Final Report

Customer  Dresser-Rand    Phone  801-295-2940
Contact     Allen Bowers    Alt phone  801-557-2447 cell
Address   25 N. 400 W. #6    Fax  801-295-0292
City, State, Zip  N. Salt Lake City, UT. 84054    Date  10.15/2013

Part  Large compressor frame
Serial number          Inspected by  Customer

1. Base metal
   cast iron
   ductile iron
   cast steel
   cast aluminum
   other

2. Machinability
   X no previous repairs
   arc-welded
   brazed
   heat-related cracks
   other

3. Casting shape where cracked
   X flat
   inside/outside corner
   radius
   other

4. Cause of damage
   impact
   heat
   freezing
   normal operation
   X other  Yielding studs

5. Length of crack/s
   #1 4.5" Diameter pull out
   #2 Partial Pull out
   #3 1" Crack from bolt hole
   #4 1" Radial crack around bolt hole

6. Material thickness
   2"
   Bolt hole dimensions:
   1-1/4 -7 X 2.00 deep

7. Operating pressure


8. Operating temperature

9. Working environment
   - hot
   - cold
   - safety concerns
     - describe: Need: Hard hat, Safety glasses, steel toe boots, FRC, H2S Monitors, short on-site safety class.
     - other

10. Remachining requirements
    - bolt holes
    - bearing bores
    - machined surfaces
    - other

11. Customer’s needs
    - permanent repair
    - temporary repair
    - turnaround time
    - describe: ____________
    - other

12. Accessibility
    - room for the tools?
    - room for the operator/s?
    - need for disassembly?
    - describe: ____________
    - other

13. Inspection method(s)
    - Customer Photos

14. Damage found:
#1 Bolt hole has large pull out
# 1 Bolt hole repair:

1st we drilled existing damaged bolt hole to the tap drill size for the FFB-12 insert and as a pilot hole for the counter boring tool.

2nd We removed the damaged and broken cast iron from around the bolt hole by machining it out.
The counter bore depth was cut to .500” deep.

3rd A steel plate was pre-machined at our facility and was inserted into the counter bored hole.
4\textsuperscript{th} The steel plate was anchored with 3 \textit{CASTMASTER} C3CHS stitching pins made from 4140 steel.

5\textsuperscript{th} We stitched around the steel plate with L8B stitching pins to lock and seal the steel plate into the frame.
The final series of L8B pins being installed.

A total of 12” of stitching was required to complete the installation of the steel plate.

Adding a second row of L8B stitching pins to replace the remaining missing cast iron.

A total of 6” of stitching was required to replace the missing iron.
Second row of stitching pins installed and ground close for final machining.

Setting up the portable mill to machine flat for gasket seal.
In process of milling of the installed plate.

Final cut.
After final machining we installed the patented FULL-TORQUE FFB121147 insert through the plate and into the cast iron to produce a new hole that is stronger than new.

Repair completed and inspected by mag particle to assure there is the correct overlap of the stitching pins and that all cracks are completely removed.
# 2 Pulled Bolt hole on cylinder # 4 bolt hole dim. 11/4-7 X 2.00"
#2 Bolt hole repair:

Repair of crack was made by stitching 3” crack with L8B stitching pins.

L8B stitching pins being installed overlapping to remove 100% of the crack.

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Stitching completed ready for insert to be installed.

FULL-TORQUE insert Installed.
Bolt hole #2 completed.

# 3 Cracked bolt hole on Cylinder # 4

# 3 Bolt hole repair:

Stitched 1” crack using L6C stitching pins.
Completed repair after installation of the *FULL-TORQUE FFB-12* insert.
# 4 hole on

Damaged Bolt
cylinder # 2
# 4 Bolt hole repair.

Stitched 1” crack using L6C Stitching pins and installed Full-TORQUE FFB121147 insert to complete repair.

After initial inspection from customer a wet magnetic particle test was completed by the customer and found an additional 6 damaged bolt holes.

# 5 Bolt hole repair:
Bolt hole #5 had a short crack that was removed and repaired by installing the FULL-TORQUE FFB121147 insert only.

Bolt hole #5 repair completed with FULL-TORQUE insert installed.

#6 Bolt hole repair
# 6 Bolt hole damage was repaired by stitching 1" with L6C stitching pins, and installing a FULL-TORQUE FFB-12 insert.

Bolt hole # 7

Bolt hole # 7 Had a very small crack in the top thread.
By installing the *FULL-TORQUE* insert it removed the crack and completed the repair.

Bolt hole repairs # 8,9,10 on cylinder # 3 of the frame
#8 had a very small crack in the top thread and was repaired by installing a FULL-TORQUE insert to repair damage.

#9 bolt hole was repaired by just installing a FULL-TORQUE insert.

# 10 bolt hole was repaired by just installing a FULL-TORQUE insert.

After all repairs were completed we completely cleaned the area worked in of all metal shavings inside and out.
Other photos sent by customer
Conclusion:
A total of 23” of crack was repaired using “L” Series `LOCK-N-STITCH` stitching pins to the depth of 1”. None of the cracks found were deeper than .500” deep. A total of 10- `FFB121147 FULL-TORQUE` blind inserts were installed that were made custom for this job. The inside measurements are 1 ¼ X 1 7/8” deep X 7tpi.

Warranty available:

This limited warranty covers our materials and workmanship for the repair of your part. Disassembly and downtime are not covered by this warranty. The limited warranty is for a period of one year from the date of completion of the repair. If there should be any failure in our repair during that period of time due to faulty materials and or workmanship, we will again repair the part at our cost including all labor, materials and travel expense, or we could choose to refund the money you paid for the repair in part or full. We reserve the right to make the final decision whether to repair or refund. This is the limit of our liability. Be aware that we are not responsible for failures due to faulty installation or improper operation and maintenance of the part. If the problem that caused the original damage has not been remedied this warranty will become null and void.

Prepared by:
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