DAICEL

Daicel Accelerates Innovation and Reduces the Number of Experiments with Aspen Polymers™

aspentech | Case Study

"AspenTech is the best partner I have ever worked with."

Takahiro Aratani

Researcher, Process Engineering Center

Organic Chemical Product Company

Daicel Corporation

70%

reduction in experiments

CHALLENGE

Daicel is developing a new polymer with a narrow molecular weight distribution using a specialized polymerization technique.

SOLUTION

Daicel worked with AspenTech to develop a custom RAFT polymerization model in Aspen Polymers. They applied the model to optimize process conditions and reduce experimental costs.

BENEFITS

- Customizing Aspen Polymers delivered multiple benefits:
- 70% reduction in experiments
- Reduced research period from 22 days to 3 days
- Guidance for key decisions during product development based on technical and economic evaluation

Daicel Corporation is a chemicals manufacturer headquartered in Osaka, founded in 1919. The company has strengths in cellulose chemistry, organic synthetic chemistry, polymer chemistry and gunpowder engineering. They have a global presence in 14 countries and regions.

The company has been operating for more than 100 years by reading trends and providing products that meet market requirements.

Developing Uniform Polymers that Meet Market Needs

In order to grow its business in a highly competitive market, Daicel needed to develop polymers with narrow molecular weight distributions to meet a specific market demand. Developing the new product required many experiments and a great deal of time. Daicel's process engineering team concluded that building a polymer process model was essential to reduce development time.

Engineers initially attempted using Excel to model RAFT polymerization. However, they found Excel could not execute the advanced calculations necessary to model the reactor and downstream purification process.

Daicel has used Aspen Plus® on a daily basis for more than 30 years. Within Daicel, it has been common practice to turn to Aspen Plus for process simulations.

Based on AspenTech's ability to accurately simulate complex processes, Daicel's engineers tried using the free-radical model in Aspen Polymers. Although some predictions agreed well with the experiments, others including weight-average mole weight did not agree with the data.

After these attempts, engineers contacted AspenTech and explained their issue. AspenTech's support team replied that the problem could be solved by building a customized model.

Building a RAFT Polymerization Model

Due to complexity of the RAFT polymerization, there was no existing solution; Daicel had to build a new model.

Engineers at Daicel reached out to several companies, including AspenTech, which moved promptly to provide the most appropriate solution. AspenTech helped Daicel develop a custom model to capture RAFT polymerization kinetics to accurately match the lab data. "I was impressed. It can really be modeled, not just theory," said Kenji Kumata, a manager in Daciel's manufacturing technologies group.

Daicel's process engineering team appreciates AspenTech's expertise and technical capabilities that satisfy their requests and realistically translate them into a theoretical model. In addition, Daicel sees the strength of AspenTech's human assets across regions, including the Japan branch, as an advantage no other company has.

Developing the Partner Relationship Further

AspenTech's process engineering tools can be used in a wide range of fields such as reaction, distillation, purification and cost estimation. They also have the ability to handle the phase equilibrium of polymers and offer a rich database of physical properties: breadth no other solution can provide. Daicel credits this versatility as a key driver of adoption across their company over the last 30 years.

"When I am in trouble, I use aspenONE® solutions first," said Daicel engineer Takahiro Aratani. "AspenTech products play an active role in many situations, such as equipment design, optimization of operating conditions, and investigation of problems."

In addition, Daciel's process engineering team learned the product can be applied in wider cases through customization, which has become an additional evaluation criterion for engineering tools.

Takahiro Aratani said, "AspenTech is the best partner I've ever worked with." Kenji Kumata added that "We would like to develop this relationship further. We would like AspenTech to provide us a solution in other bigger projects."

aspentech | Technology That Loves Complexity

About Aspen Technology

Aspen Technology (AspenTech) is a leading software supplier for optimizing asset performance. Our products thrive in complex, industrial environments where it is critical to optimize the asset design, operation and maintenance lifecycle. AspenTech uniquely combines decades of process modeling expertise with machine learning. Our purpose-built software platform automates knowledge work and builds sustainable competitive advantage by delivering high returns over the entire asset lifecycle. As a result, companies in capital-intensive industries can maximize uptime and push the limits of performance, running their assets safer, greener, longer and faster. Visit **AspenTech.com** to find out more.