



Goal:

Implement a feature-rich development framework specifically for semiconductor-equipment control.

Challenges:

The framework must reduce the overall cost of control system development and field support by:

- Supporting rapid prototyping for shorter time-to-market
- Being highly reusable and maintainable, increasing development-team productivity
- Providing excellent configuration control for support of multiple product versions

Solution:

ControlWORKS, built on Cincom® VisualWorks®

Key Results:

- Systems implemented in four to eight months, not two to three years
- Time-to-market cut from two to three years to six to nine months
- The control organization reduced by up to 90%
- Maintenance costs cut due to built-in standard processes

Profile in Success: **Rudolph Technologies**

Rudolph Technologies Helps Semiconductor Customers Reach Market Faster with Smalltalk-Based ControlWORKS



Rudolph Technologies, Inc. is a leader in the design, development, manufacture and support of high-performance process control metrology and macro defect inspection equipment used by semiconductor device manufacturers around the world. ControlWORKS is its control system solution, created with funding from Wright-Patterson AFB, the Defense Advanced Research Projects Agency and Texas Instruments beginning in 1989. Rudolph sold its first commercial license in 1994.

Today, more than 6,000 ControlWORKS systems help semiconductor manufacturers create products in a shorter time frame by smaller development teams than traditional, homegrown solutions.

Meeting Its Customers' Demand for Speed

So, how did Rudolph achieve this level of success? "We make our customers successful," said Becky Cooper, Rudolph's deputy director of control systems, "and they are successful because we met the goals we set forth at the start. VisualWorks made those goals achievable."



Becky Cooper, Deputy Director of Control Systems

Reduced time-to-market is a key factor in the competitive semiconductor-equipment manufacturing industry. Rapid prototyping is essential to market deployment, both from the perspective of Rudolph software developers and that of their customers. Because ControlWORKS is an integrated

development framework that includes 80% to 90% of the functionality required to control most semiconductor equipment, customers can add to and customize semiconductor tools to create their own unique products.

ControlWORKS customers become well-versed in the VisualWorks development environment as well. "The VisualWorks environment is a natural for both Rudolph and our customers, because it lets us quickly try out new ideas, debug quickly and effectively in both development and run-time environments and manage our code artifacts in a meaningful way," Cooper said. "We've been very successful at teaching these concepts to our customers so they can manage their own development efforts."

The need for excellent configuration control cannot be overstated. "Because Rudolph is a partner for success with our ControlWORKS customers, we often work with them remotely and end up sharing code across the miles in support of multiple product-development threads," Cooper said. "VisualWorks supports this mode of development beautifully."

VisualWorks—a Key Factor in Rudolph's Success

Being a pure, object-oriented environment means more flexible, reusable, maintainable code, which often allows equipment-makers to reduce the size of their software development team owing to their increased productivity.

Lam Research, Inc., one of Rudolph's most successful ControlWORKS customers, benefited dramatically when it moved to the ControlWORKS development environment. CH Huang, director of software engineering at Lam, said, "The ControlWORKS framework supports applicable industry standards, and the framework provides almost all of the control functionality required in a state-of-the-art process tool. Additionally, the VisualWorks package provides one of the best software development environments. Lam software engineers have been able to focus their efforts on the control functionality or control enhancements that provide a product differentiation for the Lam 300mm equipment."

The support for rapid development, increased productivity and effective code-management tools have all made Cincom VisualWorks a key factor in the success of Rudolph and its ControlWORKS customers. Cooper summed it up best: "VisualWorks is intuitive, and its development tools and environment are second to none. Without it, we might still be creating a first pass at our control-system framework."

Cincom, the Quadrant Logo and VisualWorks are registered trademarks of Cincom Systems, Inc.

© 2011 Cincom Systems, Inc.
FORM CS050418-1 11/11
Printed in U.S.A.
All Rights Reserved

World Headquarters • Cincinnati, OH USA
US 1-800-2CINCOM (1-800-224-6266) • International 1-513-612-2769
Fax 1-513-612-2000 • E-mail info@cincom.com • www.cincom.com

