

System safety software for photolithographic machines

Case study

Client:

For a world-leading pioneer in complex photolithographic systems

Technologies and tools:

C++

Java

Google Web Toolkit



Luxoft built deep domain knowledge and expertise



Luxoft teams were able to raise their competence fast

Challenge

Our client is one of the world's foremost producers of photolithography machines (the most common method for fabricating microprocessors). These machines can create extremely small patterns, down to a few nanometers, requiring precise control of the objects they produce. They need to verify what's being produced and do so safely and efficiently within the constraints of the machine's capabilities. The process for which these machines are implemented is called integrated circuit lithography. This is the most important and most complicated process from the chain of processes necessary for chip production. It's one of the first processes, mainly responsible for miniaturization, copying, and imprinting the required patterns into silicon oxide wafers "plates" prepared in another part of the whole production, a photographic-like process. Like all chip manufacturing procedures, the equipment requires extremely clean and safe operating conditions. Whichever operation you perform on the machine, you need to meet certain preconditions so that the machine itself and its components are in a specific state. To ensure that the conditions are perfect in these fantastically complex machines (over 100 000 different parts), a special application exists (called a scanner). It provides all kinds of checks and makes sure that you can execute the next operation because the safety integrity for each step is at its optimum.

To support the newest machines as well as existing ones, the client decided to transfer the current system safety software to a single trusted vendor, enhance it and develop new mission-critical features. Having this activity on the critical path of newest machine production, it was essential to invite somebody with extensive capabilities to build the competence in a fast and timely manner, and provide extremely high quality, precise estimations and follow them during the development process.

Solution

Taking into account the rather challenging client request, Luxoft decided to build two Agile scrum teams from scratch nearshore (one is dedicated to new features and one to support the legacy platforms) with core members who already had deep experience in the client's domain. As the first step, it was essential to understand the current design and architecture which had been created by another vendor. It was on a different type of machine and consisted of different components that needed to be completely reconfigured for the scanner and then migrated inside the machines. Another challenge was being able to effectively maintain the legacy set of

technologies, which could not be replaced with new ones (due to the cost of changes) and build new features on top of it using the legacy set.

Coordinating the knowledge transfer with a non-collaborative vendor, Luxoft teams were able to raise their competence fast enough to be able to provide steady development speed with the required high level of source code quality (the machine itself needs to run on 95% availability, so the software inside the machine has the same metrics). The Luxoft team was also given responsibility, as sole vendor, for the end-to-end implementation (architecture, design, detailed work breakdown structure over high-level requirements from the client's product owner, software implementation, documentation, code validation and delivery to another system integration team, in a stable state). Such was the client's trust and confidence in the Luxoft team. The road map for the project, with very strict deadlines and milestones to be adhered to, was also put into Luxoft's hands. With this solution, the people who operate these machines (one machine can cost \$150M+) are able to ensure that the machine is in the correct state, and its safety is not being breached. This allows the client's machines to maximize their production efficiency and thus generate optimal revenue.

Results

- Client's critical program road map in terms of development, desired software quality and timeframes are completely met
- Client machine operators have complete trust in the solution, allowing them to minimize downtime
- Production efficiency greatly enhanced, human-related errors whittled away
- Luxoft built deep domain knowledge and expertise in this application development, allowing the client to have a sole vendor for this application and replace a non-collaborative vendor

Technologies

- C++, Java, Google Web Toolkit

About Luxoft

Luxoft is the design, data and development arm of DXC Technology, providing bespoke, end-to-end technology solutions for mission-critical systems, products and services. We help create data-fueled organizations, solving complex operational, technological and strategic challenges. Our passion is building resilient businesses, while generating new business channels and revenue streams, exceptional user experiences and modernized operations at scale.

luxoft.com

