Heat Exchanger Maintenance

You may ask yourself why you should perform maintenance on a heat exchanger. It doesn't have any moving parts to lubricate or pins and bushings that need to be replaced. What maintenance do I have to do to a component that just sits there? According to suppliers of these heat exchangers, they are at peak performance the day you take delivery of them. From that day forward the degradation begins.

Before getting into the maintenance portion, we should discuss the function of your heat exchanger to better understand that it does more than just sit there on the rig deck. Your drill rig is a workhorse, and where there is work, there is heat. You have the diesel engine, the compressor, and a high pressure, high flow hydraulic system all generating heat as they perform their individual functions. If their heat generation was left unchecked they would self-destruct. To keep these functions in proper working order we run a circulation media; oil, coolant, or air through a heat exchanger to maintain a proper operating temperature for all systems.

This circulation media enters a manifold on one end and then passes through a series of tubes to a manifold at the other end from which the cooling media will exit. The tubes have fins attached that the hot media within will transfer the heat across these fins. A large fan in a specially designed shroud will pull a specific volume of air across these fins pulling the heat away from the exchanger. This heat dissipation will cause a drop in the temperature of the media, referred to as the differential or Delta (**Δ**) temperature. These heat exchanger components may be made from steel or aluminum depending upon the dissipation and pressure requirements of the operation.

Unlike a shop generator or compressor, the heat exchanger on your drill rig can see some unwanted environmental conditions. Combine this with the natural frequencies (harmonics) generated by the rotating equipment on the deck and the drilling operation of the tools down the hole, and you have started the degradation process mentioned above. The swirling dust from drilling combined with water will cause a cementing on the surface of these fins that will prevent the normal transfer of heat to the air flowing across them. In some cases, we have seen the airflow passages become completely blocked due to hydraulic oil leaks and airborne dirt. Another bad practice is the use of high-pressure washers that will actually fold the fins over causing a blockage of airflow.

When dust accumulation is not severe, brushing down the approach air side of the core faces is recommended. A soft type of brush is recommended so as not to damage or

deform the fins. If necessary, this could be followed by blowing compressed air at no greater than 30 PSI through the air side of the radiator panels in the opposite direction to the normal airflow, until loose material is blown free.

If the fin and tube exterior surfaces are allowed to become caked with dirt, through neglect, stubborn areas may be cleaned by washing and hosing down with detergent and hot water. Shell Teepol or Turco Sokleen, or an equivalent alkaline-based detergent, diluted in water are suitable for this purpose. A low pressure (30 PSI) steam jet is also effective in the removal of external stubborn dirt.

It is not just the small dirt accumulations that will be harmful, but a routine inspection for gravel, tree branches and other foreign objects should be performed to remove the debris if found. If this type of debris is left to rub against the delicate tubes of the heat exchanger, there is a risk that an expensive puncture repair will be required.

Other maintenance considerations must be given to the quality of diesel coolant and additives used as rust and scale inhibitors to keep the inside of your engine cooling system in proper working order. These should be tested every time an engine oil and filter change is performed on the rig as part of your routine maintenance. Your additive (DCA/SCA) should be no less than 1.2 to prevent pitting and scaling, and no greater than 3.0 to prevent cooler gelling in the tubes. Internal cleaning can be performed by circulating internally a hot solution of diluted cooling system cleaner in excess of 50°C, if possible in the reverse direction to the normal water flow for half an hour. Then drain and flush with hot water.

This will conclude our heat exchanger maintenance review.