

Thinking Outside the Box in Real Time

by Marty Gilliam

Contractors are often under a great deal of pressure to complete jobs faster, and at a lower cost. One case in point was a call we received to repair a leaking discharge flange o-ring on a large tonnage (1,500 tons) low pressure chiller. This would ordinarily require a complete teardown. Teardowns are very labor intensive and time consuming. Hundreds of bolts must be removed and re-installed. Multiple, precise measurements within thousandths of an inch have to be obtained. Finally, there's the cleaning of multiple-mating surfaces, o-rings, and gaskets to replace.

Our time was short: the leak was discovered just days

before the chiller plant (all 7,500 tons) was to be at 100% capacity in time for summer temperatures. We could have completed the job in just a few days if we worked around the clock. However, the overtime and additional manpower expense was not an option.

Solution: A plan was devised to lift the compressor assembly up about 18-in. to replace the failed o-ring. The first challenge was finding a crane small enough to fit into the mechanical room, yet be capable of accomplishing the lift. Then, the lifting brackets had to be custom-made at a local machine shop. Some modifications had to be made to the lifting brackets, to ensure a secure fit for the



shackles. Once the correct combination of chain falls and cables were acquired, the only thing left to do was drill and pin the compressor castings to prevent shifting. Even though it seemed very unlikely that there would be shifting, due to the large amount of bolts holding the castings together, the pinning process was a cheap insurance policy. The compressor/motor assembly weighs about 14,000 lbs, so every safety precaution had to be taken.

Here's how we did it:

1. The system's 3,000 lbs of R-123 refrigerant was transferred to storage tanks. The suction elbow and economizer assembly had to be removed as well as the oil lines, the liquid refrigerant lines, and the 4,160 volt lines.

2. After the compressor castings were carefully drilled and pinned, the crane and rigging was put in place for the big lift. The boom was placed over the center of gravity point of the compressor/motor assembly, and remained stationary, so that the lift could be controlled more precisely with the chain falls (see photo above).

3. Once the compressor was suspended in mid air, the failed o-ring was replaced.

4. The compressor assembly was then carefully lowered back into place.

5. The suction elbow and economizer were re-installed and then the oil lines, liquid refrigerant lines, and electrical were re-connected.

6. After performing a leak check of all disturbed areas, the dehydration was next. Once the standing vacuum test was passed, the refrigerant was transferred back into the machine and then it was time to put it on line.

Lessons learned. The job was done in less than half of the time it would have taken otherwise. This resulted in a considerably lower cost for the customer. In addition, the chiller plant was ready for 100% capacity when the warm weather arrived. Anytime a major repair such as this one is undertaken, every detail should be covered thoroughly, to ensure the success of the project, and more importantly, the safety of the personnel. Always make sure that the chain falls, cables, straps, gantries, or cranes are well suited for the task, in terms of weight ratings. You must also know the weight of the components to be lifted. Teamwork is the key in a situation such as this one, because it was teamwork that put the idea together and then into action.

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