

Case Study

BCSD Portugal Collection

Improvements in aniline distillation

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Aniline is a highly versatile organic compound, employed as feedstock in the production of dyes, and the basis for the manufacture of a wide range of chemicals, such as polyurethane foam, photographic reagents, synthetic dyes, antioxidants, stabilizers for the latex industry, herbicides, varnishes and explosives. In Portugal, CUF's chemical site located in Estarreja holds about 3% of the installed capacity of non-integrated aniline worldwide. CUF is one of the largest global producers of aniline, and a European sales leader.

CUF identified a few aspects in need of improvement throughout the aniline production process. To that end, the company developed an alternative strategy to control the aniline distillation unit. The main objective was to increase the efficiency of the aniline production process through the reduction of feedstock and steam consumption, and effluent production. To achieve this purpose, CUF used new operating philosophies, advanced control, predictive control, automatic operations of preventive maintenance and deviation alarms.

Multidisciplinary teams to meet the challenges

To implement this project, developed in-house and without the use of partners, the company identified a multidisciplinary team of process control, processing, instrumentation and automation.

Despite the successful implementation and the positive results, the team found a number of challenges along the way, and at different levels. On the one hand and first of all, the abandoning of the traditional philosophy of control brought with it a psychological burden, due to the doubts raised about the new operation, and the appropriate automatic measures to be adopted, based on analysis algorithms of procedural variables and without operator intervention. On the other hand, the specificities of the industrial environment, which is not always the ideal setting for change processes and process alterations. The fact that the unit has been in constant operation, and never available for testing, made it more difficult to obtain cause and effect relationships.

Regardless of all the difficulties, the alternative control strategy of the aniline distillation unit led to a more stable process, with better monitoring of the final product quality. Practically, product reprocessing is no longer necessary.

More efficiency to reduce losses and increase profits

Improving efficiency in aniline production helped to reduce the natural gas bills and the generated effluents, and to increase productivity. As a side effect, the process contributed to increased internal knowledge, better technology control, efficient stock management and factory modelling.

In qualitative terms, CUF has now better control of the final aniline quality and greater procedural stability; product reprocessing needs have become virtually nonexistent. In quantitative terms, through steam savings, reduced aniline losses and less generated effluents to be sent for external treatment, CUF achieved savings amounting to 950,000 euros in 2014 and gains of about 600,000 euros per year, already in consolidation since January 2015.

Lessons learned

- The solution to a complex problem can result from disruptive thoughts.
- Success is dependent on well trained staff.
- The focus on internal engineering and continuous learning is essential to quickly, efficiently and effectively overcome difficulties.

CUF – Químicos Industriais

CUF – Químicos Industriais, located in the chemical complex of Estarreja, belongs to the José de Mello Group and is dedicated to the production and marketing of intermediates of inorganic and organic chemistry. The products are used in the chemical, pharmaceutical and textile industries, among others. A significant part is destined to direct export or incorporated in other products for export. The company is certified to ISO 9001:2000, ISO 14001:2004, OHSAS 18001 and NP 4457 and endorses the Responsible Care, EuroChlor and PACOPAR programs.