

L-42 Conference Call – 2020 Hardware Purchase

Virtual Meeting - WebEx

August 4, 2020

Attendees: voting members in **bold**

R. Banas (Exxon Mobil)

C. Lonsway (LZ)

D. Smith (Intertek)

D. Beck (TMC)

T. Muransky (AAM)

W. Venhoff (LZ)

P. Kanga (Exxon Mobil)

M. Sangpeal (Afton/C)

R. Warden (SwRI)

J. LaBond (Meritor)

D. Schwenk (Afton)

A. Lange (Intertek)

R. Slocum (LZ)

Call to Order

Review of Agenda

The meeting agenda is attached

New Hardware Order

A teleconference was held via WebEx to discuss details surrounding a single lab purchasing a separate batch of hardware directly from Dana. M. Sangpeal stated that Afton needs to order L-42 axles immediately, and that the other labs will not need to order again for 3-5 years. This situation is unprecedented, so M. Sangpeal wanted to be sure that the hardware would be approved for testing.

The 2015 and 2017 hardware purchases were reviewed. The utilization of pilot batches was also discussed in detail:

- Pilot batches are only intended to provide a general indication of larger batch performance.
- R. Warden and D. Smith stated that past pilot batch performance was not always the same as that of the bulk batch.
- There is no industry requirement for pilot batches, and any data generated from testing them is not used in establishing reference oil targets for that batch.
- Pilot batches are optional and are used mainly for purchasing contracts to protect the buyer if performance is not satisfactory.
- Afton has the option to test a pilot batch in this order, no other labs will be required to test pilot axles.
- M. Sangpeal stated that Afton will test pilot axles for this order.

The process to approve this new hardware will be as follows:

- Afton will need to run 3 passing oils and 1 discrimination oil with the final hardware.
- The results must fall within the acceptable limits of the reference oil target. The test stand may need to be adjusted to hit these targets.
- The targets will need to be approved by the panel via vote. They will most likely carry over from the current hardware batch.
- No other labs will need to test the final batch of hardware, as Afton will be the only lab using it.
- The hardware will then become approved and added to the LTMS document.

Adjournment

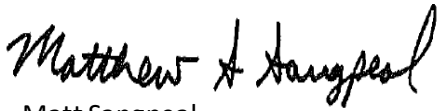
Motion: M. Sangpeal (Afton)

Second: D. Smith (Intertek)

All in favor, no objections, no abstentions.

Meeting adjourned.

Respectfully submitted,

A handwritten signature in black ink that reads "Matthew A. Sangpeal". The signature is written in a cursive, flowing style.

Matt Sangpeal

L-42 Surveillance Panel Chairman



L-42 Hardware Purchase 2020

ASTM D7452

Conference Call, Webex

August 4, 2020

10:00 AM – 10:30 AM EST

Passion for Solutions™

Agenda

Call to Order

Agenda

2020 Hardware Purchase

- ▶ Background
- ▶ Past order batch approval process
- ▶ Single lab batch approval process
- ▶ Reference Oil Targets

Adjournment

L-42 Hardware Order 2020, Background

- ▲ Afton has <1 year of C1L446 hardware in stock
- ▲ Need to place an order soon
- ▲ Other labs do not need to order for ~3 years
- ▲ L-42 test is unique
 - ▲ Self-Referencing (pass/fail based on avg. of 3 ref. tests)
 - ▲ Stand is adjusted to hit targets for ref. oils for each hardware batch
- ▲ Individual labs can purchase separate batches of hardware
 - ▲ Surveillance panel discussed in May, 2020
 - ▲ Historically unprecedented

L-42 Hardware Order 2020 Quote

Quote from Dana, 19% cheaper than 2017



DANA DRIVE AND MOTION TECHNOLOGIES

MOBILE PHONE 704 906-8671

QUOTATION	QUOTE DATE	QUOTE NUMBER	VERSION
-----------	------------	--------------	---------

1. We need to ensure that this hardware batch will be approved for testing.
2. We need to agree on the approval process.

1	044AA100-1	<p>Lead time is 16 weeks from receipt of order</p> <p>Prices increase 4% effective 1 January 2021 Price for axle Delivery in 2021</p> <p>Prices may vary if volume is significantly different than 500 units Dana reserves the right to adjust pricing if significant changes in currency or material costs occur.</p>	\$2,516.00	USD
---	------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------	-----

The terms set forth on the face and reverse side hereof are conditions applying to our acceptance of your order. If our terms and conditions as shown hereon contradict with those of the Buyer, our terms and conditions shall prevail, even if Buyer terms and conditions should expressly decline priority of Sellers terms and conditions. Should this quotation be in disagreement with your understanding please fax immediately. Buyer expressly agrees to accept Seller's terms and conditions appearing on the reverse side hereof.

Past Batch Approval Processes

Pilot batches have been produced in the past

- ▲ Distributed to participating labs for testing
- ▲ Production began after approval

2015

- ▲ Two Labs
 - Three passing oil runs
 - Two discrimination oil runs

2017

- ▲ Three Labs
 - Two passing oil runs
 - One discrimination oil run

Results

- ▲ With no stand adjustments: Both pilot batches came in close to target
- ▲ Vote to approve hardware with no changes

2020 Order Batch Approval Processes

TMC Recommended Best Practice for an Industry Purchase

- ▲ Three labs
 - Three passing oil runs
 - Two discrimination oil runs

Single Lab Purchase

- ▲ Afton will run pilot batch testing (likely three passing, two disc.)
 - Report results to SP and TMC
- ▲ Requirement for other lab testing?
 - Very expensive to purchase testing for batch qualification
 - Would those results be meaningful?
 - 2020 batch would never be run in other labs for candidate oil testing
 - Compare performance of current batch w/current shock pot settings

Thoughts?

Previous Batch Targets

TMC states that the targets will likely be carried over to the 2020 batch

- Historically voted on targets based on pilot batch performance
- Same process this time?

COAST SIDE PINION SCORING

Unit of Measure: % Scoring

Gear Batch P8L119

Reference Oil	Mean	Standard Deviation
116	23.0	5.49
116-1	23.0	5.49

COAST SIDE PINION SCORING

Unit of Measure: % Scoring

Gear Batch P8T025A

Reference Oil	Mean	Standard Deviation
116-1	23.0	5.49
117	23.0	5.49

COAST SIDE PINION SCORING

Unit of Measure: % Scoring

Gear Batch P8AD078X

Reference Oil	Mean	Standard Deviation
116-1	23.0	5.49
117	23.0	5.49

COAST SIDE PINION SCORING

Unit of Measure: % Scoring

Gear Batch P8AD132

Reference Oil	Mean	Standard Deviation
116-1	23.0	5.49
117	23.0	5.49

Conclusions

Batch and target approval is typically discussed after production has begun

- ▲ Single lab order makes this a unique situation
 - Keep SP informed so hardware is usable and targets are established

Hardware batch approval process (pilot batch testing)

- ▲ Vote at SP meeting on # of labs and repeats?
 - This will determine how many pilot axes are needed

Hardware batch targets

- ▲ Vote once pilot batch performance data is available?

Thanks!