SAWMILL FORUM

CASEY CREAMER

SAW DOCTOR

I have an old hand-set Corley circular mill. I have been using this same mill for a lot of years and in all of that time I have never stuck a saw. Yesterday as I was sawing just an 18" hardwood log, all of a sudden the saw stopped and the motor kept right on turning. Once I shut everything down I discovered that the shaft broke right inside of the third of four bearings. Should I have it welded back together? It's a very long shaft so it will be hard to replace it.

How odd that your shaft would break inside of a bearing instead of shearing the pins in the collar. The lug pins in the collar serve two very important purposes: One is to drive the saw and keep it from spinning inside the collars. The other is to serve as the weakest link in the system, so that when something has to give, it will be the pins that shear off instead of the saw or the mandrel. Needless to say, saws or mandrels are much more expensive to replace than a couple of lug pins, not to mention the price of pulling the mandrel out to put it in a lathe to get the collars resurfaced.

That said, it is important to note that anytime you shear the pins, you should definitely have the collars resurfaced because the saw stops while the fast collar continues to spin and that removes metal from the collar and deposits it onto the saw. Don't let anyone other than an experienced saw doctor remove the collar metal from the saw because a novice can easily ruin the saw forever by doing it the wrong way. Then find a good machinist to remachine both collars.

Knowing that the pins are supposed to shear first, let's see if we can solve the mystery of why the shaft broke. During our phone conversation, you let me know that you were using plain cold rolled steel pins, which means they were soft enough to do the job and not made out of any hardened tool steel or exotic metals.

These shafts don't break all that easily, so I assume you had more than one issue that would cause that shaft to be weak. You said that you were over-greasing all four of the bearings on a regular basis. What is the harm in that? Simple, a new bearing should only be greased once or twice annually—at most, and even then just one shot of grease is enough.

Two things happen when you over-grease a bearing. First, the extra grease inside the bearing creates friction because there is no longer sufficient room for everything to turn freely. The other thing that happens is that if you over-grease it enough, you will ruin the seals. Once the seals are blown, there is an opportunity for corrosive and abrasive saw dust and other contaminants to sneak inside and eventually wear out the bearing surfaces. Either way you end up with some heat in the bearings that will travel to the shaft and eventually even travel to the saw itself.

We all know what happens when the heat travels to the saw: it changes the tension. You can well imagine that the heat isn't doing the shaft any good either.

The other contributing factor I see here is that you have four bearings on that mandrel. I fully understand that with a mandrel that long, you have to support it one way or another. Here is the problem: When you have just two bearings on a shaft, they will always be in line with each other. How easy is it, for example, to put two dots on a piece of paper and with the aid of a straightedge, draw a straight line connecting them? Now put three dots on a piece of paper and see if you can get one straight line to connect all three, no matter where you place them. Even when you try to place them perfectly in line with each other, you find out when you try to connect them with one straight line, that they never quite line up.

The same thing happens when you try to put one straight shaft through three or more bearings. It is not impossible to line up all of the bearings both vertically and horizontally, but it is quite difficult and time consuming. The worst part is that if you do actually succeed in getting all of those bearings in close to the same plane vertically and horizontally, as soon as you tighten the belts or any part of what is supporting those bearings moves slightly, you are back to having a long shaft that is not lined up properly--not to mention what happens when you try to adjust the lead a little. You have to

start again from scratch.

I'm not saying that it's okay to try to support a long mandrel with only 2 bearings. But there is a better way to go about it.

What I think happened in this particular case was that there was heat in the bearings because they were constantly being over-greased. And misalignment of those four bearings was adding even more heat.

Heat is not the only issue. The fact that the bearings were not in proper alignment caused the shaft flex at one or more points, so that it was moving back and forth on every revolution that shaft ever made in all of those years that this mill has been in operation. Everyone knows what happens when you take any piece of metal and bend it back and forth a number of times. Eventually it will crack and break. Even a stout piece of steal such as a 2 7/16" shaft that is just slightly bent, will over time, eventually crack and break.

Now, band saws flex back and forth every time the band wheels make a revolution, but unlike a shaft, they're designed to withstand it. Theoretically, it is possible to wear out a band saw blade just by running it on the wheels without ever sawing a stick of wood. Of course it would take quite awhile, but eventually it would happen. Fortunately, wide bands usually wear out from sawing and being sharpened to the point where they are too narrow to work properly on the band wheels before they wear out by just being flexed back and forth on the wheels.

As long as we have solved the mystery, I suppose it is time for the saw doctor's prescription for how to remedy this problem in a cost-effective way that also keeps it from coming back.

You already have a mandrel that is broken into two pieces. Great. Make a nice clean cut on the shaft a few inches after the second bearing. Now put on a flex coupler to mate the two shafts between the second and third bearing. This way you won't have to replace the whole mandrel and you will never have to worry again about having to find a place that can make you a mandrel that long. Better yet, instead of having one long shaft running through four misaligned bearings, you will now have two shafts, with each one perfectly lined up between two bearings. Yes there will be some misalignment between the two shafts, but the flex coupler is designed to handle it.

Now you have two more issues to deal with. You really should check all of those bearings out to determine whether they have been ruined by the combination of too much grease and sawdust infiltration, or whether you can get away with just cleaning them out and loading them with the right amount of grease and learning how to only grease them one shot, once a year.

The other thing that worries me a little is the condition of the remaining mandrel. Certainly it must have taken on some sort of internal twist before it finally gave way and broke. So that needs to be checked out very carefully with a dial indicator to make sure that it is indeed okay to use. While you are at it, it isn't a bad idea to take it to your local machinist and have it resurfaced and the rest of the shaft checked for straightness.

Questions about sawmills and their operation should be sent to Forum, The Northern Logger, P.O. Box 69, Old Forge, NY 13420, FAX #315-369-3736.

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