CREATING NEW CENTRIFUGAL BARREL COMPRESSORS FOR ISO-BUTANE RECYLCING

By Steven Kaulius

A petrochemical plant had a long term issue with 2 Iso-Butane recycle compressors that needed to be solved. The compressors were horizontally split units that had an issue with split line leakage. The problem became so bad that the customer had to resort to welding the split line closed. They had long sought to replace the casings with barrel types but could not get support from any of the OEMs without having to make significant changes to the installation.

After speaking with a representative, the customer learned that RMS was willing to design a barrel casing that would be a drop-in replacement for the existing compressor.

Client contracted with RMS to measure one of the existing compressors during turnaround and conduct preliminary design. The design showed the feasibility of the concept with the following features:

For the compressor:

- Casing could be made of Stainless Steel as requested
- The inlet and discharge nozzles will match the current locations
- The existing rotors are used without modification
- The existing dry gas seals are used without modification
- The existing bearing assemblies are used without modification
- No modifications are required to the coupling or coupling guard
- Bundle pulls from the discharge end allowing service without disturbing piping connections
- Bearings and end seals can be inspected and replaced without pulling the bundle
- Two casings and three bundles provide the same spares level as the current three complete machines

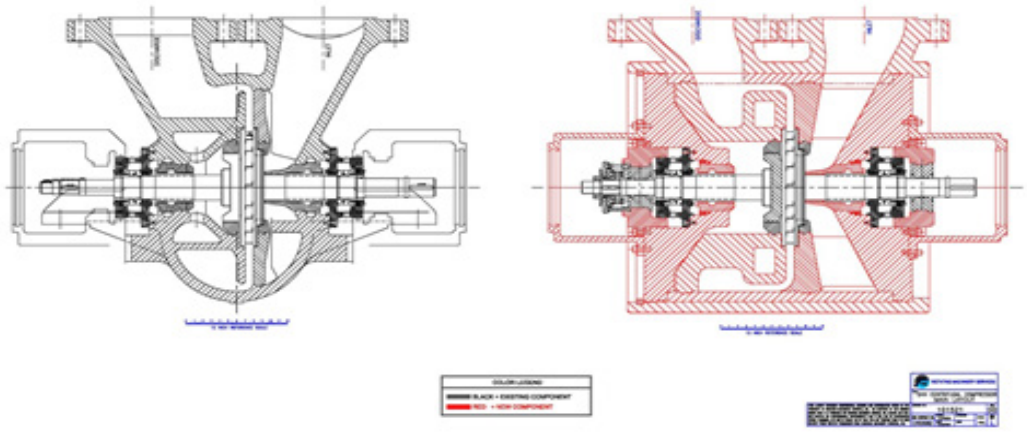

Figure 1: Comparison of cross-sections of original compressor to replacement as initially envisioned

For the arrangement of units:

- The support feet for the existing compressor are not compatible with the barrel compressor design
- The following baseplate rework was required:
  1. Torch-cut the current compressor supports from the baseplate
  2. Torch-cut the deckplate over baseplate cross-beams at the new mounting locations
  3. Weld new mounting pads to the baseplate at the location of the existing cross-beams
  4. Field machine the new mounting pads by milling the mounting pad surfaces flat, drill and tap new mounting pad holes

Based upon the findings, RMS was released to prepare a final documentation package needed to generate the final funding estimate and compressor critical path engineering/material activity. During this process the project was modified to include the following additional scope items:

- Three (3) new rotors. With the purchase of new rotors, RMS provided complete assembled compressors with no requirement to have the existing units shipped to RMS
- One spare compressor bundle, assembled with one of the new rotors
- Upgrade to gas shaft seals including one common seal gas panel for the two compressor trains
- Replacement of the existing oil console with one common API 614 lube oil system for the two trains
- Performance/mechanical run test of one compressor, per API 617 and mechanical run test of the second compressor
- Vibration and bearing instrumentation
- Customer supply a set of spare bearings that were used for one compressor build. RMS supplied one set of bearings to be used for the second compressor
- Metal nitrogen purged padded storage container for spare compressor bundle
- Chemraz O-rings and gaskets for the two compressors and the spare bundle
- Commissioning spares

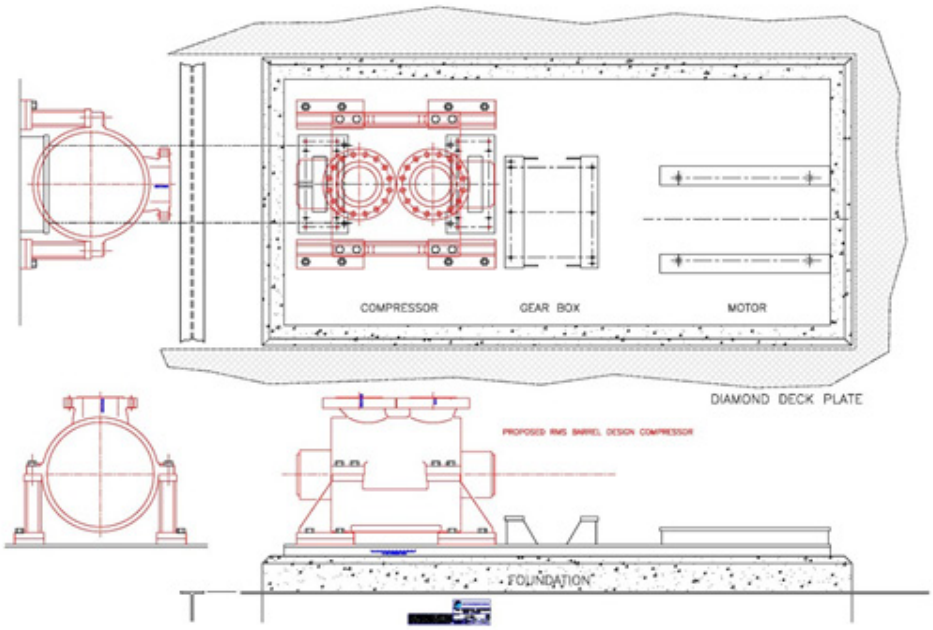

Figure 2: Layout of general arrangement of new compressor on skid

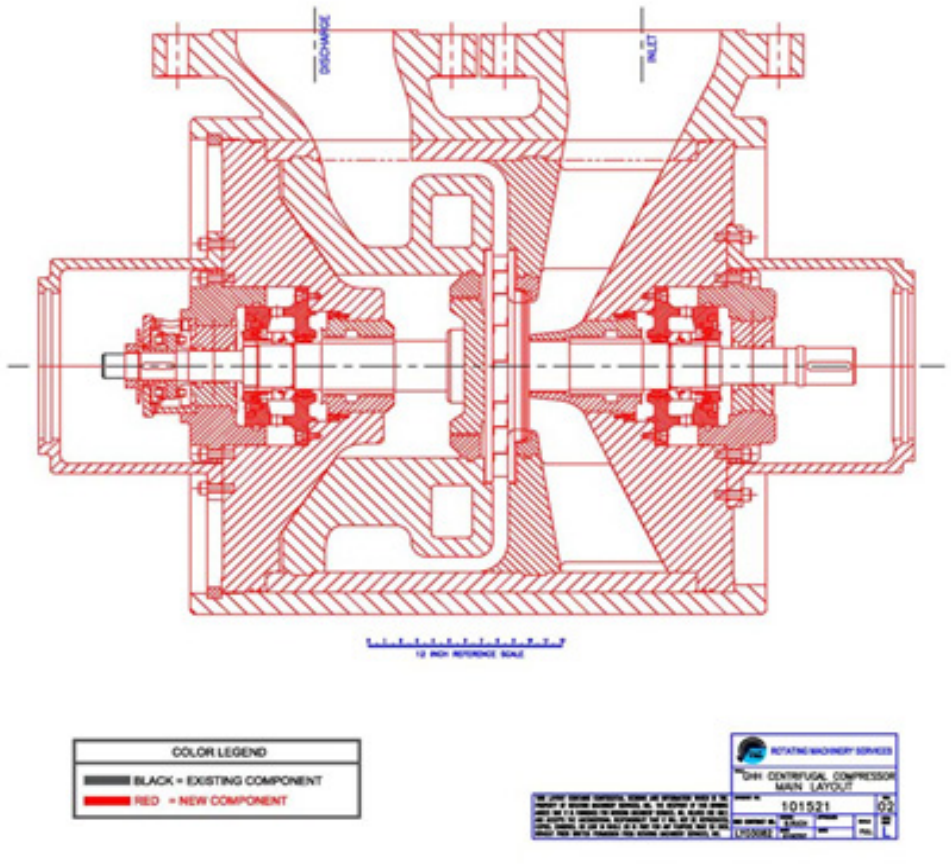

Figure 3: Layout of compressors as supplied to customer

Figure 4: Original compressor installed at customer site

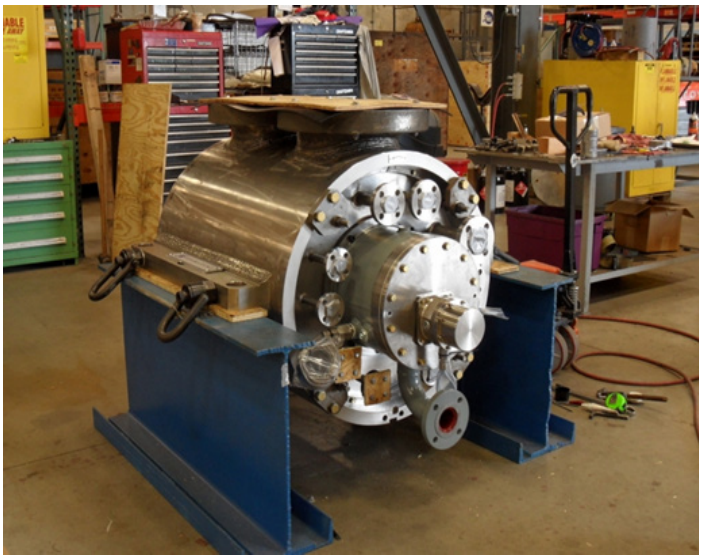

Figure 5: Replacement compressor assembled on shop floor

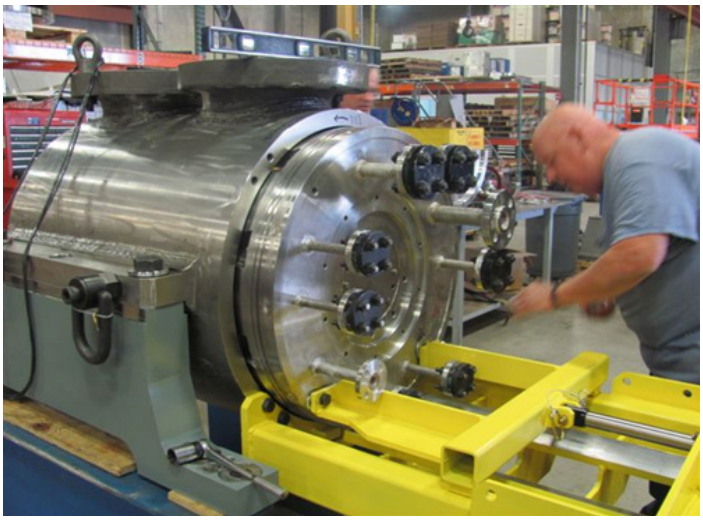

Figure 6: Compressor assembly showing bundle removal tool with bundle partially installed

Figure 7: Bundle with top half removed to show internal components and end walls

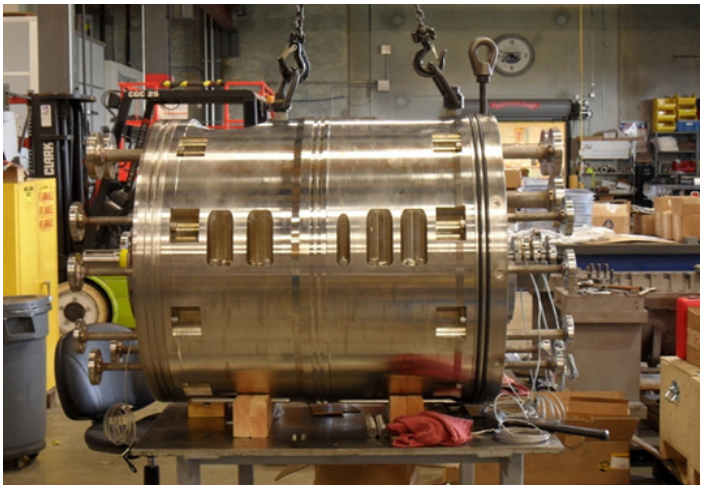

Figure 8: Bundle/end wall/bearing/seal assembly

Figure 9

Figure 10

Figure 11

Figure 12

For more information:
Steven Kaulius
Email: skaulius@rotatingmachinery.com
Tel: 484-821-0702

Headquarters
2760 Baglyos Cir.
Bethlehem, PA 18020

Houston Office
16676 Northchase Dr., Ste 400
Houston, TX 77060

rotatingmachinery.com
Tel: 484-821-0702
Parts: rms@rotatingmachinery.com

Rotating Machinery Services, Inc.