Enhanced Surfaces for Aerospace

Since weight and space come at a high premium onboard aircraft, heat exchangers need to be as efficient as possible to minimize space utilized, weight of materials and charging substances.

Vipertex® surfaces, with their inherent enhancement features on both sides of the material, provide an opportunity to design a very efficient system. Heat transfer can be enhanced as much as fivefold compared to smooth tube, suggesting compact units can do the work previously done by larger ones made of less efficient material.

Potential benefits of Vipertex® in aircraft applications include:

- Compact units
- Lightweight units
- Faster heating and cooling

Vipertex® enhanced surfaces are rolled in coil form, promoting repeatability, volume production and cost efficiency. These surfaces can then be transformed into tube or used in a flat configuration to incorporate into heat exchanger designs with greater flexibility and scalability, helping you optimize a solution for your project.

Whether you are retrofitting an existing installation or building new, let us help you determine the economic value of using Vipertex®.
**Pressure Applications**

Vipertex® tubes can be applied to exchangers operating at various pressure levels. Different alloy systems, wall thicknesses and processing specifications contribute to the achievement of various pressure ratings.

Burst and collapse tests of welded Vipertex® tubes confirm higher ratings than their smooth, welded tube counterparts. It is apparent that the enhanced surface pattern serves to create a stronger, more rigid tube.

The intersection of lines A and B shows the maximum heat transfer for the Vipertex® enhanced 1EHT tube. In order to obtain the same amount of heat transfer at the point of maximum heat transfer in the 1EHT tube (shown by the intersection of lines A and C), it would require roughly twenty times the flow in a smooth tube. At higher flow rates, there is a 90-100% increase in heat transfer.

**Flow Rate**

Vipertex® optimal performances produce a more than 500% improvement at Reynolds numbers at 1000. At other flow rates, performance enhancement values of 90-100% are seen.

**Two Phase Applications**

Vipertex® tubes work extraordinarily well in single phase processes, but also enhance two phase applications. Vipertex® is available in various surface texture options that may, based on other operating conditions, be more appropriate for particular functions, such as evaporators or condensers.

**Fouling**

Vipertex® enhanced surfaces have heat transfer anti-fouling characteristics for many conditions. Studies have been performed in crude, and once through water. Results show the design of the Vipertex® surface produces a wall shear that cleans the tube surface, allowing less debris to form on the surface.

**Charging Substance**

Since Vipertex® tubes are produced in a variety of alloy systems, optimization is possible to accommodate a wide variety of charging substances. It is important to consider what substances come in contact with the enhanced surfaces in your heat exchanger. This is helpful in determining a suitable alloy, as well as a suitable enhanced heat transfer pattern.

The increased thermal efficiency of a Vipertex® installation can reduce the amount of charging substance required, which provides the following benefits:
- Less cost to charge
- Less environmental liability in the case of a spill
- Less cost in maintaining a supply of substances that decay through use
- Reduced space required

**Temperature Range**

Vipertex® enhanced surfaces can be produced in a number of alloy systems that can be optimized for operating temperatures ranging from high temperature to cryogenic, allowing the use of Vipertex® products in a wide variety of conditions.