Hysopt – Hydronic System Optimisation

Executive summary

Elevator pitch

The design process for HVAC installations (Heating, Ventilation and Air Conditioning) has become old-fashioned and very time-consuming. Traditionally, HVAC systems are designed using rules of thumb and manual calculations. Furthermore, only full load conditions are considered (heating and cooling in the most extreme weather conditions), and partial load behavior is ignored entirely. Because of the uncertainty about the partial load behavior, system designers often prefer traditional but outdated `proven concepts'. To make matters worse, designers try to mitigate the risk of having a non-working installation by incorporating safety margins in their designs, thus diverging even more from the optimal system design. Innovative HVAC installation components and even installation concepts (hybrid production, satellite units, district heating) complicate the design process even further. Rules of thumb are not sufficient any more to design HVAC systems in this complex environment. This results in suboptimal systems, having high energy consumption, high capital investment cost, and inferior thermal comfort.

Hysopt as technological innovator

Hysopt NV is a young spin-off company of the University of Antwerp. Its main goal is to make innovative simulation technology available to the HVAC designer. As such, Hysopt makes HVAC systems transparent and allows designers to construct more performant systems.

Hysopt develops and commercializes software, which yields optimal HVAC installation concepts while decimating the HVAC system design time. Hysopt targets HVAC system designers employed at the different stakeholders: engineering offices, contractors, building owners, component manufacturers, ...

Hysopt's commercial activities are centered on the Hysopt software platform.

As a _design tool_, Hysopt enables quick HVAC system design, by providing the user with a highly automated design environment. The new `Base Circuit` design technique allows the user to build his system out of a library of predefined circuits, rather than individual components. By coupling such circuits, the designer can produce a fully functional installation in no time. At the same time, the software reports conceptual errors as they arise, thus avoiding extra costs of having to correct inferior HVAC system designs after they are built. The Hysopt optimization algorithms can select the different system components (such as pipes, pumps, valves and radiators) automatically, a process still done manually by many HVAC system engineers. This decimates the design time, while guaranteeing an optimal HVAC installation.

As _simulation software_, Hysopt enables the system engineer to evaluate the system performance early in the design process, in full load as well as partial load conditions. By quantifying different `Key Performance Indicators` (KPI's), such as energy consumption, comfort, investment costs and lifecycle cost, different HVAC system designs can be compared and optimized with respect to the desires of the building owner.

The Hysopt software platform runs in the cloud, as a Software as a Service (SaaS) application.

Hysopt as a market-innovator

Performance through transparency – Insight into the design and performance of HVAC systems will drive the HVAC business to high quality and sustainable installations.

Currently, three market drivers can be distinguished: (1) _Installation cost_, (2) _Reputation_ – Big engineering companies and contractors appear more trustworthy, and (3) _Relation_ – Prior collaborations provide a foundation for future cooperation. Strangely, the actual _performance_ of the installation (energy consumption, thermal comfort, and so on) is ignored, because no tools are available for measuring these performance indicators at design time. The building owner can only guess system performance, while the entire HVAC industry claims to build optimal and efficient installations.

Hysopt wants to enable the use of _performance_ as a differentiator. By quantifying different performance indicators and allowing designers to build and compare several system alternatives, it is possible to use system performance as an a priori driver. Furthermore, the extra costs associated with more sustainable energy technologies can be justified.

Products and services

The Hysopt software platform combines an extremely intuitive design environment, a powerful Hydronic calculation toolset and a detailed simulation package into a unique product for designing and optimizing large HVAC installations. Our powerful cloud servers allow us to perform many optimizations and simulations in parallel, providing the user with feedback and insight on the installation's performance at all stages of the design process.

The Hysopt Academy provides to transform system engineers into trained Hysopt users. Hands-on tutorials and concrete installation examples and problematic installations are thoroughly investigated, in order to provide the user with real-life examples and use-cases. Furthermore, Hysopt participates in conferences and workshops.

Hysopt Consultancy brings the expert knowledge of the Hysopt engineers to the market. Hysopt engineers optimize new and existing HVAC systems using the Hysopt software platform. You can rest assured that we will investigate every aspect of your installation, both in full and partial load conditions, in order to provide you with suitable suggestions for improving your HVAC system.

Different alternatives will be compared based on the KPI's defined by the client. Hysopt will deliver a clear and transparent report, which adheres closely to the client's needs and which will suggest several solutions to the client's problems.

An 'Industry Marketing Cooperation' offers component manufacturers the possibility to incorporate their products into the Hysopt software platform. This enables Hysopt customers to use the manufacturer's products in their engineering challenges. Furthermore, Hysopt can develop OEM products for component manufacturers. Last but not least, Hysopt offers support with R&D projects, where the Hysopt software platform can be used to model and investigate the performance of new hydronic system components.