

SUCCESSFUL USE OF UMBERTO IN THE CHEMICAL INDUSTRY

THE TASK

Ciba is using Umberto for process optimization in the chemical industry. While Ciba's worldwide production plants must meet strict emission limits, at the same time the company's operations consume large amounts of energy and raw materials. As a consequence, energy and waste disposal costs are significant. The task is to analyze, assess, and optimize material flows and emissions in chemical production processes by using Umberto.



THE CUSTOMER

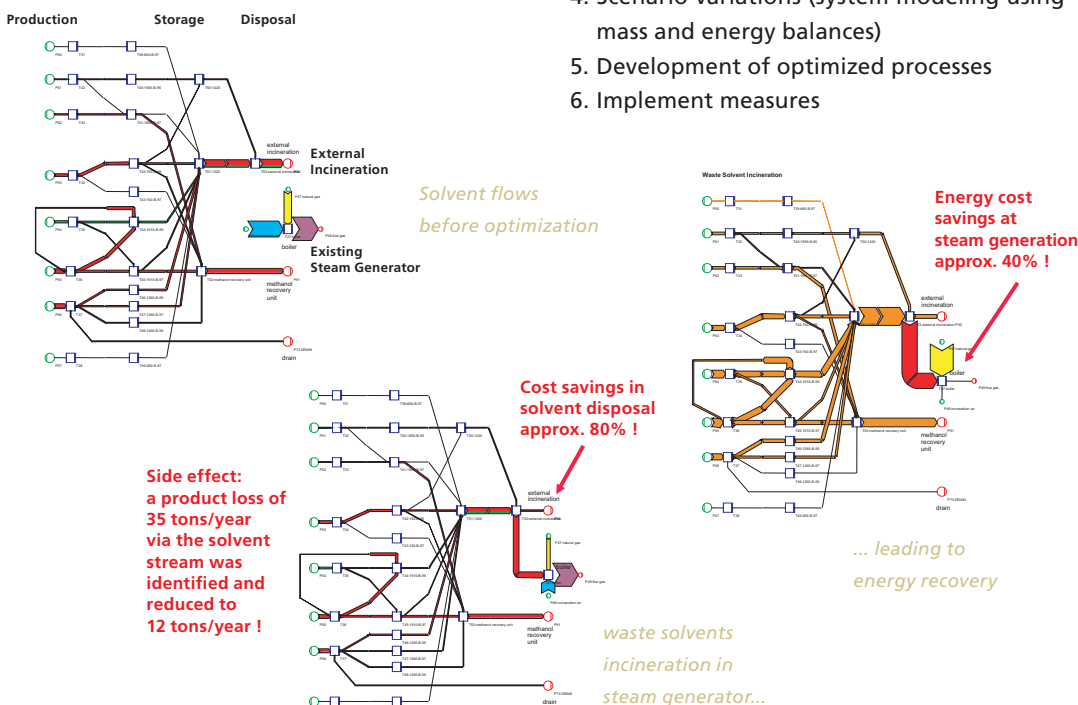
Ciba Specialty Chemicals (SWX: CIBN, NYSE: CSB) is a leading global company dedicated to producing high-value effects for its customers' products. As partner of choice, Ciba offers its customers innovative products and solutions. The company creates effects that improve the quality of life – adding performance, protection, color and strength to textiles, plastics, paper, automobiles, buildings, home and personal care products and much more. Committed to be a leader in its chosen markets, Ciba Specialty Chemicals is active in more than 120 countries. In 2005, the company invested more than 300 million Swiss Franks in research and development.

STRATEGY AND IMPLEMENTATION

ECO Engineering is Ciba's method for sustainable process optimization in the chemical and pharmaceutical industry. All relevant data is collected, analyzed, and assessed based on a consistent method. The main objective is to detect potentials for system optimization and cost savings.

The optimization cycle has six steps:

1. Problem definition (what is happening where, how much is being transformed, and why?)
2. Flow analysis (measurement, system description, situational analysis, material and energy flow analysis, and cost analysis)
3. Data assessment (where are the potentials for cost savings and system optimization?)
4. Scenario variations (system modeling using mass and energy balances)
5. Development of optimized processes
6. Implement measures



MAIN UMBERTO FEATURES USED

- Comfortable graphical modeling of process systems
- Visualization of material flow quantities (Sankey diagrams)
- Scenario analyses
- Detailed cost accounting

With a strong focus on improving material efficiency, the defined measures are permanently checked against the target. The new data is used to calibrate and update the model. Umberto is the central element for steps 2 through 4 (flow analyses to scenario variations). Ciba uses Umberto to comfortably calculate inventories for different scenarios. The models serve to check for cost-effectiveness of the processes and to identify hotspots for optimization. Based on the calculated values and the experience gathered, processes and operations are being modified by implementing technical and organizational

measures. The ECO Engineering cycle allows the verification of new data and – wherever possible – continuous optimization of performance.

This leads to cost savings in the following areas:

- Production
- Utilities
- Costs of waste disposal, gaseous and liquid effluent treatments
- Raw material costs (wasted materials must be purchased in the first place)
- Handling, storage, administration
- Environmental loads

CUSTOMER TESTIMONIAL

“Umberto has helped us to establish material and energy flow analysis as an instrument for our consulting activities. Our internal and external customers attach great importance to the powerful visualizations of the technical solutions we offer. And Umberto allows us to deliver them.”

Dr. Nikolaus Thissen,
Ciba Specialty Chemicals
Schweizerhalle Inc.,
Switzerland, 2006



EXAMPLES OF UMBERTO APPLICATION

Recovery of Solvents

In one of the Ciba plants, scenario analyses were made for solvent emissions of a specific reactor. These Umberto calculations were done to ensure that the effluent treatment equipment would not be overstressed. The model was parameterized with regard to solvent recycling possibilities and condenser temperatures between 5 °C and -10 °C. Optimal solvent recycling was achieved at lower temperatures, leading to a reduction of more than 60 % in gaseous emissions.

Energetic Use of Waste Solvents

In one of the Ciba plants in England, only a small portion of the waste solvents from eight production lines was recovered, while the lion's share had to be incinerated by an external waste disposal company. Using an Umberto model, an alternative scenario was identified, where the waste solvents were incinerated in the plant's on-site steam generator. This leads to a reduction of the waste quantities, fewer environmental impacts, and savings in disposal cost. The recovered energy is fed into the steam generation process, reducing the cost of energy by approximately 40 %.

MEASURABLE RESULTS AND BENEFITS

Optimized processes led to manifold cost reductions. For example, within one company, cost savings of 75 % for gaseous effluent treatment

could be initiated, totaling 1.5 million Swiss Franks over a five year period.