

CASE STUDY



Plant Operations Reacts Quickly to Market Demand with Aspen Plus®

**“In the past, reactors, columns, strippers and absorbers were simulated separately and case studies could not be analyzed quickly and accurately. Now the plant-wide model allows Oxiteno to develop new projects and optimization strategies successfully.”**

- Neide Hori Nagamine  
Process Engineer, Oxiteno



Oxiteno, a wholly owned subsidiary of Ultra Group, is a Brazilian chemical company that was founded in 1970 and operates worldwide. Oxiteno has an installed production capacity of about two million tons per year; they are the largest surfactant producer in Latin America, as well as a leading manufacturer of chemicals. Their products include integration of raw materials, ethylene oxide and natural fatty alcohols, in addition to other specialty chemicals. Oxiteno aims to envision business opportunities and develop solutions for the sustainable evolution of society and the world.

**With constant fluctuations in feedstock and energy prices, reacting to economic changes quickly was vital to capitalize on the most profitable assets.**

CUSTOMER PROFILE - Oxiteno - Surfactants, Chemicals, Petrochemicals	
<p><b>CHALLENGE</b></p> <p>Desired a plant-wide model to evaluate options that could increase plant capacity and quickly and accurately respond to market demand.</p>	<p><b>BENEFITS</b></p> <ul style="list-style-type: none"> <li>Responsive to market demand - No more guessing about feasibility of running the plant at different capacities and conditions</li> <li>Operational cost reduction - 15% less steam consumption and product quality increase</li> <li>Operability analysis/troubleshooting - Process variable phenomena now easily understood to achieve desired goals</li> <li>New technical tools - Simple Excel interface via ASW for operational decision-making</li> </ul>
<p><b>SOLUTION</b></p> <p>Simulated an entire ethanolamines plant using Aspen Plus and Aspen Simulation Workbook (ASW) to support capacity increase with existing high accuracy process equipment, resulting in benefits to the company ranging from current operations to future projects.</p>	

Oxiteno has used the aspenONE® Engineering suite extensively over the past 25 years to modify and optimize current units, as well as design new units with complex configurations. Detailed conceptual design models make licensing their technology to other companies quicker and smoother, and aids them in providing customer support. Aspen Simulation Workbook, a Microsoft® Excel add-in that pulls information from a linked Aspen Plus model, is used as a tool for effective operational decision-making and as a reporting tool in their varied plant processes. Not only for rating and designing key process equipment, Aspen Plus and Aspen Plus Dynamics are used to implement more adequate process control strategies. AspenTech software enables their plants to maintain flexibility to meet market needs in terms of product distribution, product quality and minimizing energy consumption.

The use of Aspen Economic Evaluation is currently being explored to benefit process optimization systems and project feasibility evaluation.

**“We can simulate very fast and have good operational parameters to keep our plants producing market needs in terms of product distribution, product quality and minimizing energy consumption.”**

*- Celestino Hissao Yamana  
Engineering Technology Manager, Oxiteno*



**Oxiteno achieved a 15% reduction in steam consumption, one of many operational benefits of building a plant-wide model.**

### RESPONDING QUICKLY TO MARKET NEEDS

Greater plant agility was required to meet market demands and, in this particular case, increase plant capacity. With constant fluctuations in feedstock and energy prices, Oxiteno realized that reacting to economic changes quickly was vital to capitalize on the most profitable assets. In the past, unit operations were modeled separately and case studies could not be analyzed quickly and accurately. It was very difficult to increase plant throughput by evaluating individual pieces of equipment without the ability to examine the effect of changing process variables on downstream processes. A simulation model build in Aspen Plus was used to gain a plant-wide view of the operations which was invaluable in many ways, including successfully increasing plant capacity while simultaneously reducing operating costs.

### BUILDING A PLANT-WIDE MODEL

An ethanolamines plant-wide model was built in Aspen Plus and matched to plant data, which supported capacity increase with accuracy. Existing equipment models were combined onto a single flowsheet and the three main sections of the plant (reaction, ammonia recovery, drying and purification) were successfully integrated into a single simulation. Kinetic parameters for the reaction section were easily assigned based on data from laboratory experiments and plant data. Specific property methods for ammonia solution in high concentration, which are not readily available, were used effectively for the ammonia recovery section. The multiple, composite vacuum column systems for drying and purifying ethanolamines products were successfully modeled

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using RadFrac, condenser, ejector vacuum system, and reboiler blocks. This rigorous plant-wide model enabled easier identification of key bottlenecks to be eliminated.

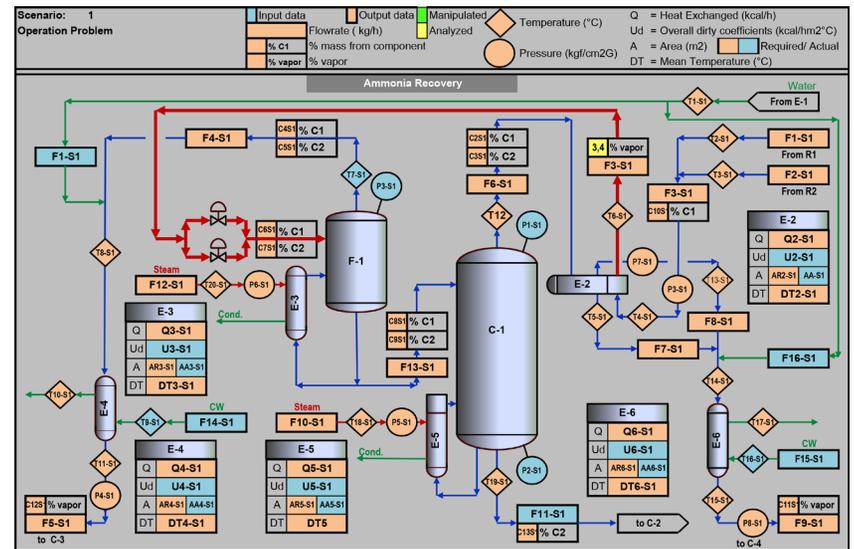
**Aspen Plus and ASW gave Oxiteno the agility they needed to keep pace with demand and production requirements.**

### UNEXPECTED BENEFITS OF A PLANT-WIDE MODEL

The benefits of the plant-wide model went beyond a successful plant capacity increase. Oxiteno achieved a 15% reduction in steam consumption through an adjustment in process variables, which resulted in equivalent cost savings. The greatest unexpected benefit was the ability to use and visualize the plant-wide Aspen Plus model within Excel (via ASW) as a tool for operations support. The following is an example of this:

Engineers were able to show to the operations team a detailed analysis of the causes of a pipe vibration issue by using an Aspen Plus model linked to Excel. This mysterious problem was easily understood using the model so that it was easy for the operators to see the cause and effect of both upstream and downstream variables, elucidating the causes of two-phase flow that could be the cause of the pipe vibration. Multiple case studies were then run in Aspen Simulation Workbook to find feasible conditions to remove the two-phase flow in the pipe and consequently eliminate the possible cause of the pipe vibration.

In addition, these models in Excel can also be used for operator training, helping them to understand the required conditions to achieve the best performance of the unit. Oxiteno built their ASW (Excel) interface to resemble a DCS Operator Screen so that it was possible to show to operators the results in a friendly way. Aspen Plus and Aspen Simulation Workbook gave Oxiteno greater agility and the tools they needed to keep pace with market demand for production requirements.



Aspen Simulation Workbook (Excel) interface resembling a DCS Operator Screen.

AspenTech is a leading supplier of software that optimizes process manufacturing — for energy, chemicals, engineering and construction, and other industries that manufacture and produce products from a chemical process. With integrated aspenONE® solutions, process manufacturers can implement best practices for optimizing their engineering, manufacturing, and supply chain operations. As a result, AspenTech customers are better able to increase capacity, improve margins, reduce costs, and become more energy efficient. To see how the world's leading process manufacturers rely on AspenTech to achieve their operational excellence goals, visit [www.aspentech.com](http://www.aspentech.com).

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