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SPRINT

SPRINT helps process engineers reduce energy consumption and total annualised cost by bringing energy targeting, utility optimisation, heat exchanger network design, retrofit analysis, operability assessment, and fouling management into one integrated workflow.

Overview

SPRINT is a software package for the design, analysis, optimisation, and retrofit of process energy systems. It enables engineers to establish energy and cost targets, select and optimise utilities, design and retrofit heat exchanger networks, evaluate operability, and assess fouling behaviour. The software combines automated design capabilities with interactive engineering control, allowing designers to evaluate alternatives efficiently while retaining authority over key design decisions.

SPRINT automatically designs heat exchanger networks for both new and retrofit applications, while enabling users to manage network complexity and practicality. For retrofit projects, the software identifies improvement opportunities and presents modifications incrementally, ensuring that the minimum number of structural changes are considered. **SPRINT** also performs network optimisation and shares common data structures with **STAR**, allowing both applications to use the same data files without manual transfer.

Together, these capabilities support the full process energy improvement cycle: setting achievable energy and cost targets, developing practical network designs, improving existing assets, and maintaining performance over time.

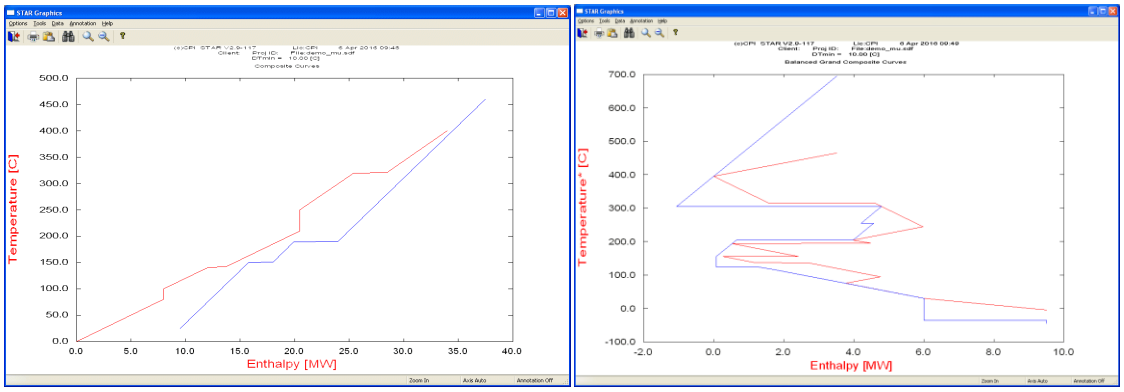
SPRINT's main capabilities include:

- Utility targeting and optimisation for individual processes
- Automatic design of new heat exchanger networks
- Automatic retrofit design with minimum structural modifications
- Support for multiple utility systems in both new and retrofit designs
- Interactive network design and editing
- Network simulation using simplified process models
- Minimum energy consumption targeting
- Economic optimisation of heat exchanger networks
- Network operability assessment
- Fouling analysis and cleaning schedule optimisation

Process Energy and Capital Cost Targets

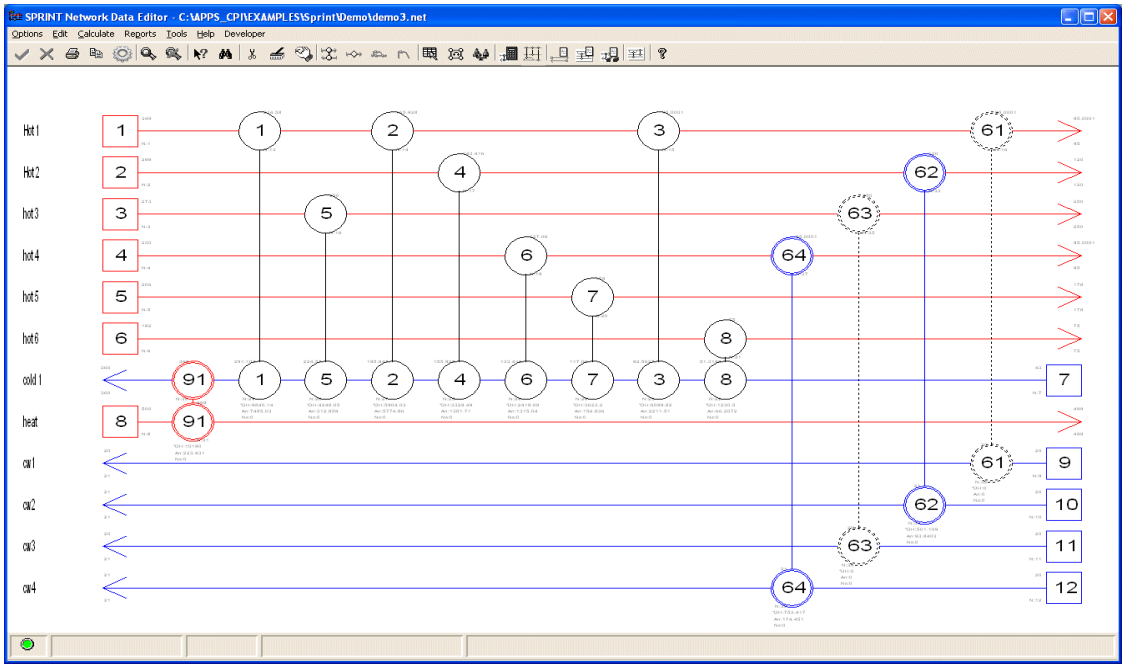
SPRINT establishes energy targets and optimises utility selection for individual processes. The software includes industry-standard targeting tools such as composite curves, the grand composite curve, and the problem table. These tools enable engineers to determine hot and cold utility requirements and identify opportunities for energy recovery.

SPRINT automatically positions the optimal utility mix against the grand composite curve, ensuring efficient utility selection. Beyond energy targets, the software can estimate heat exchanger surface area requirements, the minimum number of exchanger units, and shell requirements. By combining energy and capital targets, designers can evaluate total cost performance before detailed network design begins.



Graphical Network Interface

SPRINT provides an interactive graphical environment for creating, reviewing, and modifying heat exchanger network designs. Engineers can adjust network structures using intuitive graphical tools while monitoring system performance, energy recovery, and network complexity.



Simulation

For a selected network configuration, **SPRINT** calculates intermediate stream temperatures and heat exchanger performance throughout the network. Multiple simulation modes are available depending on the level of design information provided and the analysis requirements. Heat exchangers may be specified using either heat duty or heat transfer area, providing flexibility during both conceptual and detailed design stages.

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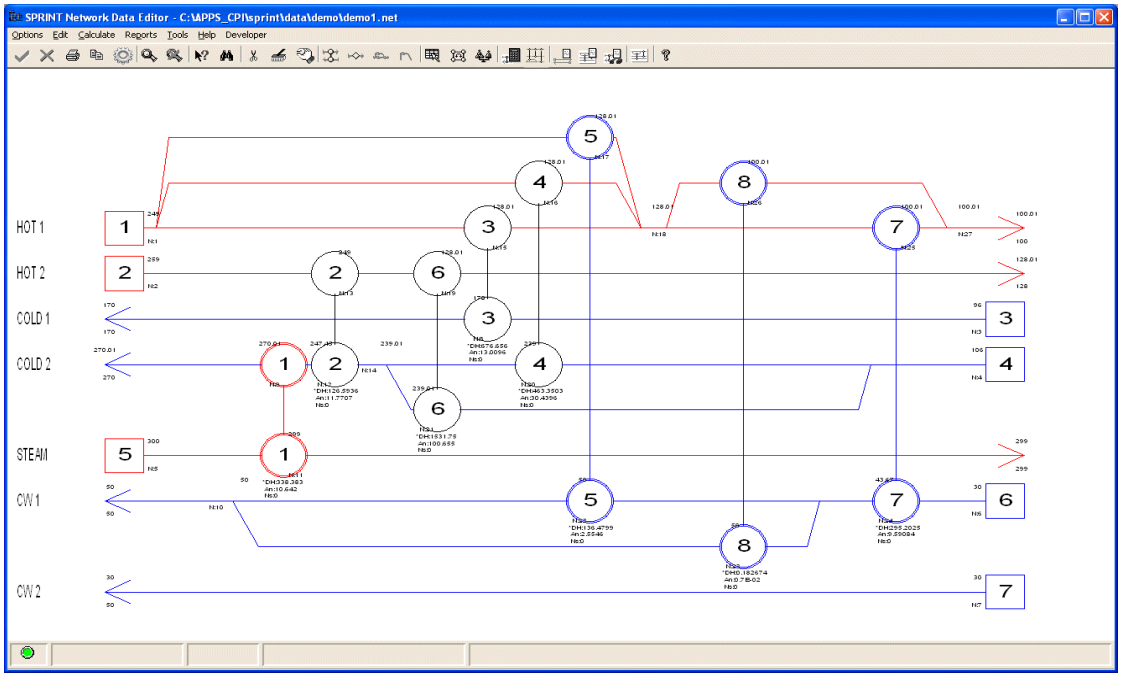
Automatic Design of New Heat Exchanger Networks

SPRINT automatically generates heat exchanger network designs while allowing engineers to control network complexity. Automated solutions may include stream-splitting arrangements that are impractical to implement, so the software enables designers to refine and simplify these configurations.

This approach combines automated network synthesis with the engineering judgement needed to develop practical, maintainable designs.



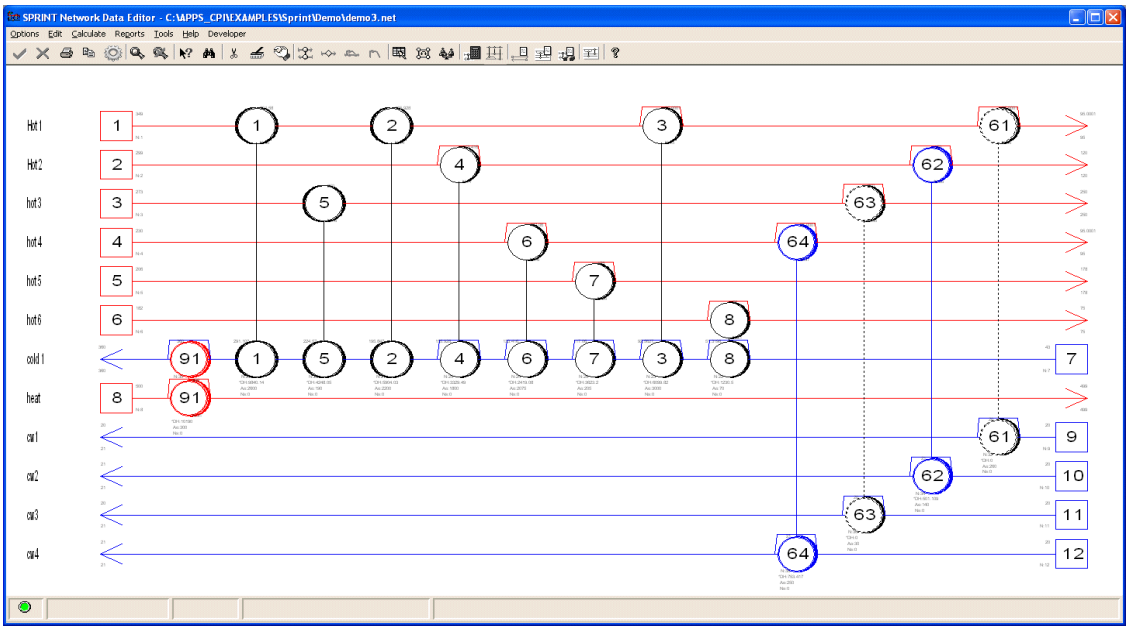
Automatic Network Retrofit

SPRINT applies the Network Pinch methodology to identify bottlenecks that limit energy recovery within existing heat exchanger networks. Once bottlenecks are identified, the software evaluates structural modifications capable of improving network performance.

Available retrofit strategies include:

- Resequencing existing heat exchangers
- Repiping exchangers to alternative stream pairings
- Adding new heat exchangers
- Introducing stream splits

Users select a retrofit strategy, after which **SPRINT** identifies the most effective modifications within that approach. Changes are presented sequentially, enabling engineers to assess each option individually and improve energy performance with the minimum number of practical modifications.

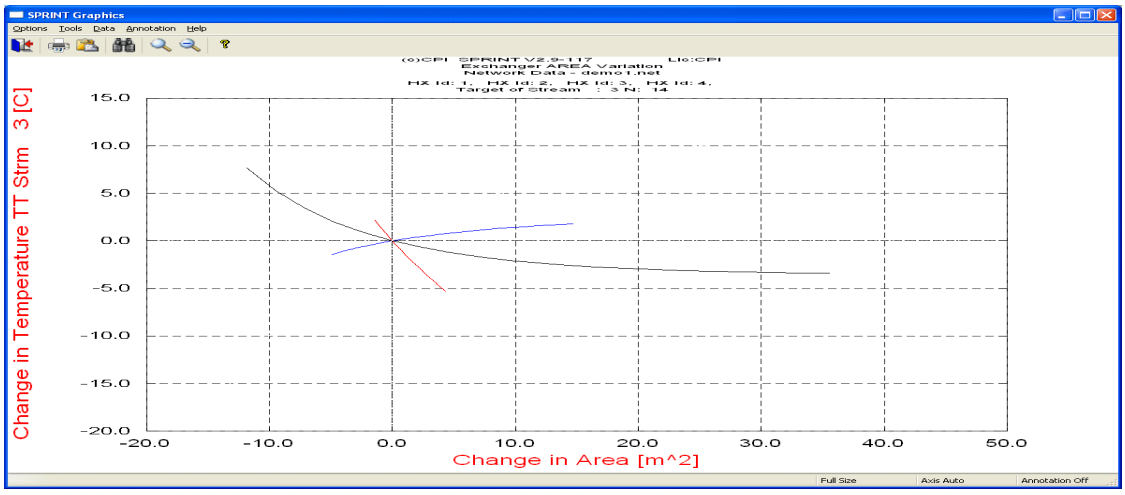


Optimisation

SPRINT automatically adjusts network degrees of freedom to minimise total annualised cost for both new and retrofit designs. The optimisation process balances utility consumption against capital expenditure, enabling engineers to identify economically optimal network configurations.

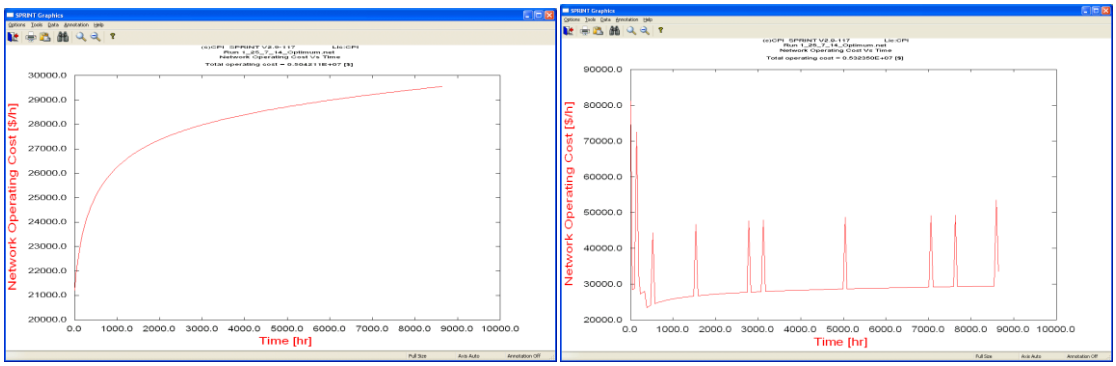
Control and Operability

SPRINT evaluates network performance under varying operating conditions and identifies modifications that improve robustness and flexibility. This capability helps engineers maintain effective operation across different process scenarios while minimising adverse impacts on energy efficiency.



Fouling

Fouling models can be associated with each exchanger, and network behaviour can be examined over an operating time period. Users can specify cleaning schedules and other network operating changes to mitigate fouling and reduce overall operating cost. The cleaning schedule can also be optimised to minimise network operating cost.



By integrating targeting, design, retrofit, optimisation, operability, and fouling analysis, SPRINT gives engineers a single environment for improving process energy systems from concept through operation.