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HYDRO Overview

This overview is intended for refinery engineers, process designers and decision-makers who need to understand how HYDRO can reduce hydrogen demand, evaluate supply and purification options, and support practical distribution-network design.

HYDRO is the software package used for the analysis and design of hydrogen distribution systems in refineries. **HYDRO** sets targets for the minimum overall hydrogen supply required by a refinery by maximising the recovery between the various consumers. Purification options can also be considered. The software also performs automated hydrogen network design, where the user has full control over network complexity and constraints.

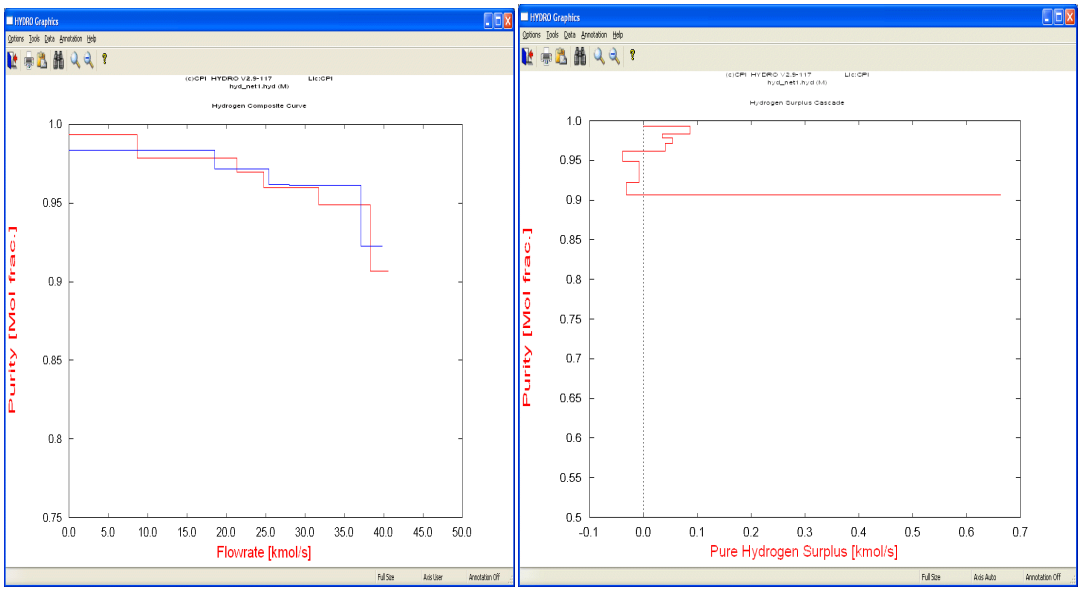
The following areas show how **HYDRO** turns hydrogen targeting, supply selection, purification analysis and network design into connected parts of one refinery-wide optimisation workflow.

Issues addressed by **HYDRO** include:

- Minimisation of hydrogen demand through maximum re-use
- Optimum selection between multiple sources of hydrogen
- Analysis of hydrogen purification options
- Automatic design of hydrogen distribution networks

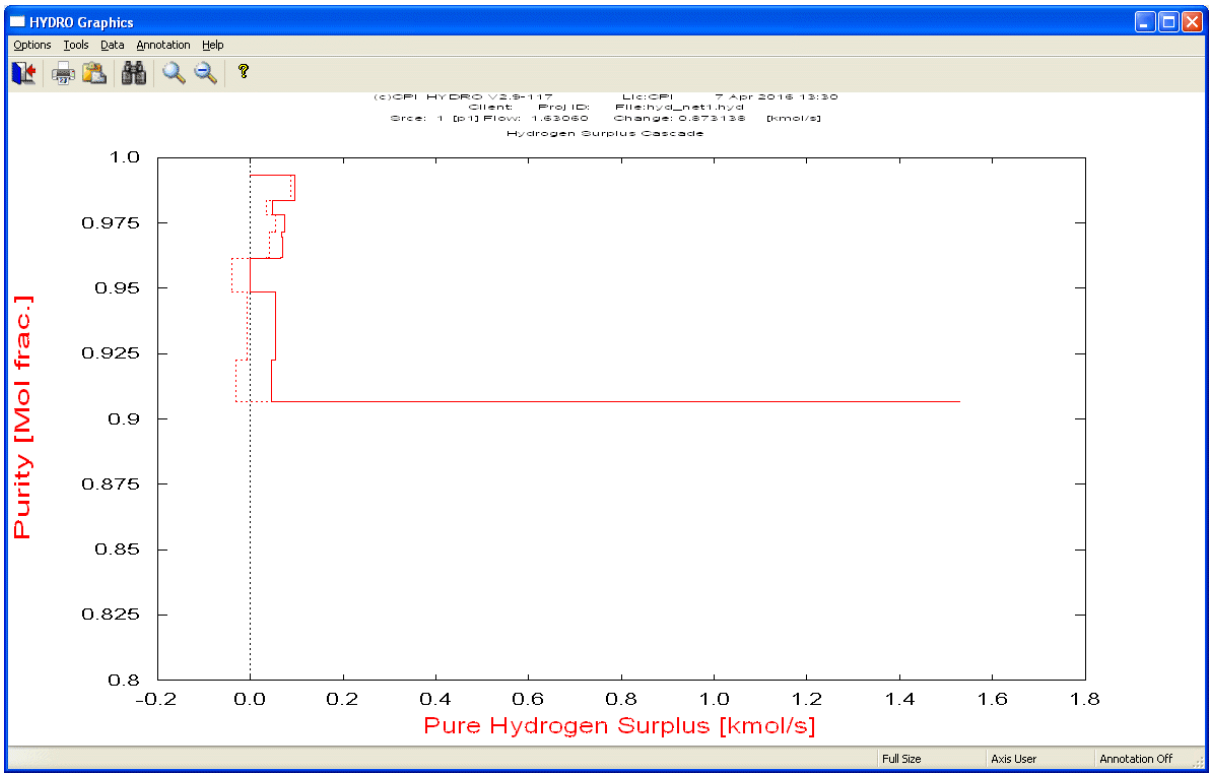
Hydrogen-demand reduction

Hydrogen consumers require a specified hydrogen flowrate and partial pressure at their inlets. In many cases, gases leaving those consumers still contain significant amounts of hydrogen. **HYDRO** systematically analyses where these gases can be re-used or recycled across a refinery, producing a target for the minimum fresh hydrogen supply needed to meet all consumer requirements. By maximising hydrogen recovery, the software also helps minimise losses to fuel or flare systems.



Multiple Sources of Hydrogen

When several fresh hydrogen sources are available, such as a hydrogen plant, pipeline import or "across-the-fence" purchase, each source may differ in quality and cost. HYDRO compares these sources and selects the lowest-cost supply mix that still satisfies the refinery's hydrogen requirements.



Analysis of Hydrogen Purification Options

Hydrogen-supply targets can be reduced further by adding suitable purification technology, such as pressure-swing adsorption, membrane separation or cryogenic separation. Using the product purities and recoveries of these units, **HYDRO** helps the designer determine the optimum purifier type, size and placement.

Automatic Design of Hydrogen Distribution Networks

After hydrogen-supply and purification targets have been established, HYDRO automatically designs a distribution system to meet those targets. The designer can control network complexity and impose constraints such as maximum and minimum flowrates, forbidden connections and compulsory connections. The design also accounts for distribution costs associated with pipework and compression.

HYDRO presents design results as both a tabular report and an interactive graphical representation.

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