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Cummins Turbo Engines: VpCI-126 bags vs. Competition

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Project #: 15-050-1525

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Background:

Cummins Turbo Technology is looking to reduce shipping costs and would like to reduce the amount of protective packaging needed while still having effective corrosion resistance.

Sample Received:

Two turbo engines were received in good condition with no signs of corrosion. Two NT bags were also received to be used in the test.

Method:

ASTM D-1748 conditions

Materials:

1) Large Humidity Chamber
2) VpCI-126 ziplock bag
3) PE bag

Procedure:

One turbo engine was placed inside an NT bag and the bag was folded over and tucked underneath the engine. This bagged engine was placed inside a second NT bag and again folded over and tucked underneath. The second turbo engine was placed inside a Cortec VpCI-126 ziplock bag that was sealed, folded, and taped shut, then placed inside a polyethylene (PE) bag that was folded and taped shut. Both engines were placed inside the large humidity chamber in ASTM D-1748-like conditions and the engine packages were opened and inspected for corrosion after 300 and 500 hours.

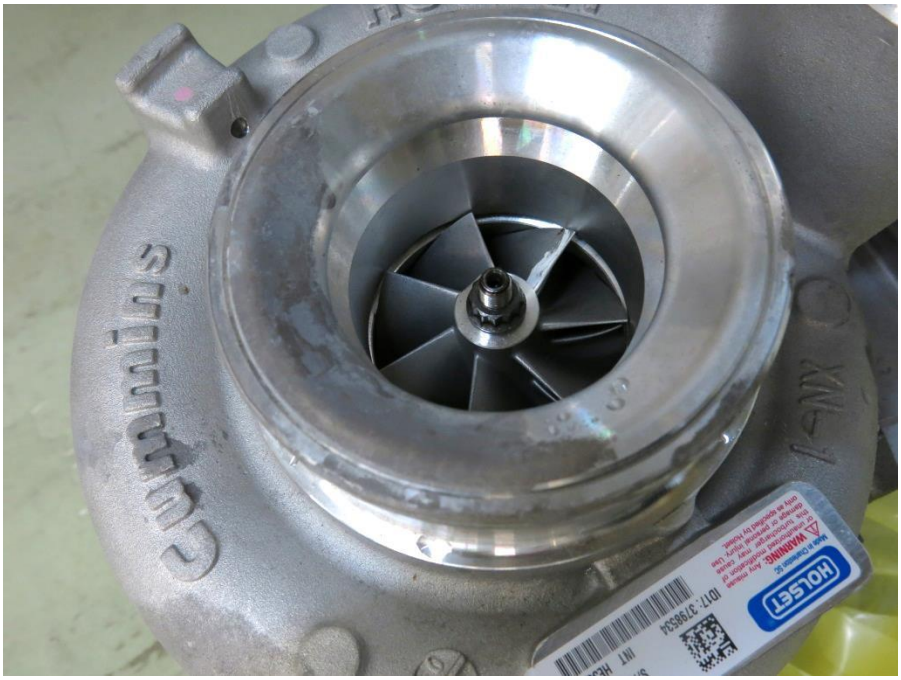
Results:

Table 1: Relevant experiment times and dates

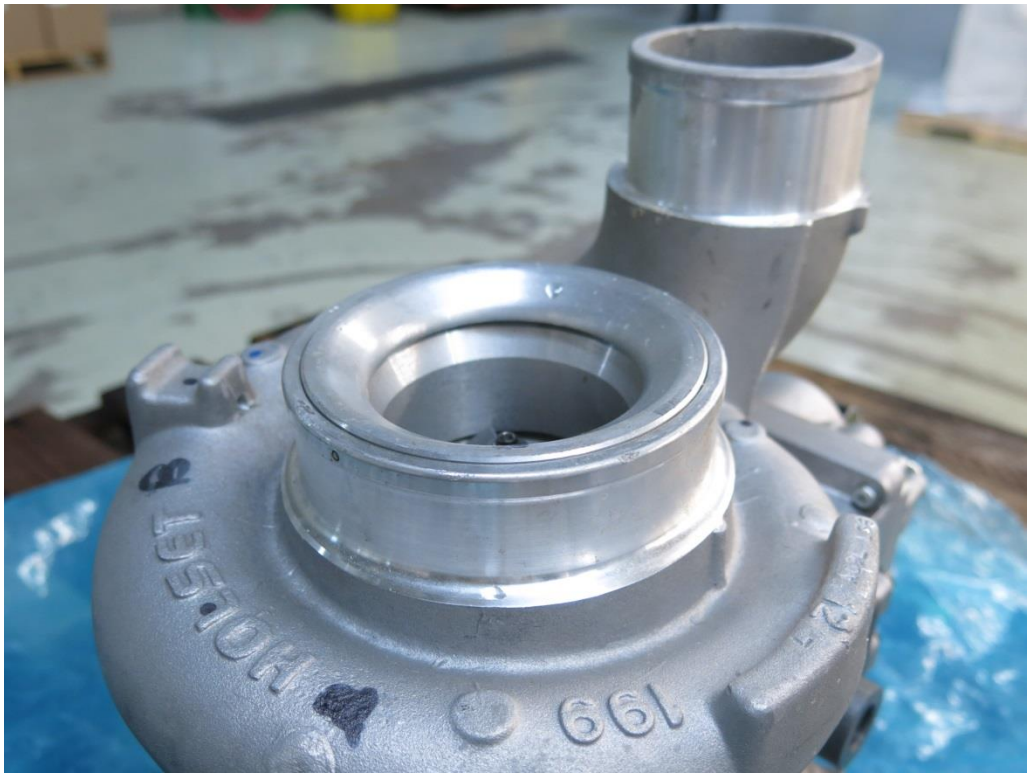
System	Rust First Noticed	Total Run Time (hrs)
VpCI-126 bag + PE bag (sealed)	6/1/15 (300 hrs)	498
2 NT bags (folded and tucked)	6/1/15 (300 hrs)	498
Chamber Start Time: 5/19/15 at 3:30pm		
Chamber Stop Time: 6/9/15 at 10:00am		
Total Run Time: 498 hrs		

Photos:

Picture 1: The turbo engine packaged and sealed in VpCI-126 and PE after 300 hours of testing. Little to no discoloration is observed on the intake.



Picture 2: The turbo engine packaged and folded in two NT bags after 300 hours of testing. Significant discoloration can be observed on the rim on the intake.



Picture 3: Intake portion of the turbo engine packaged in VpCI-126 and PE bags after 500 hours. Little to no discoloration can be seen on the intake or surrounding engine body.

Picture 4: Intake portion of the turbo engine packaged in NT bags after 500 hours. Severe discoloration can be seen at the intake and on the surrounding body of the engine.

Picture 5: The base of the turbo engine packaged in VpCI-126 and PE bags after 500 hours. Small amounts of corrosion can be seen on the flat base.

Picture 6: The base of the turbo engine packaged in NT bags after 500 hours. Moderate corrosion can be seen on the flat.

Picture 7: The bottom fan of the turbo engine packaged in VpCI-126 and PE bags after 500 hours. Only small amounts can be seen on the lip where the engine contacted the packaging

Picture 8: The bottom fan of the turbo engine packaged in NT bags after 500 hours. Severe corrosion can be seen on the lip and body of the engine that sat in contact with the packaging.

Picture 9: The wire housing of the turbo engine packaged in VpCI-126 and PE bags after 500 hours. No corrosion can be seen on the wire housing or the surrounding body.

Picture 10: The wire housing of the turbo engine packaged in NT bags after 500 hours. Significant discoloration was observed on the wire housing and surrounding engine body.

Interpretations:

The turbo engine placed in two NT bags that were folded and tucked showed significant corrosion and discoloration at the end of the 500 hour test. Corrosion was especially prevalent in locations where the engine remained in contact with the bags for the duration of the test, and discoloration was present over the remaining body of the engine inside the packaging. The turbo engine packaged and sealed in the VpCI-126 bag only showed small signs of corrosion in places of the engine that remained in contact with the packaging for the duration of the test. No significant discoloration was observed over the remaining body of the engine.

The sealed VpCI-126 and PE packaging combination provided significantly better corrosion protection than the NT bags, and may be substituted for this packaging to obtain either comparable or improved corrosion protection.