Dana - Fort Wayne, Indiana
9/25/2014
Taskforce to Observe Gear Production Process for L-42 Batch Order: (C1L925/P8AD078X)

Taskforce Composed of Jerry Gropp, Larry Hamilton, Chris Prengaman, and Matt Umerley

First, we would like to thank Lou Pappademos for meeting us and giving us an extensive tour of the facility.

The following are observations from our visit.

Ring and pinions are on site – 3rd party Forge shop delivers parts, they go through annealing, then turning – or creating the "blank".
We saw several bins of both the rings and pinions. The raw material was in spec. It is very close to the 2008 batch.

Just prior to visit – a first fire check of 20 parts were being evaluated.
Fire check involves cutting the teeth, heat treating, straighten the Pinion when necessary, and tempering the threads, and grinding the critical surfaces (bearing races & gear bore).

A sample of these "hard parts" were then evaluated on the CMM to compare to the "Master Gears" from the 2008 batch. These parts are also then roll tested to understand how to dial in the lapping process, we saw parts on the roll tester and then after lapping.

Comparing the CMM of the hard parts from fire-check to the hard part master from the 2008 batch (P8L119/C1L446), the following comments were observed.
Ring gear – within tolerance
Pinion coast side – within tolerance
Pinion drive side – within tolerance but could be improved, slight pressure angle and helix change could be implemented to either the cutting step or the lapping to achieve the ideal pattern. Lou believed he was going to make the change to the cutting process rather than the lapping process. His lapper was able to make changes to the lap to hit the pattern while we were there.

He was going to do a second fire check to evaluate the change to the cutting process before releasing the parts for cutting. Rings gears are the slowest step, and may be released soon since they were within spec.

Gear cutting tools will have blades replaced every 200-300 parts, production gear cutting would only call for blade change every 1000 parts.

All ring gears will go through one furnace at one time. All pinions will go through one furnace at another time. Rings might be a different furnace from pinions.

Lou explained we can expect an 8% loss of parts because our gears will not be re-lapped to get a pattern in spec. (production gears can be re-lapped our will not be re-lapped)

There are 2 steps during the process that are the highest risk of issues. After heat treat the parts need to be not placed on the overhead racks that go through tempering (our parts are not tempered). And

during the Lubrite line – both the ring and pinion need hung “high” so they just get washed and not Lubrited. These are the two main steps that deviate from the normal process.

Lou had the parts cut on a certain set of machines, but may switch to the other set of machines as they give just a slightly better surface finish.

Based on the current rate, Lou speculated that the gears will be worked on for the next 5 weeks in Fort Wayne and we will start receiving completed axles early in December, so we are still on time.

Overall impressed with the process, and the tracking of parts. Lou shepherds the parts through the departments. They have masters of most if not all the old batches in the measurement room.

We would like to thank Dana and Lou Pappademos for the openness to see their facility and to ask any questions concerning this build process. We were impressed with the facility and Lou’s confidence that Dana will provide us with quality hardware.

Sincerely,
Jerry Group
Chris Prengaman
Matt Umerley
Larry Hamilton