Driving Efficiency at **Tofaş** with **ThingWorx**

Everything about Tofaş—from its brand portfolio to its immense production capacity—categorizes the automotive manufacturer as a trailblazer. Founded in 1968, Tofaş has grown to be one of Turkey's largest industrial operations, boasting over 7,000 employees, export performance, research and design competencies, and unique production capabilities. Tofaş exports to 80 countries around the world, and their domestic portfolio of brands includes Fiat, Alfa Romeo, Jeep, Maserati, and Ferrari. To build on its competitive advantage, Tofaş realized it needed to undergo a significant digital transformation journey. Given its substantial market footprint, it was also key make this transformation rapidly and in a way that minimized disruption.

The Opportunity

Tofaş' digital transformation goals included focused process improvement, energy optimization, workplace organization, and professional maintenance. Tofaş needed a way to make its manufacturing more accessible—essentially creating a digital twin of all their existing processes. It also needed to accelerate projects increase the number of employees engaged with digital transformation.

Brownfield operations depend on existing equipment that is not yet connected, which can deter organizations from pursuing digital transformation. This did not stop Tofaş. Despite reliance on equipment that lacked native connectivity, the manufacturer pursued a brownfield connectivity strategy that scaled up to achieve greater value over time. Kepware, PTC's industrial connectivity platform, enables equipment connectivity, while its ThingWorx Internet of Things (IoT) platform provides the digital analytics, self-service design, and simplified approach that are perfect for a brownfield factory. By focusing on low-cost, high-ROI improvements, Tofaş set out to achieve better

safety, quality, cost, and delivery outcomes.

Tofaş embarked on a two-layer approach to best extract value from its data. While a programmable logic controller (PLC) controls each machine, ThingWorx's technology helps the PLC deliver the right data, then analyze and present it in an easy-to-digest format. Precise coordination from machine to machine is required for results to occur.
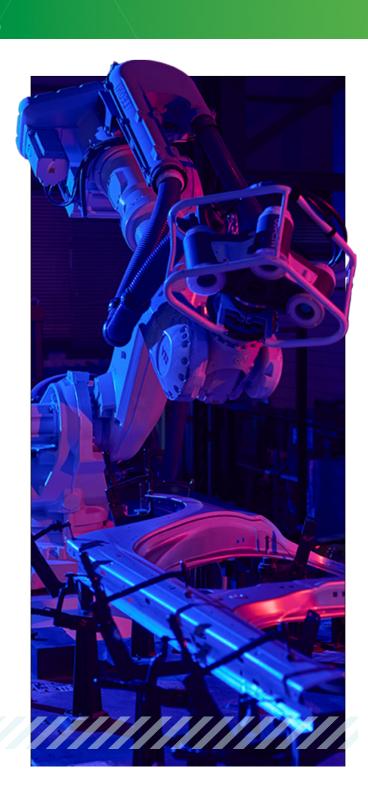
To optimize value from their data in Shopfloor, IT/OT architecture was evaluated in two layers:

1. **PTC's Kepware** connects equipment on the shop floor with IT systems to create a data pipeline.

2. **ThingWorx** leverages the Manufacturing Big Data Warehouse – the data lake operated by Tofaş – to perform complex analytics.

ThingWorx laid the groundwork for DVM, a systems integration company with a focus on manufacturing, to implement a set of applications called Digital Manufacturing Operations Management (DMOM). DMOM—designed for rapid adaptation to client requirements—keeps

track of all the equipment on the shop floor. The application's architecture utilized DVM's core modules that help manage the factory, production lines, and machine hierarchy—as well as ThingWorx's connectivity for the entire production floor. Tofaş has over 20,000 pieces of equipment across their production units, so DMOM's performance is contingent on ThingWorx's ability to process the abundance of data coming from all the PLCs. The two systems work hand in hand and have quickly become the backbone of Tofaş' manufacturing plant floor.

Challenges

It took some time to build a culture of digital transformation within Tofaş. Creating awareness was the first step, followed by extensive training sessions and pilot studies within the central team that were later disseminated to the whole company. To streamline this long and complicated process, a digital competency development path was created within the Tofaş Academy. With the help of ThingWorx and DVM, pilot and expanding studies were carried

out seamlessly, allowing a new generation of skillsets and knowledge to take hold within Tofaş.

On a more granular scale, managing data from a variety of sources is a complex process, especially when attempting to scale the information globally. ThingWorx was able to retrieve data from almost any industrial PLC, either directly or through seamless integration with third-party systems such as Azure, SAP, Kafka, and Knime.

months. By implementing ThingWorx, Tofaş cut its project completion time down considerably, enabling significant productivity and efficiency boosts.

ThingWorx also enabled Tofaş the ability to customize special projects, including the Tofaş Factory General Facilities Directorate. One of their goals was to predict and deliver the seasonal heating value to four main buildings within 30 minutes using infrastructure that transmits heat via steam pipe systems.

Early Results

A major part of Tofaş' digital transformation journey involved connecting multiple assembly lines with workstations across the manufacturing plant floor. Using integrations with third-party systems, Tofaş could seamlessly classify and store information coming from thousands of data points in real time. The ability to access data instantaneously proved instrumental for Tofaş. Research groups were soon able to analyze any given set of data in a matter of hours instead of having to develop custom systems to record and analyze information, a process that once took

Using ThingWorx, weather forecast data provided by external web services were integrated into the model and updated every 30 minutes to estimate the amount of heat required by each of the buildings. With these upgrades, Tofaş optimized energy consumption and the project was extended to additional sites.

When it comes to company culture and adoption of digital transformation, Tofaş has seen a sharp increase in employee engagement. Before ThingWorx, only 5-10% of employees were involved in digital projects. Now, over half of the company's employees are engaged with the platform. Additionally, since implementation Tofaş has realized:

- **15%** reduction in maintenance costs with the help of predictive maintenance applications

- **7%** decrease in energy use through optimization and analytics projects

- **12%** boost in Overall Equipment Effectiveness (OEE) by Quality Parameters Optimization, error prediction and process optimization projects

- **23%** less scrap

- **60%** reduction in safety incidents

ThingWorx's integration and scalable data modelling capabilities enabled Tofaş to take strides regarding digital growth—and the efficiencies, capabilities, and sustainability of its own facilities. Alongside DVM, ThingWorx has enabled model-based IoT projects to provide data communication capacities within the industrial field, allowing for flexible growth, scalability, no-code solutions, and analytical solutions.

Looking Ahead

After realizing great value between ThingWorx and DVM, Tofaş is looking to expand these capabilities even further. New modules, such as anomaly detection and deeper analytics capabilities, are being added to DMOM, giving users the ability to connect DMOM-managed data to the predictive and prescriptive analysis models running in real time.

The implementation of ThingWorx and DVM has allowed Tofaş to experience a great increase in efficiency, safety, savings, and energy optimization. Even brownstone operations achieved value by focusing on specific goals and low-cost, high-ROI improvements. The platforms are quickly becoming an important aspect of Tofaş' digital transformation and overall company culture with strong engagement among the majority of employees. With these powerful tools, Tofaş is on its way to further expanding its digital transformation efforts, bringing about even more savings, sustainability, and quality control throughout the organization.

Learn more about how PTC's manufacturing solutions can boost OEE, reduce scrap, and create a more efficient and safe manufacturing environment.