Pull Out of Line

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Willing to think outside the box? If so, take a look at a process that increases the life of hydraulic pumps by 11-fold and more.

Pump components (frosty from cold) removed from a cryogenic processor for a few minutes for inspection.

Successful maintenance managers are much like NASCAR drivers. They often take advantage of the "draft," learning as they follow the leader, but continuing to look for the opportunity to pull out of line and move into the lead.

Consider Dave Waller, for example. Waller is maintenance superintendent for automotive plastic parts manufacturer Collins & Aikman's three Rantoul Products plants in Rantoul, Illinois. The plants operate 24 hours per day, 7 days per week, and Waller's good record keeping confirmed that untreated granulator blades become dull and have to be replaced every two to three months.

Waller was then introduced to the process of cryogenic treatment, where a pallet of these individual blades would be introduced into a computer-controlled chamber. Liquid nitrogen would be converted into a gas before it enters the chamber, so that at no time would liquid nitrogen ever come into contact with the blades. This would eliminate the danger of the blades cracking from cooling too rapidly.

Conventional electrical cooling would reduce the chamber temperature to minus 100-deg F and the blades would enter a deep freeze state. At this temperature, the liquid nitrogen system would cut in and the dry vapors of liquid nitrogen would be used to cool the blades to the desired cycle. The electric cooling would hold the temperature of the blades below freezing to prevent condensation and rusting.

Cryogenic treatment would remove the stresses in these blades, thereby stabilizing the blades to prevent distortion and help keep them in proper alignment. The treatment would also close the grain structure to make the blades more abrasion-resistant, and reduce wear and breakage.

Waller listened to these claims that cryogenic treatment could reduce his production costs. It's not unusual to spend only 10 to 20 cents for cryogenic treatment and receive a dollar's worth of return, so he approved the treatment of a set of blades for a granulator. Within a few days, the new blades were cryogenically treated and installed. The treated blades were then monitored, month after month, until they became dull and had to be removed for sharpening.

In fact, the treated blades were in use for *18 months* before they were removed.

Even after giving the untreated blades the benefit of the

Dave Waller, maintenance superintendent at Rantoul Products, stands beside a large granulator equipped with cryogenically-treated blades.

A pump housing on a pallet prepared for loading into a cryogenic processor.

Pump shaft sleeves ready to be loaded into a cryogenic processor.

doubt, assuming they were *all* replaced every three months, the treated blades were still in use 6X as long as the untreated ones – a net gain of *500 percent*.

During this 18-month period, there were five fewer blade change-outs using the treated blades. In other words, there were five times that labor was not required to change-out blades; five times that maintenance technicians were not exposed to injury replacing blades; five times that change-outs (downtime) did not occur and the granulators continued to operate.

That's not all. Because the grain structure of the blades is closed following cryogenic treatment, treated blades are normally able to be sharpened more times, so fewer blades have to be purchased.

Cryogenic treatment is a one-time, irreversible process, so the blades do not have to be treated again. Once the blades are treated, they are used and sharpened until they cannot be sharpened any further. At that point, new blades are treated, installed and placed into use, and the use/sharpen cycle is repeated until those blades are finally replaced. Rantoul Products' granulator blade inventory now consists of only cryogenically-treated blades – so they can literally take advantage of cryogenic treatment in all applications.

An 11-Fold Increase!

Rotary vain hydraulic pumps at Rantoul Products are also in service 24/7. As the untreated pumps operate, maintenance technicians listen for a noticeable change in the sound that occurs before the pumps have to be replaced. They also use an electronic vibratory test to monitor changes that indicate the end of the pump's life is near. Untreated pumps must be replaced every three months.

The successful treatment of the granulator blades gave Waller confidence to attempt the cryogenic treatment of these hydraulic pumps.

To understand how cryogenic treatment works on pumps, think about building a house. Construction begins with a good foundation, which is cured and *stable* before the first board is ever put in place. A stable foundation ensures that the house doesn't settle, distortion and cracking do not occur, and the walls and other parts remain "true." The life of a house with a good foundation is much better than a house with an inferior foundation that allows distortion.

In a pump, cryogenic treatment removes stresses, thereby stabilizing the parts to prevent distortion and keep the parts in proper alignment. The treatment also closes the grain structure to make the parts more abrasion-resistant, and reduce wear and breakage.

So the housing of the hydraulic pump becomes the "foundation" of the pump. The cryogenic treatment of the housing keeps the internal parts in proper alignment. This keeps clearances and measurements true. The closed grain structure makes the pump parts more abrasion-resistant, and reduces wear. The stress relief combines with the closing of the grain structure to

Cryogenically-treated hydraulic pumps installed on a machine at Rantoul Products.

work hand-in-hand in greatly improving hydraulic pump life and reducing costs.

The first few rotary vain hydraulic pumps were cryogenically treated and installed. Month after month passed, with no change in the sound or vibration of the treated pumps. Early March 2006 marked *33 months* that the treated pumps have operated – and there is still no indication they will require replacement soon. That's an eleven-fold increase already!

There are now only treated hydraulic pumps on the shelves at Rantoul Products and, as yet, no treated hydraulic pumps have been replaced.

No More Drafting

So think outside the box. An opportunity is knocking. You've taken advantage of the "draft" and followed the leader long enough. When are you going to pull out of that line?

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Waller inspects these cryogenically-treated hydraulic pumps installed on a machine.

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