



ENTRANS™

Heat Exchanger Software for the Process Engineer



SCOPE IT

..a 'quick' estimate program for design and costing of shell-and-tube-heat exchangers with tube inserts.

Use **ENTRANS™** to:

- Assess benefits of using tube inserts in tubular heat exchangers
- Scope wide range of enhanced exchanger designs
- Don't miss opportunities to improve performance and cut costs
- Use tube inserts in new design and retrofit

See ESDU 97007 for guidance on tube inserts and ENTRANS™

Minimum System Requirements:

PC running Windows 95, 98, or NT 4.0 Service Pack Three or higher.
486 or greater processor.
2MB hard disk space.
Minimum 16MB RAM, 32 MB recommended.
Minimum display requirements: Minimum screen resolution 800 X 600, recommended screen resolution is 1024 X 678, minimum color depth 256 colors.

Available via CD-ROM or the Internet. For Web delivery, customers must download a zipped file and install the application locally

Old Technology vs. New

Commercially available computer programs currently used in exchanger design are excellent exchanger analysis tools. They contain sophisticated thermal analyses and include bundle vibration analyses and even elements of mechanical design. Moreover, the sophistication they bring is bought at a price and their design algorithms can be unreliable.

As a consequence, many engineers use these programs in a 'rating' or 'simulation' mode when undertaking design. Designers use these programs in an iterative manner; setting up a geometry; analysing its performance; and, revising the geometry until an acceptable design is achieved. This is a time-consuming task that can miss the better designs and amplifies the complexity and inflexibility inherent in such programs.

ENTRANS™ Early identification of tube insert technology leads to the full exploitation of benefits. This program allows engineers to explore the benefits of tube inserts and assists them in scoping possible design considerations including:

- Capital cost benefits of using heat transfer enhancement
- Identification of pressure drop implications
- Budget size and costing
- Layout benefits

Industry Situation

The best known application of in-tube heat transfer enhancement is capital cost reduction through reduced heat transfer area. However, potential benefits are far wider ranging and the use of tube inserts can, for a given duty, lead to a reduction in the number of tube passes or the number of exchanger shells required.

Tube inserts can also allow fuller use to be made of available pressure drop (that is, utilizing pressure drop that would otherwise have to be wastefully dissipated across valves).



Other potential benefits can include:

- improved operability,
- reduction of fouling,
- increased heat recovery
- improved flow distribution..

Product Driver

ESDU recognised a 'gap' in the market—the need for suitable tools for rapid design operability and retrofit analysis during the *approximate* rather than *detailed* design stage—these tools providing valuable 'what if' scenarios and acting as 'checks' for other data sources.

Product Description

ENTRANS™ allows the engineer to assess rapidly the benefits of using tube inserts in tubular heat exchangers. This assessment can be made by inspection of approximate designs for two-stream shell-and-tube exchangers with and without inserts on the basis of the design parameters or least capital cost.

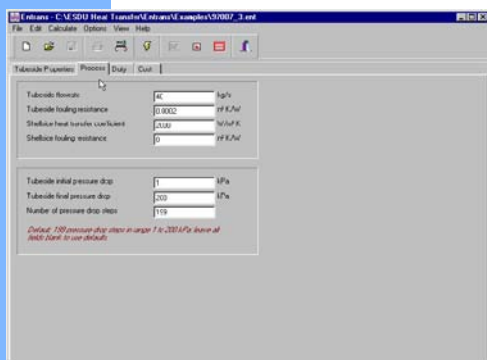
The following types of tube insert are included in **ENTRANS™**:

- twisted tapes (high and low twist ratios),
- helically-coiled wires,
- wire matrix inserts (high and low matrix density),
- static mixers,
- core tubes.

ENTRANS™ produces a series of designs over the specified range of tubeside pressure drop for both plain and enhanced tubular exchangers, using the methods described in companion Data Item ESDU 97007.

An Engineering Perspective

ENTRANS™ is easy to use



Input is organized into a series of simple screen pages. Few data are required. The program assumes that the tubeside stream has constant physical properties and the shellside heat transfer coefficient is known or can be approximated.

ENTRANS™ scopes single and multi-pass designs

In order to assess the potential uses for tube inserts the process engineer must consider a wide range of interacting conditions. **ENTRANS™** calculates a wide range of possible single and multi-pass designs with and without tube inserts and shows the key design data graphically.