



Equipment Repair Case Study

Situation: **Catastrophic Piston Failure, 48,000lb Diesel Pile Driver**
Vancouver Convention Centre construction site.

Challenge: **Evaluate & repair the failure, quickly 24/7 at Tristar's Delta facility**

The 48,000lb assembly was sent to Tristar to evaluate the cause of failure. The piston & fuel pump assembly were disassembled to assess the reason for the failure and level of repair required to return the unit to operation to continue the pile driving schedule. Based on the tight construction schedule, the work was carried out on a 24 hour 7 day week round the clock basis



Evaluation:

- Removing the piston revealed that the 24" diameter piston was broken into two pieces, and the fracture had occurred in the piston ring location of the unit.
- The remaining piston ring grooves indicated stress flaws.
- Two spare pistons were shipped to Tristar's facility for inspection and use in the repair of the Pile Driver assembly. Upon inspection of the spare pistons, it was noted that the same groove configuration existed that propagated to cause the failure of the original piston.

Solution:

- The 24" diameter x 151" long piston weighing 20,000lb, was set up in the lathe and all modifications were completed on the ring grooves on the spare pistons. The broken piston section was machined down for use in a smaller model pile driver, utilizing the broken piston component.
- While repairs were carried out on the pistons, modifications were completed on the pile driver body to ensure a uniform mounting capability for the diesel fuel pumps.
- Additional modifications, designed to alleviate load stresses, were machined into the piston.
- Evaluation, **re-design** & repair took 7 days.



Benefits: The piston ring groove configuration was re-designed to remove the threat of stress cracking and eliminating future piston ring failure.

Conclusion: The upgraded unit was re-assembled, by Tristar and the end user personnel, and returned to the new Vancouver convention centre worksite. Tristar has since been working closely with the enduser to upgrade the other pile drivers to ensure further problems do not arise.

For more information or other case studies:
Please call 1-800-663-5606 or visit .tristarind.com

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Since 1978

"reliability makes the difference"



Tristar Industries Ltd.

Machine Shop Equipment Capabilities

Delta, B.C. Facility, 1-800-663-5606

74,000sq. ft. facility in Delta, BC. – 3 heated bays,

Rail, Road and Water Access

Tristar operates a low impact environmental site with a controlled and monitored effluent system.

Lifting Capacity:

8 Overhead Cranes

- Up to 110 ton lifting capacity.
- With 379" under the hook.

Machining:

Small – Medium Lathes	5	½" Ø to 18" Ø swing by 12' long.
Large Lathes	4	to 14' Ø by 50' long.
Vertical Boring Mill	4	to 18' Ø by 13' under the Bridge.
Horizontal Boring Mill	5	2 with 5" spindles & 3 with 4" spindles.
Floor Mill	1	6' spindle with 40' horiz. by 124" Vert. travel, c/w 25 ton rotary table.
Cylindrical Grinding	3	to 20" Ø by 120" long.
Roll Grinding	1	to 78" Ø by 295" long at a 30 ton capacity.
Surface Grinding	1	60" Ø by 36" under the head.
Balancing	1	to 122" Ø by 480" long at an 80 ton capacity.

Fabrication Materials:

Titanium
Hastelloy
Austenitic 300 Series Stainless
6 – 7% Moly Stainless
2205, 2304 Duplex Stainless Steel
Ferralium

Welding Process:

Gas Metal Arc
Sumerged Arc
Gas Tungsten Arc
Plasma Transferred Arc
Ultra-jet Micro-Flow, Flame Spray Build-up & Jet Arc Spray Build-up

Weld Control Processes:

"U" Symbol 23,384 – Construction of Pressure Vessels to ASME Code Section VIII, Division 1
"S" Symbol 33,733 – Construction of Power Boilers to ASME Code, Section I
"R" Symbol 2377 – Repair or alteration of the above equipment to the National Board of Boiler & Pressure Vessel Inspectors Code.

Material Testing Capabilities:

(NDT) Non-destructive & destructive testing offsite.

Certifications:

ASME "U", "S" and "R" Stamps

Shop Union:

United Steel Workers of America – Local 2952

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