving gear box. It is also probably the part we are the least capable of doing easily, inasmuch as neither the motors nor the gear boxes commonly have any means of securing such an arm. The traditional means is to then solder or fasten cross-frame guide pieces fore and aft of the gear box to keep is from rocking. In practice this is easier said than done for many modelers not comfortable with the complete dismantling and tricky soldering usually required -especially with finished locomotives. These fixed guides are then limiting to any gear box changes that might be necessary or desired in the future.

I have used a variety of devices to limit gear box rotation centering on a variety of ways to attach some sort of brass sheet stripping to the top of the gear box with 1.4mm screws into drilled and tapped holes with the other end held by an existing screw (commonly holding down the valve gear hanger). However, if the brass is too thin (so that the driving wheel with its gear box can still freely move up and down), the torque exerted on the box can overcome the arm and bend it, and the loss of power can be dramatic; If it is too thick, then it hampers the driver springing with the adverse effects that Ken Clark describes. I have also used wood blocking (it works, is actually elegant, but subject to ridicule [I am sensitive]).

The effects of torque under load can be truly amazing when a torque arm weakens or fails, and the universals are placed under stress (motor and decoder overheating). It is also a cautionary lesson when one considers the extent of energy loss with common rubber tubing.

The solution, of course is to devise some means of easily fastening a brass bridge between motor and gear box. I have tried glue (yes!) -total failure-, and fabricating brass caps to motor and gear box- with mixed results. Some motors, correctly positioned with forethought have unused mounting holes that can be used, but many have none. Very few gear boxes have enough meat on the tops of the boxes to safely drill, and tap for a screw.

Microscale Krystal Clear/Canopy Cement: At a recent Saturday morning operating session with some seasoned modelers (more seasoned than me), they commented on these products as a sort of “secret sauce” that so many of us have learned to use as a very useful modeling cement, easily cleaned up, easily undone with water/alcohol, flexible, relatively universal, clear, and relatively fast set up time. The downside is that it is NOT a strong adhesive, so is best used to hold pieces or things in place that do not undergo stress. I use it all the time.

P.S. A recent completed locomotive project -a brass Milwaukee Road F-7 4-6-4 with new nickel 84” drivers weighing 1.9 lbs.- would initially not pull the train it was built to haul- a nine car brass 1939 HIAWATHA. It

was an immense disappointment. However, after a month of running around the layout with other lighter trains, the locomotive now pulls the nine car train without hesitation, without slipping, and with class. The reason: the shine has been removed from the driver treads, defacto increasing the factors of adhesion.

Denny (Anspach)

DONALD HENNEN

07/30/13 #11197

I have upgraded a DC71 motor with a Neodymium magnet and it was very noisy. This was not the skew wound version. The skew wound one would have been quieter. If you turn the shaft of a permanent magnet motor with your fingers, you feel the armature popping in and out of the magnetic field. Strengthen the field and that effect increases. Strengthen it enough and it sets up a loud vibration. A skew wound motor eases the armature into the field.

I happened to need a lot of torque because of a very steep grade that caused some downhill lurching. If your grades are less demanding, the stock DC71 should be plenty good without the louder new magnets. If you choose to keep the original drive, I think you should try it first with the motor unchanged and only change the magnet if you have to

Don

 CWRailman

07/30/13 #11200

Dave,

In re-powering locomotives I try and come up with the best combination for the "normal" operating condition. Most models do not spend a lot of time near their peak speeds. Most model railroads, especially home model railroads, just are not large enough to facilitate models running at top speeds for long periods of time. You will probably find your 2-10-2 suited for freight and pulling 18-24 cars depending on how long your passing sidings are. A scale 55MPH will gobble up a lot of track in a short period of time so you will need some very long runs. The local club has a computer system that controls the trains during their "display mode". In that mode, their passenger trains are running between 35-45 smph and stopping at four or five passenger stations on the system. Freight are running around 30-35 smph with making three or four slow downs for signals. That gives the illusion that the railroad is larger than it really is.

You will be running DCC. All the motors have ratings at 12 volts but in reality your normal DC system actually delivers 15-16 volts and the average DCC system is capable of delivering 16-18 volts to the motor. Running an electric motor at more than it's rated voltage for short periods of time does not harm it hence my suggestion of a 9,000 rpm motor which will have a lot of torque when used with the 36:1 gearbox and will get you the speeds you want for the brief periods of time you want them. It's all about torque. For your model, it's initial weight and the loads you may be considering you probably should forget about that 1833 motor and focus on something in the larger ranges as you previously mentioned.

Some time ago I had a brass PFM ATSF 2-10-2 with similar sized drivers which came with a 40:1 United gear box. Though it weighed less than your Bowser, because it had a sprung chassis, the PFM model was probably capable of pulling what your unsprung Bowser will handle because not all of the drivers on your Bowser will be exerting equal amounts of down force on the rail.

By the way, while I know some modelers prefer them, I am one of those who does not use flywheels.

Denny (Anspach)

 Ken Clark

07/30/13 #11209

Dave,
As Denny also mentioned, it's the combination of springing and ten flanged drivers that gives these engines extra pulling power compared to a rigid engine. On my SP engines, the Mountains and the Fourteen Wheelers had virtually identical boilers, the difference being an extra set of 10" smaller drivers. For many years I used 2032s in both models, but then decided that the 2-10-2s were just running too slow compared to all my other 63" drivered engines with 2032s. Checking the current when pulling trains the motors were drawing max current. Changing to the much stronger 2236 dropped the current draw and increased the speed; proof that I was overloading the 2032s. A lot of modelers do not pay attention to current draw when re-powering. The Canon 2231 flat can motors, basically the same size as the 1833 flat can motors were a favorite in many models. If weight was added these otherwise reliable motors easily burned out in bigger HO brass engines. Members at big clubs found this out quickly. Part of the problem was that they could handle only about half the current of a comparable Sagami, a big difference. A motor drawing only 250 milliamps was actually overloaded. Some coreless motors were even worse and would be overloaded at current levels that wouldn't register on some ammeters. With new motors a 300 milliamp meter is more than adequate; a 3 amp meter is pretty much worthless..
Kenneth R. Clark
P.O. Box 212454
Chula Vista, CA 91921

Denny Anspach

10/05/16 #15318

There is a lot of good replicable information in this thread, and i cannot help adding my bit.

Jim Betz' and others' comment that one really needs to know what relative pulling powers might be is absolutely true, making the choice of how one measures this power an easier one. The Model Railroader used a simple mechanical postal scale for many, many years to measure and record estimated pulling power on their new product review locomotives, and perhaps they still do. Like Jim Betz, for many years I kept informal track of pulling power by noting how long a train/how many cars given locomotives might successfully pull around my layout (with long 1.5-2.0% grades). More lately I have been using a Tractometer, a device -long ignored- measuring pull in ounces made for this purpose in Texas about 20 years ago (the principle based upon rotating an eccentrically-weighted wheel). It is a little awkward, but pretty accurate, its only Achilles heel being that it red-lines at 6 oz., and too many of my locomotives exceed this. I have avoided the Micro Mark device, because I generally avoid Micro Mark.

One of the most poorly controlled variables are the effects of Factor of Adhesion, the ability of a driving wheel tread under power to adhere, i.e. not slip, to the rail surface. If driving wheels had treads of ice, there would be no adherence to the rail surface. If treads had teeth like gears that fit with teeth on the rails, adherence would be perfect. In between, we have everything else. The best have been steel treads on steel rails, an O gauge standard of years ago (still?). Brass on brass was and is very, very good; nickel on nickel (our current standard) is not very good at all. Combinations work pretty well, i.e. nickel on steel or brass, brass on nickel, etc. We also skip over these problems and use traction tires, i.e. studded snow tires on an icy road.

My predilection on these issues is to hope and pray that the nickel plating on my brass drivers wears out quickly, because when it does, the pulling power of that locomotive improves dramatically (and I can observe it doing so along the way). I do not sniff at traction tires, because they can and do work,

but…..they do not last forever, both wearing out (they are forced to slip on curves) and -more commonly- become loose. Lastly, the contract Chinese maker of the replacement tires that you need is long gone.

As Manfred has pointed out eloquently, physics dictates that for a given weight, the theoretical pulling power of a single drivered locomotive is the same as that with twelve drivers. Where this breaks down is that the accumulated effects of factors of adhesion are additive, the more driving wheels that are actually hitting the rails. This can vary all over the place, but as a pragmatic general expectation, for given weight and power, a locomotive with more driving wheels squarely on the rails will pull more than one with less wheels.

There is a fluid on the market with a repulsive name that when applied to driving wheel treads is supposed to improve traction. What few reports i have read have not been very positive.

Weights: For years I have used in the brass locomotives that I favor sheet lead that I have rolled, molded, cut to fit, etc. and secured with GOO (years past) and BARGE Cement (years recent). These contact cements really work well tying down the weighting to the common irregular surfaces of the locomotive interiors. They retain flexibility and cure in place with minutes to hours. I have had occasion (some quite recently) to remove weights applied in the seventies with GOO, and with care and deliberation I could so so mechanically , i.e. prying, without collateral damage. I usually pack lead around the cylindrical engine weight, fitting brass or aluminum tubing in place as conduits for lighting. I also pay a lot of attention to balancing, sometimes packing cab roofs and the frames to attain the balance I want.

Torque arms: These are probably one of the most important parts of the efficient drive lines that we all favor in our model steam locomotives, i.e. keeping a steady relationship between a fixed motor and a universal connection with a moving driving gear box. It is also probably the part we are the least capable of doing easily, inasmuch as neither the motors nor the gear boxes commonly have any means of securing such an arm. The traditional means is to then solder or fasten cross-frame guide pieces fore and aft of the gear box to keep is from rocking. In practice this is easier said than done for many modelers not comfortable with the complete dismantling and tricky soldering usually required -especially with finished locomotives. These fixed guides are then limiting to any gear box changes that might be necessary or desired in the future.

I have used a variety of devices to limit gear box rotation centering on a variety of ways to attach some sort of brass sheet stripping to the top of the gear box with 1.4mm screws into drilled and tapped holes with the other end held by an existing screw (commonly holding down the valve gear hanger). However, if the brass is too thin (so that the driving wheel with its gear box can still freely move up and down), the torque exerted on the box can overcome the arm and bend it, and the loss of power can be dramatic; If it is too thick, then it hampers the driver springing with the adverse effects that Ken Clark describes. I have also used wood blocking (it works, is actually elegant, but subject to ridicule [I am sensitive]).

The effects of torque under load can be truly amazing when an torque arm weakens or fails, and the universals are placed under stress (motor and decoder overheating). It is also a cautionary lesson when one considers the extent of energy loss with common rubber tubing.

The solution, of course is to devise some means of easily fastening a brass bridge between motor and gear box. I have tried glue (yes!) -total failure-, and fabricating brass caps to motor and gear box - with mixed results. Some motors, correctly positioned with forethought have unused mounting holes that can be used, but many have none. Very few gear boxes have enough meat on the tops of the boxes to safely drill, and tap for a screw.

Microscale Krystal Clear/Canopy Cement: At a recent Saturday morning operating session with some seasoned modelers (more seasoned than me), they commented on these products as a sort of “secret sauce” that so many of us have learned to use as a very useful modeling cement, easily cleaned up, easily

undone with water/alcohol, flexible, relatively universal, clear, and relatively fast set up time. The downside is that it is NOT a strong adhesive, so is best used to hold pieces or things in place that do not undergo stress. I use it all the time.

P.S. A recent completed locomotive project -a brass Milwaukee Road F-7 4-6-4 with new nickeled 84” drivers weighing 1.9 lbs.- would initially not pull the train it was built to haul- a nine car brass 1939 HIAWATHA. It was an immense disappointment. However, after a month of running around the layout with other lighter trains, the locomotive now pulls the nine car train without hesitation, without slipplng, and with class. The reason: the shine has been removed from the driver treads, defacto increasing the factors of adhesion.

Denny (Anspach)
--- In repowerandregear@..., "Nigel Nichols" <Lakewood@w...> wrote:

Most of the slop or play in the Athearn gear train is at the worm shaft bearings. These square bearings are able to slop up and down in the plastic gear housing. This allows a variable mesh with the worm gear (whether it be the original or Ernst). Bare in mind the "worm gear" is the first gear that meshes with the worm.

I found that there is not only a slop between bearing and "journal", i.e. the housing for the bronze bearings. There is also slop inside the bearing giving the shaft additional freedom to wander about.

The problem with these slops is that they add up. The universals are anything but concentric or balanced. They are the driving force in the wild movements of the shaft. Add to that the natural, that means unavoidable, unevenness of motion in a universal, the friction of the horned balls and you have what some techno freaks need to be in heaven.

So it needs to be fixed to minimum play:
- bearing fixation
- bearing bore to shaft fit

The lurch phenomenon has already been addressed by the washers.

Once you have done that the universals will move in a more controlled way. They will produce vibration in the whole gear case but not the nasty sound of banging the shaft around.

I found that the worm gear in some units is not concentrical. But that should not be a great issue as they turn not at a high rpm.

Manfred Lorenz

Pittman DC60s – loss of power

01/22/03 #988

In a message dated 1/22/03 10:30:20 AM Central Standard Time,
danspach@... writes:

Most of the time, this is because of loss of magnetism in the Alnico "permanent" magnet. Remagnetize it, and the motors almost always regain new life.

Denny (Anspach)

Doc (Anspach)

How do you do that again? I've got some old timers with DC-60's that just can't be replaced with a can motor, or would be too damn difficult. So, perhaps remagnitization would do the trick. I'll give it a try.

BTW, the Varney with the DC-71 I mentioned is my Northern. I've also got a Roundhouse 0-6-0 that I reworked into a Milwaukee Road switcher many moons ago, and it too runs smooth as glass with its original Pittman DC-60.

Both of these are 1950's vintage, early 1950's. Can it be that the older Pittman motors were somehow built better? Better magnet quality?

I don't have anything that old to compare with -- were sold/traded off a long time ago. However, a few years ago I obtained a few old steamers with 1960's Pittman motors, and they seem to have the problem with fading magnetism, or whatever.

Has anyone else noticed this? Old, old, old Pittman's run/last longer than the newer versions?

Bill Flood
Algonquin, IL

01/22/03 #991

Nigel
Nigel Nisso wrote - - -
"An alternate is to replace the magnet with a more modern material, and some steel. See Bowser's new skewed armature, DCC ready, DC70 motor for reference."

Bill Flood
Speaking of skewed armature motors..... Does anyone remember the old Lindsay 7-pole skewed armature motors?

I've got an old Kemtron Baldwin switcher with a Lindsay, both trucks powered, and it runs very well. However, I'm suspicious that it appears to not run as it should. Over the last few years it appears to be getting anemic.

Does anyone have any experience with the Lindsay motor?

Bill Flood
Algonquin, IL

Denny Anspach <danspach@...>

01/22/03 #987

Bill Flood mentions that his Pittman DC 60's are failing. Most of the time, this is because of loss of magnetism in the Alnico "permanent" magnet. Remagnetize it, and the motors almost always regain new life. I have re-magnetized the DC 60 in my Varney 0-4-0 several times over the past 55 years, and it still runs the socks off of a lot of far more sophisticated locomotives.

Denny
--
Denny S. Anspach, MD
Sacramento, CA

Victor Bitleris

01/22/03 #989

I have always wondered how do you re-magnetize motors that have lost their magnetism.

Vic Bitleris
Raleigh, NC


Jim Betz

02/17/15 #13071

I don't know if this matters or not ... but it is worth mentioning (to me only?).

Our universals are done significantly differently than anything in a truck or tractor power take off for several reasons.

1) The percentage of the change in overall length between the fixed part of the setup (the two 'cups' on the ends) is, often (usually?) quite a bit larger.

2) The range of movement -in terms of the angular change-of our universals is often a lot greater than anything you'd see in any kind of commercial application. If you take a hold of the truck of an HO diesel and swivel it both side to side and up and down you will see 'gross misalignment of the two fixed shafts (the motor and the worm shaft in this case).

3) The design of the 'slots' that the shaft sits/moves around in (in the cups) is considerably different than anything I've ever seen in a car, pickup, truck, or tractor.

4) The materials we use are -significantly- different-as in a delrin cardan shaft turning in a delrin cup just doesn't compare to two pieces of high strength steel. (Which is also part of why ours works as well as it does for such low cost.)

5) The loads on our universals are -hugely- different from anything I know of to compare them to-the closest comparison I can come up with is things in R/C such as a push rod in a servo.

I've seen HO cardan shafts where the 'nipples' on either end were in line with each other and I've seen some where they were 90 out-at they both seemed to work just fine.

All of the NWSL cardan shafts are a single piece of delrin and as far as I know they all have the nipples aligned.

- Jim (Betz)

Victor Bitleris

11/02/12 #9778

Hi Denny,
Thanks for asking. Sandy did affect both ends of North Carolina. The outer banks, Hatteras, and north got the bad ocean swells and tore up Hwy 12... AGAIN. Seems like a yearly occurrence. The coast below Hatteras just received very good waves for the surfers and some rain. Here in the Piedmont I got some rain while I grilled burgers, but with an umbrella, it wasn't bad. My son said they were the best burgers yet. The mountains in the western part of the state got a lot of snow, as did Virginia, West Virginia, Ohio, and Pennsylvania. I did not call my Mom, who lives in the Detroit area, but will do so this weekend. I did not see anything bad about that area in the news. By far, I think we all know that our friends in New Jersey and New York got nailed pretty bad. Much of our NMRA Division lives in New Jersey, Virginia and Pennsylvania, but so far all I heard was everyone is ok.

Regarding the gears, I am not so sure that being made in the US would prevent that. I think many were made in the US. I do understand that historically, Athearn's gears seem to fare better, but still suffer the same issue. The reason the NWSL gears, which are indeed made in the USA, do not have that problem is because of the very expensive process in which these gears are made. I understand that NWSL uses AGED plastic and machines the gears from this stuff, so it will no longer shrink, whereas Athearn and Proto 2000 had the gears cast. These gears cost a LOT more than the Athearn gears, but they will likely last forever. If you have an "Operating" layout and have regular operations on it where the locos get to do real work, then the NWSL gears are a very good investment. If however, you are a casual modeler like most of us, well, then you need to determine personal need. You mentioned that you have seen gears that were split even before they were installed? I have never heard of this. Everyone has said that the splitting occurs as the gear plastic shrinks over time and the axle diameter becomes too big for the hole that was cast in the gear. If you have split gears that have never been on a wheel, then that is really pretty bad. I wonder if someone put split gears in a package? There are some underhanded people around, but most Model Railroaders are pretty straight people. That is one of the things I like about this hobby, the people, just like you Denny.

Vic Bitleris
Raleigh, NC

Ken,

You just have to get out of California . I know gas there is more expensive but fuel line?

http://www.hobbylinc.com/htm/dub/dub221.htm

There is also an Ebay seller that offers several variations of this stuff for about the same.

One of the reasons I inquired about the slipping coupling is because about six years ago I discovered that I could no longer get the 1/16" size fuel line, which I use for most loco's, from local hobby shops. If your shops are like those here in AZ you're probably getting the 3/32" fuel line because this 1/16" fuel line was only used for small Cox engines which, according to the airplane guys here in Arizona , have been replaced by the battery powered models. I have to take their word for that because I know little about that hobby however fellow motorcyclist Ed Carlson of Carlson engines http://carlsonengineimports.net/ verified what I had been told. Hence none of the six stores I contacted here in AZ sold the 1/16" size. Four of the shops told me it wasn't even available. Two told me it was a special order item which they had not sold in years. While the 3/32id (2.3813mm) 5/16" OD which they all sell will work under normal conditions on the 2.4mm gearbox input shafts and old open frame motors, when under strain it will slip on the 2.0MM motor can motor shafts. For the 2.0mm shafts you have to use the 1/16" ID uel line which is 1/8" od. When I could not get the 1/16" stuff I super glued a NWSL bushing to the 2.0 motor shaft to bring it up to the same 2.4mm as the gearbox and used the 3/32" fuel line.

Denny (Anspach)

from Denny Anspach to Ken (Clark)

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Denny Anspach

To John Betz from Denny Anspach

First off the tubing you are using is too large in dia. It should fit snuggly. I could explain that with an analogy but this is a family forum.

The type of coupling used between motor and gearbox has little impact on the lateral thrust of a gearbox. That is a common misconception.

The gearbox rotation is induced as an opposing force to the direction ofthe drive axle. If the worm gear is rotating forward it thrusts the worm in reverse which in turn rotates the gearbox. Holding the gearbox in a locked position with some sort of suspension eliminating torque arm is not going to stop that action from taking place. The worm will still move forward and back under load. If you use universals all you are doing is transferring that load back to the motor where the armature bearings are relied upon to absorb it.

I am assuming that you have properly lubricated the motor etc as sometimes those old open frame motors themselves will squeal if not properly lubricated. Besides such issues, the problems that usually causes the noise you are referring to is that "thrusting" changes the relationship between the worm and worm gear. The coupling has little to no control over this. In the old United gearboxes this was amplified by a hardening of the worm gear which happens over years of immersion in lubricants. I would recommend that first you replace the worm gear with a NWSL #304-6, 40 tooth worm gear. (Check to see if your original worm is the 40 tooth.) They sell for around $7. I never let a model with a United gearbox out of the shops without replacing that gear.

Secondly completely dismantle and clean the gearbox. After removing all lubricants, clean the lube crud from the worm, then do a DRY reassembly and shim the worm to remove all of the movement. In the mechanical field we call those shims "thrust" washers and they are used to maintain the proper relationship between the worm and worm gear. Check this play by assembling the gearbox with the screws tightened and look for a slight forward and backward play. Once you have removed most of the worms lateral movement during the dry assembly, disassemble, lube with LaBelle #102 oil or similar heavy gear oil and reassemble. Again you should have a very slight amount of movement and the shaft should turn quite easily. After reassembly into the chassis, if you continue to have noise in forward that means the worm needs to be shimmed in the rear. Take one from the front and move it to the rear of the worm. If you experience noise when going in reverse requires a shim be removed from behind the worm and transferred to in front of the worm.

In a less critical situation without a precision "gearbox" I recently showed the play being taken out of a less precise mechanism in the re-motoring of a Rivarossi locomotive on my Projects Page. Proper

control of the worm's lateral movement removed a growl that the loco had in reverse when the worm was allowed to be thrust forward.

Denny (Anspach)

In repowerandregear@..., "pksuhmann" <pksuhmann@...> wrote:

Hi,
I forgot and already had uploaded my instruction for repairing LL and Athearn axle gears. I will up load the photo sequence to follow the instructions. Once you become adept at making the bushing, you can fix a 4 axle loco in about a half hour. I make lots of bushings at one sitting. I always have spares because the gears sooner or later go snap. If you are on this group site, you probably have the tools and skill to do it. This not highly precision work.

Pete Suhmann

Tractive effort-Brass versus steel

 Ken Clark

05/05/12 #9200

Anyone have thoughts on why mild steel tires, used in other scales including some lightweight O scale models, have never made an impact in HO? At one time someone ion Southern Cal was producing replacement 63" steel tires for HO 63" drivers, but other than thatI haven't seen others. I suspect that if you had steel tires for 57", 63", 73" and 80" you would cover 85% of the HO steam models produced in Japan. I pick Japanese models because they are the oldest and most likely to have the driver tires wearing out, they tend to run very well and I imagine that many of the models could be renewed with enhanced tractive effort with new steel driver tires and if needed axle bearings.
With DC the relative lower conductivity for an 1/8 inch is probably not a big deal since some model railroads use steel rails for a much longer distance and more efficient motors aid greatly in this issue. Perhaps with DCC the steel electrical pickup could be a problem, but I'm just guessing on DCC issues.

I remember when replacement NS wheels for Athearn diesels were introduced, the wheels stayed cleaner, but pulled less. At the time the motors drew much more current so wheels got dirtier, faster.

For one thing, the drivers would look better with steel tires and wearing off the plating would not be an issue.

Kenneth R. Clark

Andy R!

05/05/12 #9203

Hmmm...

it's been many years since I left HO for O scale. One problem I seem to recall, at least back then, was the use of dissimilar metals on HO wheels and rail which caused pitting and arcing at the contact point, ultimately trapping grime on the rail head. Back then, many of us were laying track using steel rails which was, as I recall, less expensive than brass. Steel rails actually rusted. Brass tended to corrode and pit. Some used to oil their rails, claiming it improved contact. But it collected dust and became gunk after awhile. All this was a constant irritant to us, leading to the use of flywheels to roll the loco over bad contact areas, pulse-power and other power-pack electronics to compensate, all kinds of rail cleaning products, etc. The introduction of NS rail and NS wheels seemed to help all this to some degree.

But are you saying that today's way high-priced HO locos are not equipped with NS (or steel) wheels and tires? What are they... just nickel plated?

~Andy R!

John Hagen

05/06/12 #9207

The problem with steel tires is the rust that accumulates on collectors engines. Collectors are a big part of the hobby (or at least of the model train collecting hobby) particularly with brass. And I am quite certain many of the new, highly detailed plastic, especially also ends up on shelves or put away in their original boxes. For those who really operate their models steel would be fine, in fact preferred to help avoid such things a traction tires and BS.

There used to be locomotive performance contests at the NMRA Convention and various other meets (Are these still being done?). Modelers would mechanically tune up their pets to compete with others from around the country or even world. The only time I ever competed was in the 1985 Milwaukee national with an Athearn Baldwin S-12 (Cary Alco S-2 shell, Sagami 2032 w/flywheels, Ernst gear kits, Blunt side frames (can't remember the manufacturer), frame modified as needed for Cary shell and so the underframe looked like an Alco with full depth battery boxes and dual, center mounted air tanks plus lead stuck any and everywhere it would fit). Well I did okay (maybe third) but not first. No traction tires, BS type substances, railroad sand or road salt allowed, thank you. What with all the adaptable ions floating around in the electronics available today these contests are probably passé, something that would be a loss.

John Hagen

Denny Anspach <danspach@...>

05/06/12 #9208

Because of the poor factor of adhesion posed by nickel silver driving wheel tires on nickel silver rails, I am overjoyed when the nickel plating wears off the treads of those fine brass nickel-plated drivers. All of a sudden, the locomotive begins to actually dig in and pull something. Electrical pitting, etc. is simply not, a problem on a DCC layout, i.e. zip, nyet, nada, and... the wheels stay remarkably clean, in fact with little of no noticeable difference compared to other wheels. I agree totally with Ken Clark re: steel wheel tires:. They would be and are the best, with a very favorable factor of adhesion.

I also agree with listers as to the unreliability of traction tires (they become loose, wear out, and the outfit who would supply or make replacements is nowhere to be found). As to B.S: The brand name is repulsive

enough to not go further, but fortunately there are other more pragmatic reasons not to touch the stuff.

This gets back to the extensive threads on this List on springing. I am convinced that poor springing alone is one of the truly major factors underlying poor performance. Very simply, unless all wheels are on the rails, maximum traction will not be realized, no matter how much weight on the drivers or how many drivers. If you believe that your track is so perfect that your locomotive has all wheels equally pressing on the rails at all times, please think again, because the track is not perfect -especially hand-lay- , and despite appearances, a significant number of the hard-springed wheels will in fact be turning in air..

Denny

Philip Lebow

05/06/12 #9209

Ken,

I have used stainless steel tires on HO locomotives for years. They seem to have better traction that brass, nickel plated brass or nickel-silver. They don't cause oxide build up on NS track.

I tried tires made from bar cast iron (Meehanite actually) and although they gripped really well,
they were very fragile to make and press on.

i made some from sintered iron bearing stock, and they worked well, but were very prone to cracking during installation, frequently cracking off a section of flange.

Mild steel works, but does rust, as was mentioned

i finally settled on 303 or 304 stainless alloys. The tires show no wear after much running.
they clean very easily

I recommend sharp tools to get a good finish. Stone them to a mirror finish before using. Don't put much back rake on the top of the tool.

High speed steel tools will work OK, if you touch them up frequently with a stone. Form the tire tread and flange, before you bore for the wheel hub.
Thanks,

Phil L

---

to Rod Miller from Denny Surufka (CWRailman)

Rod,

All of my work has been in HO scale and with over 200 loco's serviced in my shops, then add those that I own that have not gone through servicing and those of friends, in over 35 plus years of doing 0this I have only seen one model with a ball bearing gearbox and that was a shelf queen. Now most of the models I am dealing with are pre 1995 issue so that may be the reason I have yet to see one come through the shops. I have one ball bearing gearbox in my inventory but no customer has seen sufficient benefits to cough up the money for it's installation so I have never had to worry about the lapping issue. If I

did install it. I probably would not lap the gears for just the reason you are suggesting.

One of the things the retired machinist who, between drags on a cigarette, taught me was to remove the worm and shaft from the gearbox, heavily coat the worm in jewelers rouge, take a damp piece of cloth or sponge and coat it with rouge and lightly wrap it around the worm and hold it between your fingers. (His fingers were smoke stained and that may have helped.) He would then start the worm spinning in the rouge covered cloth. This would remove some of the sharp edges of the worm. You could see the difference with a magnifying glass. That in itself reduced some of the noise in the early gear boxes that had metal gears such as the MB Austin that I mentioned earlier.

Denny (Surufka)

CWRailman

04/06/13 #10639

Jim (Betz)

I would stay away from gear reduction motors as the gear reduction head adds a degree of unnecessary complexity to the drive train, is a source of noise and unless you periodically dismantle the assembly and remove the head from the motor, there is no way to keep the gears in the head properly lubricated and they tend to wear out. This is based on personal experience running narrow gauge locomotives for long periods of time in a club environment.

With a few exceptions the slower the motor starts running the more low end torque it has.

IMHO, for most of our purposes, unless you are modeling the Bullet train or attempting to run at prototypical 70 mph - 100 mph speeds a motor with about a 100 start rpm and 9,000rpm top speed is about ideal. For a while there was a NWSL Sagami 1630 with a start speed less than 100rpm and a top speed 12,000rpm. I found that to be one of the best motors. Roundhouse used a similar sized silver can motor in some of their 1980-2000 era kits with can motors. Those motors had a nice slow start speed and a reasonable top speed.

Unfortunately the 14mm sized Sagami motors had a very high start speed and higher than necessary top speed. That is one reason I would like to see a nice 14 mm x30 mm low speed can motor.

Denny (Surufka) aka CWRailman

From Denny Sarufka (CWRailman)

Steve,

I've said this in the past but I will say it again. First the NMRA weight guidelines (note, it is a guideline, NOT a Standard) are way too high. It was partially compiled by early members who came from the O scale community which at the time preferred heavily weighted cars. Irv Athearn never agreed with their recommendations which is why none of his cars met their criteria for weight and it is less relevant to today's free rolling cars. I recommend using between 60-75% or less of their recommendations. For my 1900-1928 era equipment I use about 55-60% of their recommendations and make sure that all of the cars are within the same limits. You do not want a very heavy car in the mix.

Secondly even though you have metal wheels, check to see if your cars free roll down a 2% grade. Years ago, as a member of the Lake Shore Model Railroad club in Chicago, several of us did a study on rollability. The primary reason was to assist several members who were attempting to pull long trains with single unit motive power. I note some of those findings in Improving Equipment Rolling Characteristics which is a PDF you can download. At that time we insisted that any car on the railroad had to free roll down a 2% grade. I

introduced this concept to The Scottsdale Model Railroad club about 12 years ago and one member built a test ramp which they still use to this day.

Several have noted the impact proper springing can have on tractive effort. I talk about that very issue in Remotoring and Regearing Clinic which is again a free download. However in addition, proper location of weight is also important.

As a loco comes under load going up a grade you need to shift the weight forward just as if you were carrying something up a flight of steps. You do not walk up standing straight up or leaning backward, you lean forward. Considering your grades, to maximize tractive effort on your Mikado's the loco, minus lead and trailing truck should balance over the second set of drivers. No further back than that. A bohemian way of testing the balance is it to pick the loco up by pinching it at the running boards between your two fingers. I have an unsprung PFM Long Bell Prairie that easily handled 16 and sometimes 18 of my free rolling craftsman cars up the clubs 2.5% grades. That loco was weighted and balanced between the first and second set of drivers.

From Dennis Surufka-aka CWRailman

To: Vic,(Bitleris)

Anybody who knows me knows I am not a diesel person and as such I am noticeably absent from conversations about them. However for some bizarre reason I have a soft spot for FA and PA diesels. I have the old Model Power FA's and more recently I had gotten several Proto models of each when I bought a small collection of items years ago. I also have two of the Walthers gas electrics. The two doodle bugs and three Proto diesels all had cracked gears so I ordered replacement sets from Walthers. I actually order four sets of them for the Doodlebugs so I would have spares around as I planned on operating those on my RR someday. Well, when they came in I dropped the replacements into the diesels and discovered that out of the sets they had sent me, two axles had cracked gears. It was not obvious to the naked eye but when inspected under a magnifying glass I could see the cracks and they showed up when the model ran.

Several weeks later I went to install the drive axles in the gas electric and found that out of the 8 geared drive axles they sent me, three were already cracked. Three out of eight is not representative of good quality control. All those cracked geared axles are still in a box buried somewhere in the black hole. The next time I have to do such replacements I will pop the extra money and go with NWSL replacements. I just do not appreciate the uncertainty that I got with the manufacture supplied replacement geared axles.

After reading about it, I did procure four packages of the Athearn gears which I have used on a friends Proto diesels. They worked well and I noted this in a previous post.

Denny

In repowerandregear@..., "Martha E.R" <lar@...> wrote:

> I have been casually following the discussion on the cracked gears so

My apologies if this is redundant. All plastic moldings shrink over time, the majority of shrinkage being in the first minute or so. Some plastics such as acetal (Delrin, Celcon) have a shrink rate of about .025 per inch which is substantial and must be engineered into the mold to get a correct finished size. In order to get a hole in a molded part a pin of the correct diameter is placed and as the plastic enters the mold through the gate it must flow around the pin join on the opposite side and weld together. Where it joins is called the knit line and is the weakest part of the completed part. If the part is press fit on an axle, as the plastic continues over time to shrink it puts increasing stress on the part and it can fail -- usually at the knit line. How well the plastic knits/welds is determined by the material temp, mold temp,

material pressure, cycle time and the material itself. Gears that are cracked while still in the package were incorrectly molded. Nylon and ABS for example are hydroscopic materials which absorb moisture out of the air and must be adequately dried before they are molded or the encapsulated H2O will literally evaporate as its molded leaving visibly imperfect material.

I have been molding a compound gear for about 20 years and at first used Celcon, some of which started to fail years after they were made even though the gear is made for a running fit on a shaft and the part is filled with 3 equally spaced gates. The shrinkage was evident as it's running mate would often be tight on the shaft. About 12 years ago switched to Nylon 6,30% glass filled which totally stopped the cracking --why? because the shrinkage can't occur with the glass fill. I think all of the discussion has been on 3/32 half axle gears. I suspect that the reason the Genesis models went to 1.5 mm axles is probably to maximize the amount of material surrounding the axle even though the trade off is that the axles won't hold as well. I have numbers of blue box outside bearing (metal side frame) trucks that are decades old and have never seen a failure and I suspect that is because there is also more material on the sleeve than the inside bearing style, rather than some secret that Irv did with his molding. (I prefer those trucks because they are easy to equalize and therefore run better. I can't see the detail on the side frames from x feet away anyway) NWSL gears don't crack (unless the minor diameter is too small in relation to the bore size and forced onto a shaft) because they are hobbed (cut) from stabilized material. They cannot make correct replacements for the Athearn gears because they are not "real" gears, ie. they are not involute in form because they are a spur gear made to run against a worm. (Unless they were to have a special hob made.) My question is how prevalent is the problem? I will retire in the next year or so and plan to continue to do some "play" jobs and could easily make these parts so long as I can get my money back. At this point I don't see where to market such an item

Larry Richards

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roachie6042 (Bill Roach)

11/18/12 #9868

Hello from Australia.....

I am a new member on this forum and have stumbled on this thread, which I find very interesting indeed. I model in HO scale, the NSWGR (New South Wales Government Railways). After having amassed a fair collection of brass steam locos in my formative years, I left the hobby for about 2 decades whilst we raised our family. I decided to get back into the hobby a couple of years ago, but as a diesel era modeller. So, I sold all my expensive brass steam locos and then had enough cash to buy a reasonable number of recently imported (from China) diesel locos of NSWGR.

I am also a member of an Australian web forum "Railpage" and there has been some considerable discussion about the propensity of some of these recent diesel locos to suffer from cracked "muffs" (the term I understand to mean the gear cog between the drive stub axles). The symptoms are as you describe.....clicking and less-than-perfect loco performance.

The importer has undertaken to see what the Chinese factory can do, but as they have changed from a manufacturer called "San Der Kan" (spelling is probably incorrect) to another factory, we won't be surprised if the repair/replacement doesn't eventuate. To compound the problem, the width of the gear teeth is deemed to be insufficient and the idler gear/s between the drive cog/s do not always marry-up fully as the drive axles wander from side to side due to the transverse play available.

Sorry for my long-winded response, but I thought you might be interested that the problem is not unique to USA based models.

Regards,

Bill Roach, Kadina, South Australia.


CWRailman (Denny

11/18/12 #9869

Yes, and I have recently found out during a dinner with an old friend that the problem is not just this hobby. My friend owned his own machine shop here in Arizona that specialized in low volume custom components for various industries. One such component was a plastic piece used in medical procedures. Several others were small machined plastic like components for business machines. He retired and closed his shops a few years ago but recently has been contacted by former clients wondering if he was still in business. They said the China made components they were getting were prone to failures way before their life expectancy. They both noted cracks in the materials. The fact that they had left him and moved their business to China where they had to buy larger quantities, was one of the reasons he decided to retire and close his business so he was less than enthusiastic about helping them with their problem.

Denny

davidry@...

11/18/12 #9871

Hi Bill and welcome to the list. We here at NWSL can sometimes help you with a replacement. We cut our own gears from brass and from US-made, pre-shrunk acetyl rod, and although we make hundreds there are some that just aren't practical for us to machine. Here's a link to our gear request form; this is the easiest way to make a gear inquiry.

http://www.nwsl.com/Gear_Request_FORM.html

Oh, and the Chinese company is called Sanda Kan. They used to be their own company until they were acquired by Hong-Kong-based Kader, so is far and away the biggest model RR manufacturing concern in China. Kader also owns Bachmann.

Dave Rygmyr
NorthWest Short Line (www.nwsl.com)

From Denny Surufka – aka CWRailman

Actually Steve (Haas) the worm diameter is a factor. Not in how far it advances the worm gear but in the mechanical advantage it has.

From a mechanical standpoint a small worm will produce more torque than a larger diameter worm all other factors being the same.

In addition a larger worm gear will produce more torque than a small one so for optimum torque applied to the drive axle the desirable configuration is the largest diamter worm gear available with the most teeth mated to the smallest worm that will drive that gear. That is the main reason I prefer to use the NWSL 40t gear in the original United gear box than to switch to the 36:1 NWSL gear box. Besides the additional teeth, the 40t gear has a significant mechanical advantage over the smaller diameter 36t gear. This mechanical advantage results in more torque which results in slower starting speeds.

Now, off to the parts store,

Denny

In a message dated 3/3/2005 8:11:57 AM Pacific Standard Time,
don_worthy@... writes:

hey guys, I've enjoyed the conversations lately! I recently changed to a flat can motor and installed a 37:1 idler gear box (Presion Scale) and driveshaft in a old brass HO scale 2-10-2. I, even, managed to get a small flywheel in it. It is super quiet in forward but, in reverse it makes a good bit of noise. I'm unable to put the noise to words but, I would think that if it is SO quiet in one direction, shouldn't it be in the other. I've checked it with out the boiler, so it's not rubbing. Could someone help trouble shoot this?
thank ya'll
Don W
Ivey, Ga.

To Don, from CWRailman

First guess is drive train noise due to the gearbox rotating against the drive train. The gearbox wants to rotate with the rotation of the drivers. Going forward this is not a problem as it pulls away from the motor. In reverse the gearbox tries to rotate toward the motor. Flexible tubing consumes a considerable amount of motor energy just holding the gearbox in place. I put brackets on the frame, front and back of the gearbox (normally a PSC/KTM idler gearbox). This allows the gearbox to move vertically with the springs on the bearings; but it cannot rotate with the axle. I've seen this reduce no load current draw 35% or more, even when the original tubing was retained. I prefer to replace the tubing with universal drives and it is necessary to have these brackets with a universal drive train. I use K&S 1/4" angle soldered across the frame for these brackets. On many KTM models the valve gear hangar prevent the gearbox from rotating forward, so a bracket is only needed at the rear. Some KTM models used a formed wire around the gearbox to hold it in place, but that is a weaker restraint and frequently would break loose.

...in the far south and west...
.....Ken Clark .....…

Yes, and I have recently found out during a dinner with an old friend that the problem is not just this hobby. My friend owned his own machine shop here in Arizona that specialized in low volume custom components for various industries. One such component was a plastic piece used in medical procedures. Several others were small machined plastic like components for business machines. He retired and closed his shops a few years ago but recently has been contacted by former clients wondering if he was still in business. They said the China made components they were getting were prone to failures way before their life expectancy. They both noted cracks in the materials. The fact that they had left him and moved their business to China where they had to buy larger quantities, was one of the reasons he decided to retire and close his business so he was less than enthusiastic about helping them with their problem.

Denny

Janitor in Training
Re Proto 2000 E6/E8 cracked axles

Correction! I changed out the axle gear on a Proto Geep (4 axle). However, I did change the wheels on the E unit and the six axle E unit did have sloppy, lateral play as I mentioned.BTW, I read on another forum that the early Proto 4 axle were the only ones with the splitting gear problem. I bought Walthers replacements a couple of years ago, at my local hobby shop. The number of teeth are actually different

from the Athearn gears (by plus one tooth, if I remember correctly).

KJ (Kijovesyas)

to Kijovesya from Vic Bitleris

Actually, the Athearn gears are not the same. But, they are compatible, you just need to replace all of them with Athearn gears. You cannot mix them.

Vic Bitleris Raleigh, NC

From mmrichard22

As production manager at NWSL I set up all of the gear making capability and developed all of the gear sets from the creation of US manufacturing in 1974 until I left the company in 1996. Gear growl was horrible in those days with KTM , Tenshodo and early Toby gear towers being some of the worst offenders. Having the ability to make gears at will I spent many hours trying different materials, sizes, combinations etc. in our efforts to make better products. The first thing to understand is that noise is by definition vibration. Therefore anything that minimizes vibration helps. That often means better bearings, tighter clearances between gears and their cases etc. One thing that I could never solve however is the inherent growl/whine from spur gears running at high RPMs. If the gears have too little back lash they will whine. I used to demonstrate this by deliberately misadjusting the" number of teeth gear" on our hobbing machines. Undeniable proof. A pair of gears which is eccentric and too tight will wow-wow-wow. Properly lashed or gears with "too much" lash will always be quieter, but what about the growl inherent in spur gears running at " high" RPMs. I have no proof but have come to the conclusion that since the teeth on spur gears are constantly engaging and disengaging I believe that that that is the source of the vibration/noise. When Athearn and others went to worms driving worm gears there was an immediate observation that these drives were quieter. The worm can be turning at high rpm but the spur gear train is turning at 1/Xth (X = the gear ratio) . Furthermore, the worm is in continuous contact with the teeth on the worm gear (under load). One further comment. PFM's Bob Longnecker once told me that his grandfather had reminded him " you can never wear a gear in you can only wear a gear out". Beware of sand in the gear box.

From George Galyon; 1/1/17

The October 1971 Model Railroader had an article by a Bob Higgins "Loco with Double Chain Drive". The chain/sprockets were purchased from Bohannon Industries now known as Serv-O-Link and the Bel Gear and Bevel Pinion Gear were purchased from Boston Gear Works (P/Ns G478Y-G and G478Y-P) which is still "around" with the same company name. Shaft bushings were purchased from Pic Designs which is still around and located in Middlebury, CT. I think PIC designs could supply the gears also..check their web site.
A considerable amount of lathe work was required to make the necessary brackets and to fit the bushings to the brackets.

Mr. Higgins states that the bevel pinion/pinion gears were made of brass but that the fit was not really to his satisfaction. He also stated that the "noise at light loads is not excessive" which implies that at high loads the noise was excessive.

The object of Mr. Higgins work was to see if a precision motor (a 12 Volt Swiss Instrument Motor) and a new driver system would produce more tractive effort and less driver slippage in comparison to the stock motor (whatever that was???) and the stock drive system. Long story short...according to Mr. Higgins data

the tractive effort did improve from 3.5 oz to 5.5 ozs but I doubt that the new motor/drive train system had much, if anything, to do with this improvement in tractive effort...I rather think the 11.83 oz. lead weight added to the boiler is responsible for the improved tractive force (total engine weight with weight was 33.26 ounces). However, the low current start improvement was undoubtedly due to the new motor/drive system as was the improved speed under load performance.

Rick Knight to Jim Betz 1/13/2017

Jim, Its the worm to worm gear causing the noise which is vibration. Changing the gearbox is the ultimate fix. Before I did that I would take out the gearbox, ultrasonic clean, add a sheet brass cover over the worm. Double check mesh and backlash, re install, mount motor in silicone, add flexible torque arm mounted with silicone and test. This has worked repeatedly for me. Even with a new gearbox I use the flexible torque arm. All testing should be done on DC with with good meters measuring voltage and current draw. It is the only way to know that you are making progress. I suspect the noise would be dimished to a point that sound would be reasonable to do. It looks like speaker in smoke box (TTX mini supersonic), small decoder, and keep alive will fit. Rick.

From Denny Anspach 1/22/2017

NWSL ball slipping on NWSL 1630 motor shaft:

The shaft is almost assuredly 2.00 mm. and in this regard I have also had a lot of problems with the slipping NWSL balls. IMHO, no amount of CA or even Loctite is likely to solve the issue (at least they have not for me).

My first solution attempt is to physically upset the end of the shaft with a cold chisel, two whacks @ 180º so that the ball has something to grab on to. . To do this, It goes to say that the shaft has to be independently and solidly supported (i.e. nested in the trough between two almost closed vise jaws) to avoid bending, but Jim, you know how to safely do this! Another way is to roll the end of the shaft back and forth with a sharp file to create a sort of knurl. In either case a tiny droplet of Loctite may be just the thing to lock the ball in place.

If THIS does not work, then move on to a Hobbytown 2 mm universal set. They hold on as if welded.

BTW, Rusty Rustermier is back in business machining cast brass horned balls for OMI 1.5MM cardan shafting. I can attest to their fineness, their ease of installment, and their reasonable pricing (@3.50).

Denny

Denny S. Anspach MD
Sacramento CA

Denny,
Knurling the shaft with a diamond file works very quickly and easily. You do not mention an equally important part... which is to use a circular steel mini file to create 'threads' into both sides of your gear/ball. Twist the gear/ball onto the file gently till it stops then do the same on the other side. Now, all parts are 'knurled' and when set with Loctite 'Red' will not come loose ever. If you need to loosen the 'Red' later, touch a low wattage soldering iron to the metal motor shaft and the 'Red' will easily and quickly release. Take care...

***Regards*,**

Phil Floyd "***The Shay Fixer***"

@
www.shayfixer.com
and...
on my "YouTube Channel", see model Shays in action!
@
www.youtube.com/Dawglife4me

From Victor Biteris 4/10/16

Re: pressing on flywheels

A vice should work ok, but a press is better. A drill press might work if your careful, but truthfully if the flywheel is a tight fit, there could be problems.

You can try warming up the flywheel in boiling water, for example, and cooling the motor in a freezer at the same time. This will temporarily make the shaft smaller and the flywheel bigger. In any case be careful about forcing it too much.

Regards, Vic Bitleris Raleigh, NC

From Jim Betz 4/15/2016

Hi all,

I thought I'd post the status of my search for more pulling power ...

1) I'm finding that, using lead, I can usually get a medium-sized brass steamer up to "about 1.25 lbs" . Perhaps a bit more, perhaps a bit less. The larger/smaller the loco is the more/less weight you can add.

2) A friend sent me the following "formula" for computing the effective grade when the track is on a curve. For calculating the drag effect of curves on trains, the John Allen formula of 32 divided by the radius gives a fairly close approximation. For example, a 32 inch radius gives a result of 1, which is the amount that should be added to the actual grade. A 2.5% grade on 32" radius would be the equivalent of a 3.5% grade on straight track. The best way I know to measure the actual curvature of an existing layout is

to use those measurement tools you insert between the rails that allow you - in very few "test fits" to know the curvature at a particular point in the layout.

3) The same friend pointed me at smartphone apps that provide an effective way to measure the gradient of existing track. You bring up the app and put your phone on the track and it tells you the grade! Searches for "clinometer" will produce lots of hits.

4) Another friend mentioned a very old "pulling power meter" he has (I think it is called the "Tractometer"). I went looking for fishing scales at Bass Pro Shops and found several that would probably work that had digital readouts. I didn't buy there and came back home and checked eBay and found the same ones - and several others. Search for "digital postal hanging scale" to get the long list. I've selected and paid for one - but it won't be here until next week.

5) The same friend from #4 sent me some actual measurements of several diesels (this is not, after all, a "steam only" topic). The tractive effort followed very closely to the simple weight of the loco and the number of drivers. That's no surprise to me – but it is nice to see the numbers proving the concept in such a consistent manner. After I've gotten a working "pull meter" (#3) I intend to measure a lot of

different locos and create a "Pulling Power Table". I expect similar locos to pull about the same - and I also expect that I will start to develop some kind of "formula" that can be used to -predict- the amount of pulling power that a particular loco is likely to be able to achieve.

6) One of my final tasks will be to modify my existing "locomotive cards" (think "car card for power") and add in the pulling power of the locos (I will probably state it in terms of "number of cars").

7) I also intend to see if I can't develop a similar formula for locos that are consisted - the idea being for a yard master to use it to "know" how much power a particular train requires.

8) One of the 'unknowns' is that we don't have the actual weights or "rolling characteristics" of the individual freight and passenger cars we run. But I expect to be able to come up with some very good... i.e. "usable"... pulling power numbers for my locomotives. I figure that any info is better than just a guesstimate (even though I sort of "just know" already).

Passenger power is a particularly difficult problem - and steam in front of a passenger train is often a surprise - sometimes pleasant and sometimes it is a case of "reality sucks". I tend to run mostly brass passenger cars and experience shows that they do not have predictable rolling characteristics from mfgr to mfgr. And when you add a few plastic cars into the mix then you can really quickly end up having to "test it to see" - and removing cars from the train until it will make it over the layout (the "ruling grade" thing). And often the result is "less than satisfying" (too few cars) -primarily due to typical grades and curvatures on our layouts.
- Jim B. (Betz)

Hi Bud, a little off topic, but do you plan on being at the Hagerstown MER conention this November? I plan on coming and if you go, I would like to meet you and have a little chat about this stuff. Maybe you will even give a clininc (VBG!)
Regards, Vic Bitleris
Raleigh, NC

From: "Arthur Bonello" <bigbud@...>
Reply-To: repowerandregear@...
To: repowerandregear@...
Subject: [repowerandregear] NEW MOTOR COMPARISON DATA
Date: Fri, 20 Aug 2004 20:36:54 -0000

Hi:

Are can motors really better? How do NdFeB conversions compare? For those who are interested in drawbar pull, power or changing to can motors, some very important surprises are in store. For the first time, the unbiased, naked truth about motors is available.

Data on Stall torque and noload RPM with current has been updated and expanded to include 15 common motors for comparison. In addition to the original 12V standard tests, a second series was

run at 5V to compare low voltage performance. Calculated with the abbreviated non-graphical method, maximum power output values are included to enhance comparisons.

From these data, graphs on a par with that supplied by manufacturers can be plotted or practical close estimates can be calculated.

For more details, observations and conclusions; see first site below in motor evaluation.

Hope this helps.
Thank you,

Budb (Arthur Bonello)

Author of: MODELRAILROAD TECHNICAL INFORMATION (http://www.geocities.com/budb3/)

PROTOTYPE TECHNICAL INFO FOR MODELRAILROADERS

(Revised. New address)

http://www.geocities.com/budb3/pindex

Moderator of: MR TECHNICAL HELP GROUP (http://groups.yahoo.com/group/mrtechhelp)

COUPLER HELP GROUP: (http://groups.yahoo.com/group/mrcouplers)

Re Drivers, Bearings, and Siderods,

I am having a very hard time tuning an ancient Mantua Belle of the Eighties (4-4-0) made of Zamak and brass. It has a new can motor and motor bracket from Yardbird Classic Trains. The tender is fine. The drivers will not turn freely (without the motor). They are OK with one or the other side rod connected, but not with both. I have quartered and re-quartered all four wheels (NWSL Quarterer). It appears that at least two of the wheels wobble a little no matter how I try to square them up with the axle. I have tried new driver bearings and have filed them to eliminate any possible catches with the wheel sides or gear. I think that the side rods may have elongated after I pounded them straight. I made new side rods out of 0.02 inch brass. I had to elongate the holes to get the drivers to turn until they now are so elongated that the drivers "go out of quarter" and stick.

Please talk to me about all of this. I think the problem (besides having a very old engine) is that the side rods are the wrong size and the wheels wobble (and I just lost one old side rod in my shop somewhere).

Martin Rosenfeld

Martin (Rosenfeld) ,

When working with a model steam locomotive the only solution is to take it one step at a time and be sure everything is right before moving to the next step.

Start with only the drivers and frame. Roll it on a flat surface and examine the drivers. If you have wobble, then that must be corrected before you go any farther. It might mean trying to find replacement drivers. Not an easy task with an old model like this.

Once you are satisfied that the drivers are true, then check the quartering. You state that you used an NWSL Quarterer. Have you used one of these previously? The reason I ask is that they can be tricky to use

if you are unfamiliar with them. Be sure to read the instructions carefully, paying special attention to the sequence of how the removable slides are positioned. NEVER turn one of the slides 180 degrees with respect to the Quarterer frame when you check the opposite driver for quarter.

Once satisfied that the drivers are indeed in quarter, go to the rods. With elongated holes, you might have to find new rods. If you have the correct rods which are precisely the same length between the holes as the axle spacing and the drivers are in quarter, everything should run smoothly. Never deliberately elongate holes in rods. If you have a bind then it is most likely in the quartering.

One other possibility is that the crankpin screws are not exactly perpendicular to the driver. If one of the crankpins is tilted, and the screw is not bent, it most likely means you need a new driver.

I know I haven't set out an easy task for you, but there is really no other way to go. Good luck, take your time, and be sure everything is right before moving forward.

Bill DeFoe

To Martin Rosenfeld

Since the problem occurs when you attach both siderods it is a quartering or axle alignment in frame issue. Here are some ideas you may or may not have thought of. Brass is more flexible than nickel, make sure they’re not flexing. Check and make sure crankpins are not loose or crooked in drivers. Something that may be occurring, although unusual, is that the axles are not in alignment/parallel with each other in frame. If this is the case you will need to move 1 axles bearings by shimming bearing sides or machining slots in frame to install oversize bearings to straighten in frame,(you may have misaligned axle slots when filing)axles should fit snugly with no excessive play in bearings as bearings in frame should, are your axles possibly worn allowing for loose fit even in new bearings any of this will effect quarter. Measure center to center of driver axle ends with compass(drivers in frame) and use this measurement for drilling holes in new siderods. Solder the 2 pieces of brass siderod material together drill and shape now unsolder them and you will have IDENTICAL siderods. After drilled hold up to axle ends and visually check for correct length, You say you have wheel wobble, you may need to put some thin spacers(washers)between siderod and driver on crankpin make sure shoulder on crankpin is long enough that when crankpin is tightened that driver siderods and bushings turn freely you need some endplay when crankpin is tight to allow for driver/axle side to side movement in frame I would take drivers out of frame and attach siderods to drivers to make sure they turn freely. Greenway and precision both have crankpins/I believe you can get different styles/sizes of bearings also from these sites. NWSL has bushings/thrust washers. I have used these in siderods where crankpin holes have become elongated rather than fabricate new side or main rods.
Hope this helps.
Alan (albymo)

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To Martin (Rosenfeld)

From: Victor Bitleris

> You already have received some very good advice, but heck, I may as well add my own suggestions.
>
> 1. Generally, Mantua drivers never need to be re-quartered, they have splined axles and should be

good unless they were bad to begin with. If one driver set wobbles, it is likely bent or something and you need at least one new driver. Dan at Yardbird trains does have these drivers. They are 72" drivers with square counter balances and brass tires. If there is any question about these, get two new drivers. But before you go to that expense, make sure your frame is good. Check number 2.

2. Once side rods are elongated in an attempt to make it work, they are no longer any good. Scrap them and make new ones. Get a set of calipers and check the frame to ensure the axle slots are correct. It is very unusual that Mantua frames have messed up axle slots, unless someone has taken a file to to them or it took a dive to the floor. Lets hope that never happened. Use the calipers to get the correct rod hole spacing, it should be 1.25". If not, there are other problems and they should be corrected first. The driver and side rod spacing should be 1.25"... period. If you need a new frame, I don't know if you can get one. Making a new frame is not impossible, but does require good machinist skills. Mel Thornburgh had an article a long time ago on building a 4-4-0 using a Mantua Belle of the 80's frame and drivers or you could just buy the drivers and make your own frame. He explained that in very good detail. It would be a LOT easier if you can get a new frame if needed.

3. The bearings should need VERY LITTLE touch up with a small rat tail file, not much at all. If you filed them too much Dan at Yardbird trains has these at very reasonable prices. Get both sets, one long and two short ones.

When you have corrected the above three items and are ready to to put the loco back together, first just set in the drivers and bearings and the bottom plate. Then try to roll the assembly on a piece of glass, it should roll smoothly. If you do not have a piece of glass, use some other very smooth surface. You can start with a piece of flex track initially, but you want it to roll without any hitches on a smooth flat surface. This is without the side rods, keep it simple, one step at a time. You may need to file the frame plate at the drivers with a small rat tail file. If the drivers are tight after you tightened up the bottom plate, back off the screws a bit and see if that helps. If not, maybe the bearings need a bit of filing, but I would do that as a last resort. Make sure there is a bit of oil in the bearings first. Once you get this going, put on ONE side rod and try it. Hopefully, you will not need to enlarge the side rod holes. If you do, use a small rat tail file and enlarge them slightly, not much. Do NOT elongate them, for sure that will cause binds. When that side rod is good, (hopefully no need to enlarge), then take it off and put the other one on and make that one work. When that one is good, put the other back on and see what happens. Hopefully, you will be ok.

Good luck and regards,
Vic Bitleris
Raleigh, NC

From Martin Rosenfeld

To: All

I have tuned my balky engine paying special attention to its brass U shaped bearings and side rods. I made new side rods with the holes drilled precisely to correct spacing. The wheels now roll smoothly with no motor mounted (glass sheet test). It runs well backwards, but has a hitch running forward. I don't have a word to describe what it does running forward (wheels off of the ground), so I will describe it.

If you hold the can motor with worm attached to the shaft in one hand, you can pull the shaft forward out of the motor about 1 mm. It will snap back when let go. When running forward with no load the worm and shaft move forward and snap back repeatedly, making a "thud" sound. It does not appear that the worm is slipping on its worm gear, but I am not certain. What might be causing this?

Martin Rosenfeld

From: Victor Bitleris

To: Martin Rosenfeld

Hi Martin,
You are getting there, just keep plugging away and you will get there. Since you don't really detail when you have the hitch going forward, I will guess that it occurs when you push it on the glass with the siderods on and no motor. That would definitely make the motor do what you are seeing. A can motor normally has a bit of "pre-load" with that amount. If there is no hang up or hitch in the chassis, it will never be a problem.
So, maybe you can clarify about when the hitch occurs.

No siderods on while being pushed on the glass.
The right siderod when pushed on the glass.
The left siderod when pushed on the glass.
Both siderods when pushed on the glass.
Only with the motor running.

I will guess that it occurs with both siderods when pushed on the glass. I am also hoping the siderods have almost no play around the siderod screws. If they already have play, that is not good. A test of siderods is when you have one end fastened to one driver, it should swing freely all the way around with no hitches, but it can't be loose or sloppy at all. Check each siderod end with its respective driver to ensure there is no hitch on any of em. Make sure there are no burrs left from the drilling operation. File them off and use a round rat tail file to round up the hole again. Once you are certain they are nice and smooth and no play, then take a REALLY close look when you are very slowly pushing the loco. At some point it will slow/stop. At this point, you will want to use a needle or scribe and very carefully feel to see which siderod/screw is bound up. It make take many tries to find the actual culprit. But, you gotta be honest with yourself about the prior tests. Once you are ABSOLUTELY certain which siderod screw is at fault, use a round rat tail file and open the hole a bit, do NOT elongate it. It MUST stay round. Do very very little and check after every try. You may find that you need to open up more than one hole, but I hope that is unlikely. And you should never need to open more than one per side. If you feel that you need to open more than one hole, then most likely there is a different problem.

On the other hand if the chassis rolls perfectly smooth with barely pushing it in both backward and forward, you could have a gear issue. I would suspect a gear issue if the hitch happens at a specific spot EVERY time. You can mark the gear with a black marker to be able to see if the snap is at a regular spot. The mark will always be at the same position if it is a gear problem. Keep in mind it will not be at the spot you marked. If the hitch or snap back occurs randomly, it is not the gears or motor, but most likely the chassis assembly. Mantua's gears are not the best, but they aren't bad either. I suspect the worm is ok, but look at it very carefully, under a magnifier and see if there is anything in it at all, dirt or machining swarf, etc. But, also look really close at the gear itself. This is a plastic molded gear and may still have some molding marks and dirt in it. Look for any obstruction possible and clean it up. You may need to use some very fine sandpaper (600 grit or finer) to clean up the gear.

Vic Bitleris

To: Martin Rosenfeld

From: Ken Clark

Martin,
The symptoms you describe are typical of a gearbox with excessive end play on the worm shaft. On an

enclosed gearbox NWSL thrust washers can eliminate most end play, as will connecting the motor to the gearbox with a good universal. For an old style open gearbox with a worm mounted on the motor shaft, not only may the worm gear become poorly aligned to the worm, but the end play in the motor becomes the end play of the gearbox. Typically, better motors have less end play. Mellor used to make a worm bracket to use on Mantua engines to greatly reduce the end play and alignment issues.

To: Ken Clark and Martin Rosenfeld

Hi Kenneth,
In this case, I doubt that the excessive play in the motor is the case. The type of motor/worm/flywheel combination Martin is using is one of these:

http://www.yardbirdtrains.com/YBMotorIndx.htm

Ordinarily they work very well and should not cause a problem. The can motors used don't lend themselves to washer shims as did the open frame motors. Considering Martin's description at the this point, I am more inclined to believe some worm to gear issue. Hopefully it is nothing more than foreign matter in the teeth or some web or flash in one or some of the teeth on the plastic Mantua gear. It is very unusual for one of these flywheel/worms to be bad, but if that is the case, I am sure Dan at Yardbird trains would gladly replace it immediately.

The one thing that puzzles me in this case is that the problem only occurs on forward and not reverse. I do agree this happens often on open frame motors where the armature shaft has back and forth play, but I can't believe this is the case here, because the can motors are built with a pre-load that should negate that effect. The hitch or bind must be significant to make the can motor act in that manner. I do believe also that using an NWSL gearbox and can motor with a torque arm and universals is technically the best way to go, but it is also the costliest and largest work effort as well. I have done this and quite honestly, I question the effort and expense as compared to one of the combos like Martin is using. The motor/worm/flywheel combinations by Yardbird trains and Alliance locomotive (Helix Humper) have a very good reputation, but sometimes there are other problems.

Regards,
Vic Bitleris
Raleigh, NC

From: Ken Clark

To: Vic Bitleris and Martin Rosenfeld

Vic,
The bearings in many can motors are not nearly as stout as those in the older open frame motors and can quickly develop excessive end play. Coreless motors especially need the protection afforded by universal drives. Maintaining proper gear mesh is key and this is difficult to maintain in gearboxes where the worm is positioned by adjusting the motor position. I've rebuilt open gearboxes by adding end bearings and separating the worm shaft from the motor shaft; without reworking any of the rest of the drive train the end play "bucking" disappeared. I've found good bearings at model RC Car stores that I use in rebuilding PFM shay gearboxes. At $2 each, not as cheap as I hoped but far cheaper than a new gearbox. After a couple of tries it becomes pretty easy to build a bracket to hold the worm/shaft in proper position on the worm gear. In many older engines the selection of a motor is restricted by the motor mounting angle that forces the motor against the frame in order for the worm and worm gear to mesh.

A better solution would be a bolt on reverse worm gear and worm upper gearbox that could be bolted onto the frame making the gearbox into an idler gearbox and eliminating the motor mounting angle. With the motor mounted parallel to the frame, a larger, longer, and typically slower motor could be installed. Many

years ago NWSL did this with some of their tank mallets, selling new idler gearboxes to mount onto the geared axles of their older non-idler gearboxes.

Kenneth R. Clark P.O. Box 127054

A case in point - I was rummaging around in a box this past week and 're-discovered' an A+B set of HO P1K F3s. I popped the shell off and saw that doing a decoder install was easy. So I installed a 2-function TCS BEMF decoder, programmed it with DecoderPro and tested it for slow speed. Excellent. I turned off the BEMF and it ran like the proverbial piece of crap at slow speeds - had to be up to a scale speed of about 15 mph before it smoothed out. No amount of 'tuning' would make it run well at slow speed (without BEMF). I set it back to use BEMF and it ran like a dream again. So I installed a decoder in the B unit, set it to the same address, programmed the motor the same way as the A - and it ran just as well. Then I took them to a real layout and consisted them with some Stewart F3s. Nothing to do - they ran together beautifully right from the get go. I then ran a consist of eight(!) F units, 6 of them were Stewart's and two of them were the P1Ks above. One of the Stewarts has a Tsunami sound decoder, most of them were a mish mash of TCS T1 decoders of various versions (all BEMF), one of them is the very latest TCS with BEMF and one of them is the earliest BEMF decoder that TCS did, one is a Stewart with a non-sound Tsunami decoder. And they all ran together beautifully as long as you didn't twist the throttle too fast all at once (different momentum settings in one or two).

11/25/11From Scott (Iner2512) 11/25/2011

I recently bought a Pull Meter from Micro Mark; it is a digital device that measures tractive effort. After playing around with a bunch of locos, I compared two that I was interested in because of the differences in their tractive efforts.

Two of the locos in my test were articulateds, one a stock Bachmann 2-6-6-2 and one a newly kit bashed 2-6-6-2 that I mounted on a PFM United Sierra Railway frame and drivers, with a can motor and the original gearbox. For this test, I added weight to the Bachmann so that both weighed just under 24 ounces, then tested both for tractive effort. The Bachmann pulled 3.1oz, while the kit bash pulled 4.47 oz. I added two more ounces to each loco--the Bachmann pulled 3.58 oz while the kit bash pulled 5.55oz. I added another 1.6oz to each loco—the Bachmann pulled 4.23oz. and the kit bash pulled 5.82oz. (Each of these pulls was repeated five or six times and the results were averaged to reduce measurement error, but the individual pull results did not vary much anyway.) You can see the pattern and I think I can explain it.

Like most, the weight on Bachmann's articulated sits on the rear engine. While the front engine is free to swivel, it does not support the front of the locomotive. So when I added weight to the Bachmann, I had to concentrate it on the rear engine to maximize tractive effort (I tried adding weight to the front porch but the results were worse). The front engine just can't add that much power because of the design. When I divided the Bachmann's weight by its tractive effort averaged over all the tests, I found an average tractive efficiency of 12.9%.

The kit bash articulated not only pulled more at the same weights, it averaged a tractive efficiency of 19.7% and I think I know why, but this post has already gone too long. I'll post some photos of the kit bash articulated along with another long-winded thesis later.

Cheers,

Scott

From Scott (Iner2512) 11/25/11

Since about the mid-1800's, prototype locomotive suspension has used the "3 legged stool" approach to ensure proper balance--supposedly, a 3 legged stool cannot be positioned without all 3 legs supporting it. British modelers use this approach in much of their model locomotive construction but I've never heard of it being done here. When I kit bashed the Pickering #70 2-6-6-2 now in my Photo File, I tried this approach, and it seems to have worked.

Pickering #70 is a Bachmann 2-8-0 boiler fitted with a Mogul cab and mounted on an old PFM United 2-6-6-2 mechanism. All the drivers are sprung, but unlike other articulated mechanisms I've seen, there is a sprung support in the front engine that is designed to bear against a flat spot on the boiler. I modified this support by mounting a ball-bearing vertically at a 90 degree angle to the center line of the boiler, so that is could roll across a flat piece I epoxied to the bottom of the new boiler. That meant the front engine could bear some weight, but how much? And what to do about changes in grade?

I decided to swivel the rear engine on a vertical axis instead of bolting it to the boiler. I soldered vertical supports to each side of the frame at about the mid-point of the rear engine, epoxied two tabs to the boiler to extend down to the supports, drilled and tapped the tabs and supports and inserted a 1-72 screw in each support so that the rear engine rotates around these screws. Those two support points are the only place the rear engine, frame, etc., actually touch the boiler/cab assembly.

And that's the 3 legged stool--one leg under the front engine, two under the rear engine. I did not add any weight to the boiler shell, but the loco's weight seems evenly divided between the front and rear engines. The loco has more tractive effort and is much more efficient than the comparably weighted Bachmann loco. I think it is because all the weight rests on both engines in a way that keeps it steady and equally divided between both engines. One other thing--when I tightened those screws down to prevent rotation, the tractive effort and efficiency dropped from 19.7% almost to the Bachmann's level.

I'm no scientist, but this little test was fun. I'm already modifying a non-articulated loco in a similar way. And I'd like some feedback, especially from the other side of the Pond, where you're probably all chuckling!

I posted this info on the On30 Conspiracy board as well, but I thought the technical aspects of comparing tractive efforts and suspension systems might be of particular interest to people on this board-and might elicit some well-informed responses.
Cheers,

Scott

From Ken Clark to Scott (Iner2512) 11/25/2011

Scott,
A couple of thoughts, First many of the Japanese articulateds had a spring loaded support for the front engine. KTM used a pin; PFM on some of their Sierras had a roller; Sunset and others tried a wide spring loaded pad. Most were partially effective, having problems on sharp curves where the downward force was directed outside the rails promoting engine tilt. Real mallets could never go around tight curves like our models.

Second on most brass models the rear engine is attached at the rear under the cab and in front at the rear cylinder saddle. Additionally there is a spring loaded drawbar connecting the front and rear engines. The connection between the front and rear engines is important in transferring boiler weight to the drivers. From your description I saw no mention of what is supported by the rear cylinders. or how the weight is transferred from the boiler.

Kenneth R. Clark
P.O. Box 127054
San Diego, CA 92112

From John Hagen to Scott (Iner2512) 11/26/2011

The Mantua 2-6-6-2's do not have a problem with rather sharp radius curves using such a system to put some weight on the front engine. They use a bracket with a flat rectangle on its lower surface mounted to the underside of the boiler. The front engine has a spring loaded ball that presses upward on the bracket. This is most certainly a similiar arrangement as on some brass imports. Never having owned any, I really can't say. My Mantua runs fine through Atlas #4 turnouts including a crossover made up of two #4's.

Back in late 1961 and early 1962 there was a multi-part article in MR titled "The Art of Superdetailing" including the Big Boy. In part 3 (February 1962) the author, Bob Darwin, wrote about "Designing good running gear." He modified a brass Big Boy to include a prototype type weight transfer device that also made the front engine "lead" the loco into curves. The whole gist of this installment was to have the model have the same sort of weight distribution and equalization as the prototype. IMHO, the whole set up is too complicated for the average modeler and I doubt it would work all that well when scaled down. Dimensions can be scaled but not the "mass" of a model. I have no idea how this would have affected tractive power but it is an interesting read.

John Hagen

From Graham Collins to Scott (Iner2512) 11/27/2011

Your experiences with the two locos is very interesting and I find it confirms some of my own results from comparing various locos tractive efficiency or pulling power.

A few years ago I started to investigate the differences in pulling/tractive power of various locos, both steam and diesels and arrived at some interesting results. The only real way to measure the pulling power of a loco is the efficiency of it.

Obviously the biggest influence on tractive efficiency is loco weight. The more weight a loco has the more cars it will pull, but obviously you cannot weight it up that much that the motor becomes overloaded.

However the material that the wheels are made from also has a big bearing on the results.
I have only nickel silver rails and found that nickel silver wheel sets are the slipperiest that I have experienced. I have a brass wheeled steamer which pulls reasonably well once the wheels are cleaned, but for my money the best traction I could get from various wheel sets was Athearn's older sintered metal wheels.

Having been told that nickel silver wheels give better pick up I changed a loco's wheels from the sintered to NS and was very disappointed in the result with a drop of about10% or more in the tractive efficiency. I changed the wheels back to the sintered ones and the loco improved back to its original figures. I have never had much of a problem with electrical pickup and this is in spit of my layout being adjacent to my wood shop. At first I used Whal hair clipper oil on the rails and this ensured good electrical contact, with the downside being that plastic car wheels picked up a crud over time and required cleaning. I am now using motor vehicle auto transmission oil instead of the Whal oil and the plastic wheels pick up less crud, while electrical contact remains excellent.

I have been quite disappointed with the pulling capabilities of some of the newer Athearn Locos and have changed the wheel sets to the old sintered ones with a marked improvement in tractive performance, from pulling16 odd cars to 18 to 20 around my layout. The most efficient loco I have is a three truck Rivarossi Heisler at 23% even though the loco only weighed 13 oz. but could pull about 4oz. This was after extensive

tuning and adding weight where ever I could.

With diesels I was able to get an Athearn FP 45 up to about 20%, this was after repowering and adding some extra weight to the chassis. This particular loco will now pull 26 cars.

All my testing has been done with the same cars, Athearn ACF hoppers, all weighted up to 5 oz.

I would also like to add that the design of the model also seems to have some bearing on the tractive efficiency of the loco. I have found that different locos within a Manufacturers stable have quite differing tractive efficiencies. You would expect 4 axle and 6 axle locos to be quite different but this is not necessarily so. In my experience an Athearn F7 is more efficient than an Athearn SD40-2, GO ASK? Maybe all the wheels are not making good contact with the rails?

From John Hagan to Graham Collins 11/27/2011

I absolutely agree with you regarding tire material affecting traction.

Several years ago I had an Athearn Alco S-2. Originally am Baldwin, I put on a Cary shell, put an Ernst gear set in the trucks, replaced the Athearn motor with a Sagami 2032 with brass flywheels and stuffed as much lead as possible in every nook and cranny possible. It weighed a tad over one pound. I used it on my Timesaver module, never challenging it power. But on a friend's layout, it would move huge (for HO) cuts of cars. Now he weighted his cars to one ounce over NMRA standards. His rolling stock consisted mainly of 40 footers. I never tried to determine the max number of cars it could switch but the longest cut I switched was 56 cars. I counted as it was such a long looking cut. Cal also had a Cary shelled SW 1500 on a Hobbytown drive. It also weighed a ton and could out pull my S-2..... providing one didn't stop at the wrong spot on turnouts where the Hobbytown's four wheel electrical pick-up would lose contact. When this happen on one hard to reach yard, we'd send my S-2 to drag the heavy dead beast off the switch.

Comes Command Control (no, not digital cc, way too early on) and he insisted all locos on his layout must have nickel silver wheels. Simple change for my Athearn based unit (more of a challenge for all his Hobbytown's but he did it). Again I never tried to determine exactly how many cars the S-2 could move but I soon learned that around 40 seemed to be the limit. The only other change I made was to add the receiver. I did not have to remove any weight (albeit I should have as the receiver would overheat and stall after a few minutes).

How to handle this problem depend on what the individual modeler wants. If sound is an absolute necessity, nickel silver wheels are also a necessity. If pulling any sort of a train is also a necessity, traction tires are also a necessity. Talk about going backwards.

If sound is not involved, I feel that nickel silver drivers are not needed. All wheel pick-up with sufficient weight on those drivers should be all that is needed even with dcc. On steamers, besides having the drivers doing the pick-up, the tender wheels, which could be ns, can be used in addition. Any wheel on the rails should be used for pick-up with the possible exception of lead and trailing trucks on steamers. Many of these have little weight would probably derail if any wires were attached.

Weight and tire material are likely the main components of traction. Weight distribution is probably next and equalization, proper springing also help IMHO.

John Hagen

From Scott (Iner2512) to Graham Collins 1127/2011

Graham,
I recall those Athearn sintered wheels and their outstanding traction, and I still have a few around. How would they work with DCC? I'd like to use them, if possible. And I agree with you on the slipperiness of nickel silver, but that seems to be the standard these days.

I've now tested fourteen other locos, found the most efficient are the little four-wheelers like Bachmann's gas-mechanicals, but don't know why yet. The least efficient are the mallets, which is why I started there. I tested three mallets, including one with the boiler mounted conventionally on a NWSL chassis, which was the least efficient of the three. I focused on the two larger mallets because they have almost the same driver diameter and wheel-base, I could easily make their weights the same and one is a stock Bachmann.

There are only two real design differences between the Bachmann and my kit bashed mallet; the kit bashed loco is sprung and uses my three point suspension, which allows me to weight both its front and rear engines about equally while allowing the rear engine to better follow track irregularities and grade changes. My tests seem to indicate that three point suspension is the reason it is more efficient than the Bachmann. Springing my also have an effect and I'll try to isolate that in a further test, but my gut feel is springing doesn't much affect tractive efficiency because the springs are typically too strong.

Both the mallets in my test ride on nickel silver wheels and track, and my kit bash mallet picks up current via all the drivers and all tender wheels; none of that should affect efficiency, I believe. All the tests were conducted on the same point on level track to minimize other variables. What I cannot do until we assemble our entire Yosemite Short Line exhibition layout is test the locos under actual operating conditions, to see how many cars they will actually pull and what happens on our sharp curves.

ITM, I'll keep testing using that Pull Meter and I'll post any results that are interesting. I'm testing some four and six wheel locos now, trying to see why the four-wheelers are more efficient, and I'm wondering if weight per axle has a bearing on the results.

Cheers,

Scott (Iner2512)

From Wayne Roderick 1/03/2006
Looks like it's time to make my first contribution to this list. I Have an old version Big Boy that I rehabbed years ago, so I dug out the notes. The following text is verbatim and a link to a sketch is her:
http://www.ida.net/users/tetonsl/railroad/4000motr.jpg

Notes on the extensive work done on the AHM 4005 – 11/5/94:

- Axle worm gear has 16 teeth driven by a 7 turn worm. Ratio is 2.29/1
- Vertical drive shaft has a 13 tooth wormgear driven by 1 turn worm= 13/1/
- Total reduction ratio is 29.71
- Wheel diameter should be 68" but is undersize at about 60" to accomodate AHM's deep flanges. 60" wheels make 336 revs/mile and at 60 miles/hour its 336 rpm.
- Hence a motor must turn 336*29.71 = 9980 RPM with 12 volts for scale speed. Wheel diameter might be corrected with a 4" tire and it would sure look better. 4"/87 = .046. Pretty tricky to machine.
- The horizontal drive shaft in the boiler is about .25" off center, so the biggest Sagami motor that can sit on a satisfactory angle to drive it via U-joints appears to be the 2236.

- The 2236 fortunately has a no-load speed rating of 9800 RPM- very close to our calculated requirement. Its rated 6600 RPM at full load of .47amps.
- Installation required major butchering in the cab area including cutting off a chunk of the cab weight and old motor mounts.
- Weight was added to each engine unit in the form of lead shot and lead blocks. Approx 1-1/2 ounces each.
- The leading and trailing trucks had weights added and springs removed long ago.
- The engine does not need additional weight located high, but I think that more weight in the axle/wheel area will increase stability and reduce rocking.
- The friction loss in the engine (on blocks) draws about 0.2 amps and according to the performance charts this results in about 9000 RPM for a speed of about 9000/9980*60 = 55 mph.
- Drawbar tests indicate the motor will stall and burn up with just the weight of the engine without the shell & cab. The traction tires must GO!
- Boiler roll was minimized by replacing the riveted swivel connection on the front engine with a 3-48 bolt.
- Traction tires are gone, 11/7/94. Swapped with Len Brotherton who wanted more traction for his big boy. His has a big diameter, short length motor that bolts right onto the old mounts. No idea where it came from. Helped him do some work on it. Found his boiler roll was already minimized by the "bolt" fix. His runs good, but hasn't been load tested yet. Mine now slips with about 1.0 amp @ 12v. The continuous rating is 0.47 amps. Not too happy with the load limit, or the high slip current.
- Speed compares favorably with other diesel units.
- Under size wheels irritate me. The oversize flanges require under size wheels. They should be 68"-> .780". They are about 62"→.720". 1/2" emt is.690 OD, .610 ID. It could be shaved, cut and swedged to make a tire. Would have to lathe mount it on 5/8 cold rolled (.630) slightly trimmed to work it.
- Dual motor idea. Appears to be plenty of room for another motor to drive the front engine. Would have to mill some material out of the big weight slug and replace it elsewhere. The engines would now be unsynced- a nice prototype idea. Clamp the motor to the slug to dissipate heat and protect the plastic superstructure.

=====END of NOTES, begin further comment

It's kind of neat to see one truck slip while the other still has traction but the engine will fail if you load it down and run for a long haul. I did that and left it running on a club layout on a show day. About thirty minutes and One of the upper gearboxes overheated (plastic) and failed.

A FUNDAMENTAL problem with this old drive technique is the HIGH torque/low speed vertical drive shaft (worm is on top). This puts a twist to each truck so they are trying to climb the rail on one side. The heavier the load, the worse the climb. Cut down the flanges, like I did and you can't keep it on the tracks. FIX-> Select a coil spring and parallel it with the link between the trucks- It helps dramatically.

With the flanges cut down, they look "sick" with the big gap between under size wheels.

Wayne in Idaho

At 01:02 AM 1/21/2006, Roger Perry wrote:

> **One technique I have not seen discussed is mounting with RTV Silicone. I have constructed brass strap motor mounts and just laid a bead of RTV on it. Set the motor can, flat or round, in the RTV so that it does not touch the brass to isolate the sound, and 24 hours later you have a great isolated motor mount.**

I've done all my steam engines this way with one very important addition! Carefully block the loco so the drivers are lined up in position but not touching rails. Put an ammeter in series and apply enough power to get the motor running slow. Push, prod, toothpick shim the motor (or whatever it takes) to get the smoothest running and minimum current. Walk off and leave it running that way for a few hours while the silicon sets up.

Nope- not my idea, but a good one.

Wayne in Idaho