



INTEGRITY™

Pinch Technology Software for the Process Engineer



INTEGRATE SIMPLY

... preliminary design of heat exchanger networks in new plant

Use **INTEGRITY™** to

- Develop simple integration schemes
- Consider realistic exchanger technology

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

Don't Miss Design Opportunities

ESDU has developed software tools that can be used in integrated plant design. They offer an improvement over traditional tools in that they produce output that is simple to follow and easily understood. ESDU helps you keep network design 'in touch' with reality.

ESDU's **INTEGRITY™** software program provides a simple, rapid, and straightforward route for the design of heat exchanger networks in new plants. It offers the advantages of considering a network design that keeps close to plant layout, controlling expensive piping costs, and designing safer more easily understood plants. This simplicity provides you a cost-effective means to combat expensive plant design and maintenance issues. With **INTEGRITY™** you can:

- Design networks which keep close to layout -control piping costs, design safer plant
- Eliminate need to model heat exchangers as 'black boxes'
- Keep network design in touch with reality
- Optimise network design elements during synthesis



Industry Situation

Process Integration is an important means of improving the energy efficiency of industrial processes and refers to the systematic approach resulting in efficient process design with integrated use of energy and water within and between process operations on-site.

ESDU has developed a number of computer programs that can be used in integrated plant design. **INTEGRITY™** allows the user to

*"By using suitable software, such as ESDU's **INTEGRITY™**, it is possible to quickly establish which parts of a plant offer the best opportunities for energy saving. A new structure that allows these savings to be made can then be established. Detailed design changes can be identified by trading-off energy saving against investment. The result is a detailed design that directly complies with the economic constraints specified for the project. These trade-off calculations can be undertaken using standard spreadsheets. Sophisticated and expensive software is not needed."*

--Graham Polley
Technology Transfer
Management

- Determine utility consumptions, utility cost, network area needs, network capital cost and total annual cost at a specified minimum temperature approach.
- Generate the composite curves and HDS diagram.
- Specify stream velocities and pressure drops rather than assumed heat transfer coefficients to produce estimates of how the network area is distributed across the various process streams.
- Undertake optimisation (Range Targeting). **INTEGRITY™** and has been set up for easy implementation of the Repetitive Targeting approach to network design developed by ESDU.

Process Integration traditionally has been restricted to energy use minimization of process plant, but extended by ESDU to include equipment capital cost reduction and options for safer plant design (by localization of key components to minimize complexity).

Process Integration is based on a systematic and practical understanding of the process heat and material flows. ESDU aids the practicing engineer in getting up-to-speed and familiar with these topics.

Product Driver

The aim of effective process integration is the optimum trade-off between energy and capital cost minimization. Confidence that the best possible design has been achieved is more easily achieved, today, using ESDU's process integration tools and guidance. Understanding heat recovery and water reuse opportunities, and ensuring that process equipment is correctly located within a plant design are key to realizing savings in practice. ESDU data helps you unlock the data you need for safe, confident designs.

Product Description

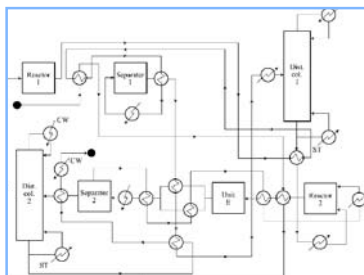
Application of Process Integration offers users the ability to:

- Make better use of capital, energy, and water resources
- Reduce operating costs
- Meet the challenge of sustainability

Process Integration is applicable at all process engineering design stages including:

- On-going improvement of existing sites
- Upgrades and major retrofits
- Conceptual design of new plants
- Development of new technology

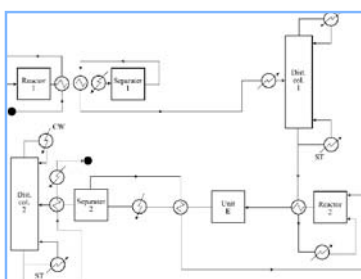
Network Design Using Traditional Methods:



Plant appears highly energy efficient, but actually is:

- over complex
- capital cost intensive-pipework overdesigned
- modelled poorly in terms of heat exchangers

Network Redesigned Using ESDU's INTEGRITY™



The overall plant design demonstrates improved operability and is:

- energy efficient
- less complex
- safer to operate and maintain
- cheaper
- modelled realistically in terms of heat exchangers

Future Developments:

- Retrofit
- Batch Processes
- Site analysis
- Separation scheme synthesis
- Distillation column thermodynamics
- Heat pumping
- Dealing with constraints

A comprehensive training package is available to enable **INTEGRITY™** users to achieve maximum benefit in applying the program to their design projects.

There are other ESDU Process Integration Data Items on application to utilities, CHP and heat pumps, and process change and batch processes. Like all ESDU data, these are now available to subscribers via the Internet or CD-ROM for stand-alone or network delivery.

ESDU's on-going work in Process Integration Data will encompass other practical aspects such as retrofit and will include practical case studies developed with the help of industrial and academic experts.

"Process Integration will continue to generate valuable cost savings by improved heat recovery and water reuse. Perhaps the most significant feature of the methodology is the insight it provides towards inherently more efficient processes. Process Integration is a tool that incorporates systematic understanding of process thermodynamics to arrive at optimum process configuration and operating conditions. Because the methodology can be applied across a whole site, it also eliminates the pitfall of designing individual operations that are very efficient, but result collectively in less than optimum site performance."

--Harry Cripps,
HRC Consultants, Ltd.