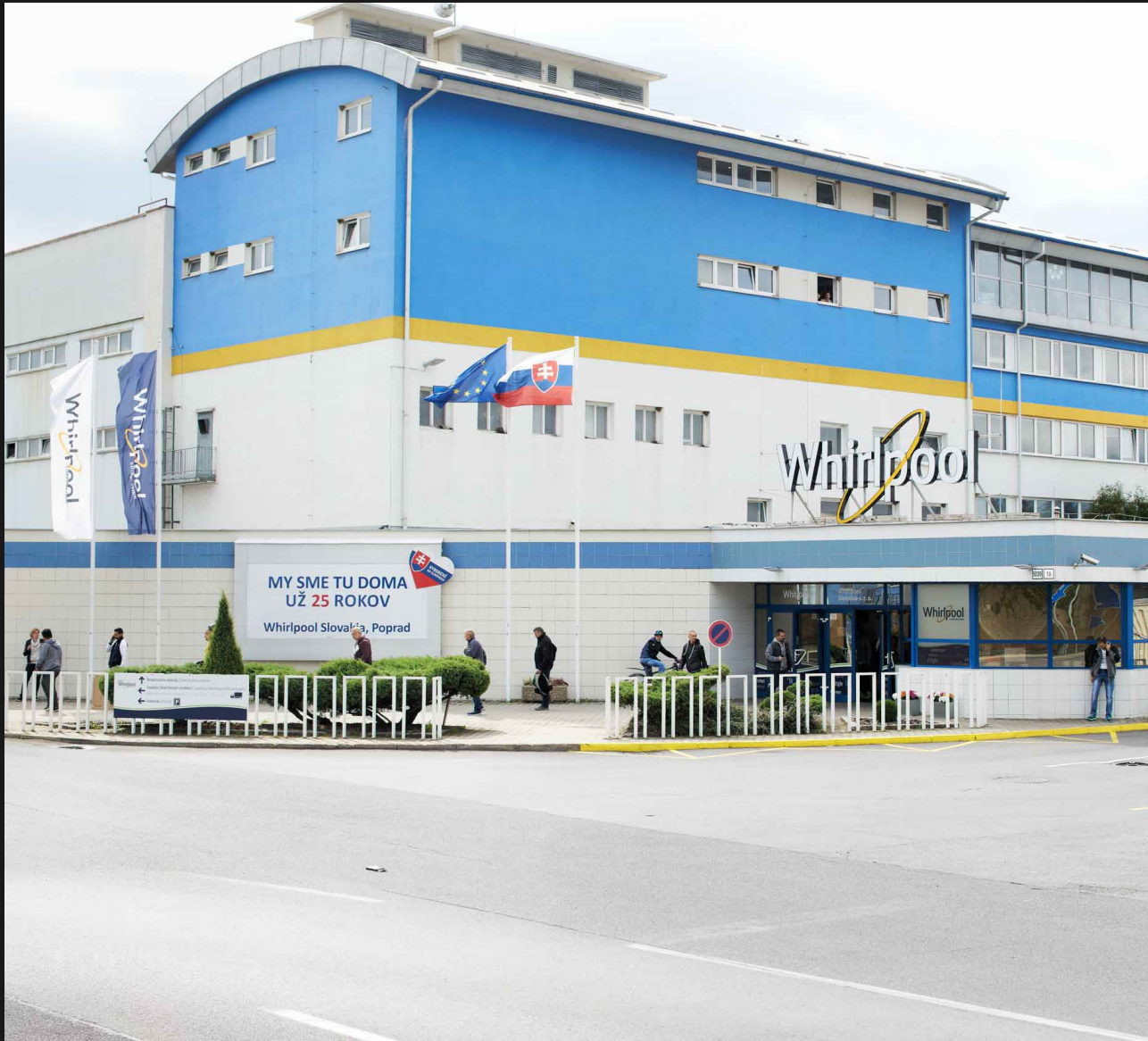

BEKO SLOVAKIA S.R.O.

Before Whirlpool Slovakia, s.r.o.

Case Study: PIEx System Implementation





BEKO

SLOVAKIA S.R.O.

Beko Slovakia, before Whirlpool Slovakia is one of the major manufacturing plants of Beko Corporate, a global leader in home appliances. The plant in Poprad manufactures washing machines and plays a key role in the supply chain for the European market.

- **Location:** Poprad, Slovakia (since 1992)
- **Function:** manufacturing of washing machines (front and top loaded)
- **History:** part of Beko Corporate
- **Capacity:** approx. 2.4 million units per year (11,000 per day)
- **Employees:** 1,400
- **Operations:** manufacturing, internal logistics, material handling, and distribution of finished products



BACKGROUND

Planned growth of production to current levels demanded implementation of more efficient processes for material inbound department, as well as for the whole supply chain.

Once the processes were in place, Whirlpool's attention shifted towards finding an information system, since additional effectivity improvements without a supporting system were not feasible.



ESSENTIAL FEATURES OF THE REQUESTED SYSTEM:

Data management without spreadsheets

Data input validation and control

Effective information sharing among
operators

Simple and quick reporting of
information needed for decision making

Complex real time view of material
inbound processes



REQUIREMENTS

Satisfaction of Beko Slovakia, before Whirlpool Slovakia with quality of our services and products resulted in 2010 into assignment of implementation of system for transport planning and inbound process visualization and management.

- Support of all the established processes in Whirlpool Slovakia
- Visual management of operators through process visualization
- Replacement of existing spreadsheets for inbound while keeping the automatic data recalculation functions intact
- Easy and quick reporting of information needed for decision making
- Visually attractive and modern design
- User friendly and efficient interface



OUR SOLUTION

By leveraging our platform (M2M Platform), we were able to deliver the first version of the system for use just three months after the order was placed.

- Rapid deployment
- Data is automatically updated after every change
- Historical data processed in the form of reports and graphs with the ability to model the future

Using augmented reality, information panels, and traffic lights, we created a visual management system right in the production hall.

- Every process participant sees the current status without the need for communication
- The main interface allows the process to be managed as an augmented reality system
- Simplified control and rapid decision-making in real time



BENEFITS

- Saving of one work shift on the inbound floor
- Undisputable success of the PIEx system can be seen in real savings that reached 2 Mio EUR in the year 2011 when compared to 2010
- Increase in efficiency of inbound processes, its stabilization and standardization
- Easy to use monitoring of transport effectivity (CPU calculation, delays) and quality



BENEFITS

- Reduction of transport costs (CPU), unplanned production stops due to logistic issues and reduction of stock levels
- Improvement of relations with transport companies
- Removal of hidden costs in processes (communication, planning)
- Optimization of transport planning, loading, unloading, route and capacity



EXPANDING COOPERATION AND FURTHER DEVELOPMENT

After successful implementation of PIEx we have delivered the following functionality updates:

- Transport and production KANBAN
- Packaging catalogue
- Advanced reporting and data analytics
- Stock-taking
- Cross connection with ERP SAP HANA

In addition to updates of PIEx we have also implemented our product **OEE (Overall equipment effectiveness)** for Whirlpool Slovakia, which serves to measure efficiency of usage of equipment.

Our cooperation is already planned far into the future. Besides additional enhancements of PIEx (Waste & Scram management) we shall implement our **technology M2L (Manipulate to light)** in order to navigate operators and control manipulation in warehouses.



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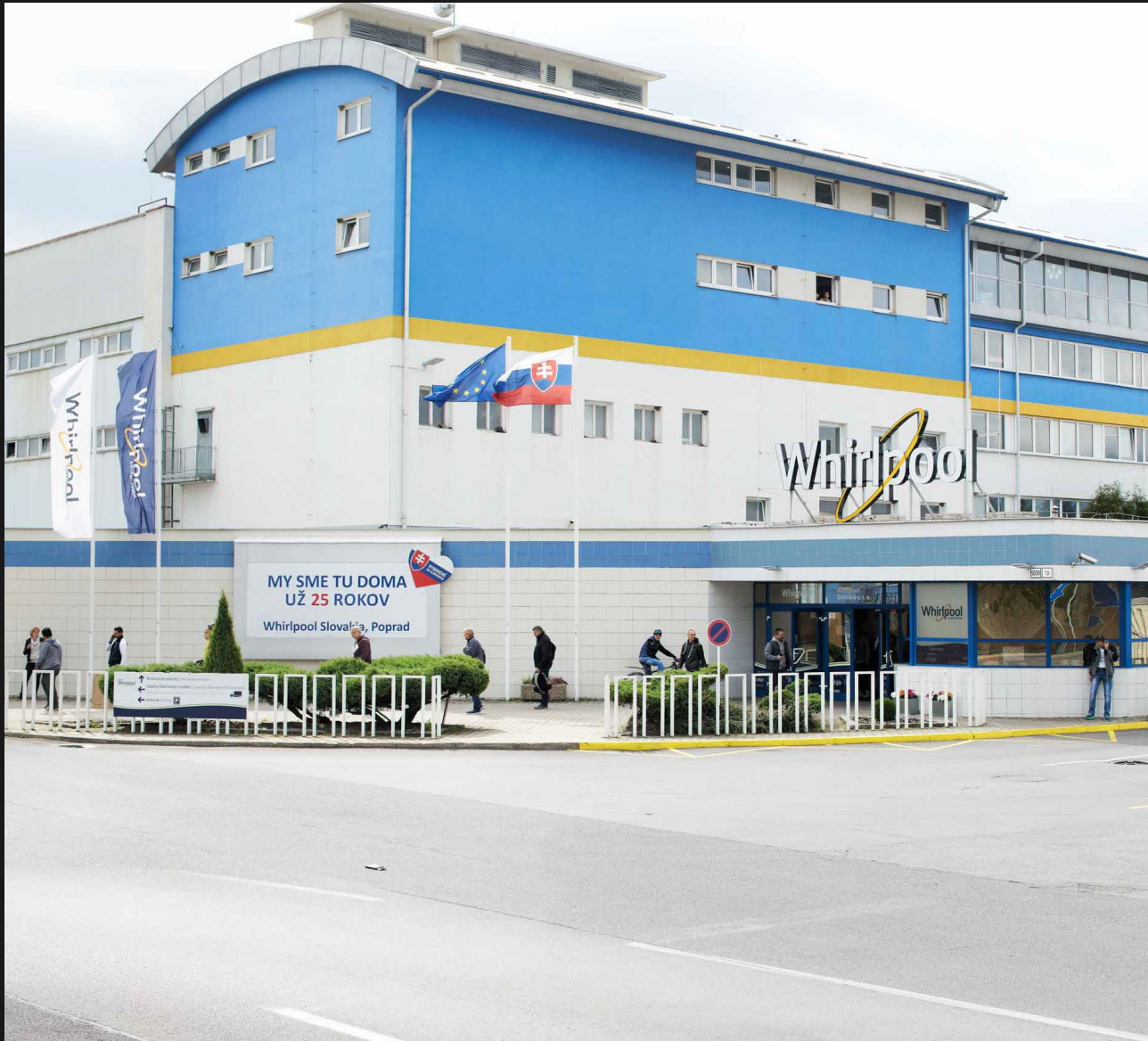


BEKO SLOVAKIA S.R.O.

Before Whirlpool Slovakia, s.r.o.

Case study: Implementation of the OEE system





BEKO

SLOVAKIA S.R.O.

Beko Slovakia, formerly Whirlpool Slovakia, is one of the major manufacturing plants of Beko Corporate, a global leader in home appliances. The plant in Poprad manufactures washing machines and plays a key role in the supply chain for the European market.

- **Location:** Poprad, Slovakia (since 1992)
- **Function:** production of washing machines (top-loading and front-loading)
- **History:** part of Beko Corporate Capacity: approx. 2.4 million units per year (11,000 per day)
- **Employees:** approximately 1,400
- **Operations:** manufacturing, internal logistics, material handling, and distribution of finished products



BACKGROUND

Production had grown to a level that required the implementation of a new, efficient system to measure the actual performance of the machines and the plant.

The system based on paper reports did not provide accurate and reliable data.

The production line was usually not operating at optimal speed.

The suboptimal operation of the machines was caused by a number of reasons, usually in combination:

- Line malfunctions
- Machine failures
- Product changes
- Short downtimes
- Operator inefficiency
- Reduced speed
- Quality
- Missing materials



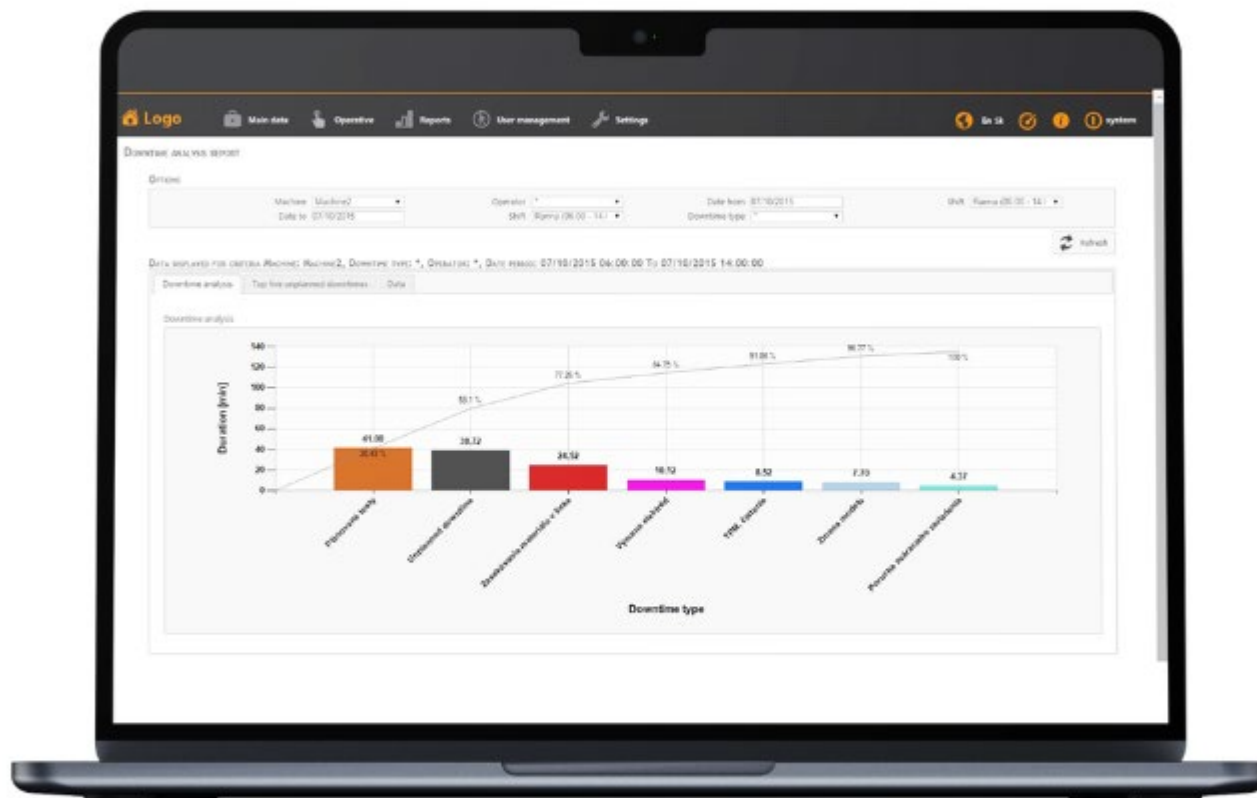
REQUIREMENTS

To improve efficiency, it was necessary to have a detailed understanding of the causes of downtime.

Continuous improvements, combined with ongoing monitoring of downtime, provide us with information on how successful these improvements are. This leads to a higher level of improvement.

Key requirements:

- Automated collection of performance data for machines and production lines every second of production.
- Monitoring of machine downtime and efficiency.
- Simple and fast reporting of information.
- Comprehensive real-time view of all performance indicators (availability, output, quality). Tracking and evaluation of KPIs.



OUR SOLUTION

The pilot project was carried out in 2014. Over the following year, we implemented the system on an additional 13 machines and 2 production lines.

The OEE tm system communicates with the machines and production lines by exchanging data from the PLC via an OPC server, OPC client, MOXA converters, and PowerMeter.

As soon as the system had collected enough data, managers were able to begin analyzing the most common causes of downtime and make the first changes.

Managers can respond immediately to changes in efficiency.



RESULTS

- Reduction of the most common unplanned production downtime.
- The system reduced both direct and indirect costs caused by malfunctioning equipment, poor quality, and excessive waste.
- Production bottlenecks were identified.
- Database of OEE metrics for future analysis.
- Easy comparison of OEE by work task, workstation, shift, or day.
- Real-time monitoring of product and process quality to facilitate continuous improvement.



EXPANDING COOPERATION AND FURTHER DEVELOPMENT

Following the successful implementation of the OEE system, we expanded the system to include additional features in the subsequent period:

- Structured downtime reporting.
- Integration with the central SAP HANA ERP system.
- Automated machine supply system.
- A new, more efficient data collection system.

In addition to our collaboration on the PIEx system, we have implemented **our ORS (Operator Resource System)** product at Beko (before Whirlpool) in Poprad, which is used for automated recording of operator work.

Our collaboration is far from over; in the future, in addition to expanding existing systems—such as Waste & Scrap Management—we also plan to implement **Manipulate to Light (M2L) technology**, which will visually guide operators when handling components.



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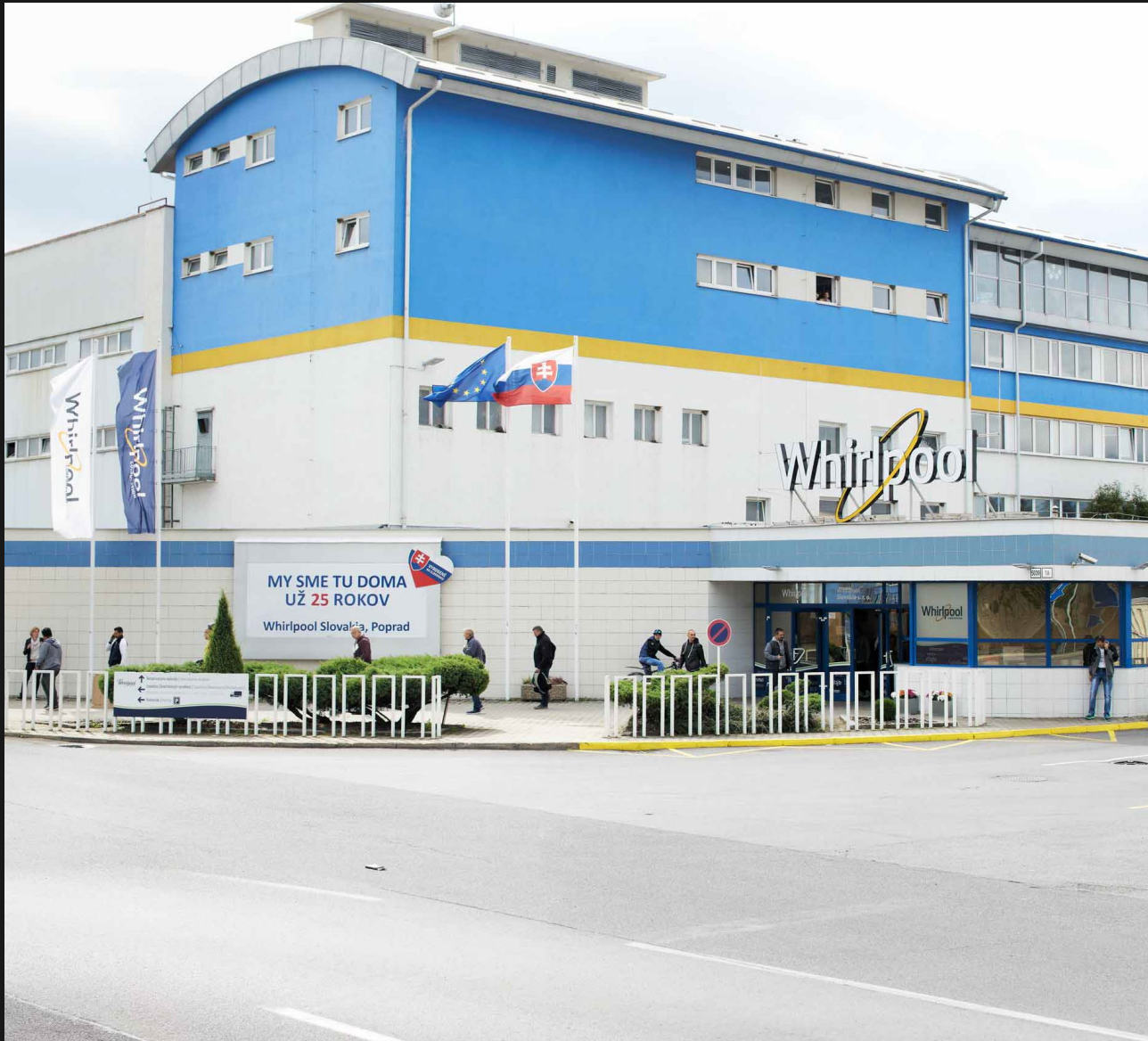


BEKO SLOVAKIA S.R.O.

Before Whirlpool Slovakia, s.r.o.

Case Study: Implementation of the ORS system (operator resource system)





BEKO

SLOVAKIA S.R.O.

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- **Location:** Poprad, Slovakia (since 1992)
- **Function:** production of washing machines (top-loading and front-loading)
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BACKGROUND

One of the key requirements for maintaining the quality of manufactured goods is ensuring that operators remain sufficiently trained throughout the entire production process. Only a properly and sufficiently trained employee can ensure error-free operations during the production process.

Insufficient training of operators results in:

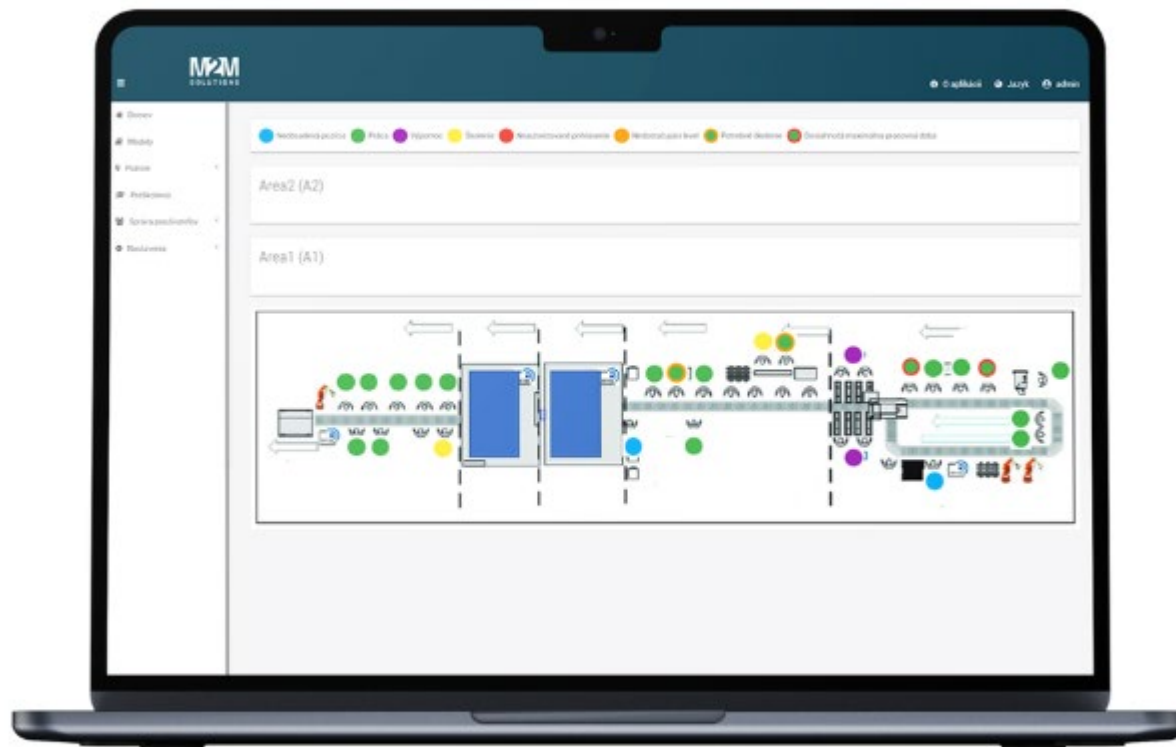
- Defect rate
- Product repair costs
- Production line shutdowns
- Short-term downtime
- Operator inefficiency
- Reduced speed
- Quality



REQUIREMENTS

The basic requirement for an ORS system is to track:

- Basic employee skills
- Qualifications
- Competencies
- Certifications
- Training
- Retraining
- Employee rotation among job positions



OUR SOLUTION

The pilot project was implemented in 2019 on two production lines for top-loading washing machines, with a total of 114 workstations monitored. Each workstation is equipped with an RFID reader with a display that informs the operator of the following:

- Authorized login (adequately trained)
- Unauthorized login (insufficiently trained)
- Assistance
- Ongoing training
- Required retraining
- Maximum working hours reached (rotation required)

Managers and production line leaders can use the "dashboard" to view the current operator sign-in status at each production station.



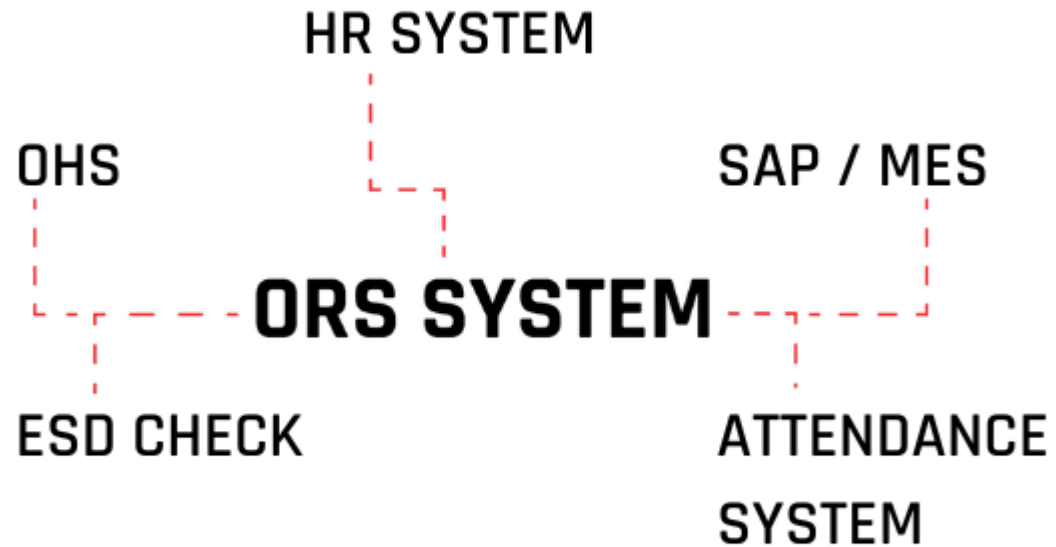
MONITORED INFORMATION

- HR Managers
 - Employee position overviews
 - Data for calculating wages based on night shifts worked or positions in hazardous environments
 - Training planning
 - Proposals for recruitment policies
- Operations and Quality Managers
 - If a quality issue is detected, it allows you to pinpoint the exact source of the problem
 - Identification of critical tasks and current requirements



MONITORED INFORMATION

- Team leaders, project leaders
 - Quickly assembling work teams
 - Based on the current staff status at the start of a shift (sickness, employee absences)
 - Quickly finding suitable replacements
 - Handling peak demand at specific times
 - Planning training and retraining



PLANNED SYSTEM EXPANSION

The ORS system is not yet complete. In 2020, we plan to expand the system to include integrations with the following systems:

- ESD control
- Occupational Health and Safety
- HR and time and attendance system
- Defect tracking system for primary processes and assembly lines



EXPANDING COOPERATION AND FURTHER DEVELOPMENT

Following the successful implementation of the planned functionality expansion, we are considering adding the following feature:

- Automated work team scheduling based on the current availability of operators at the start of a shift

In addition to our collaboration on the PIEx system, we have implemented our **OEE (Overall Equipment Effectiveness)** product at Beko (formerly Whirlpool) in Poprad, which is used to measure equipment utilization efficiency.

Our collaboration is far from over; in the future, in addition to expanding existing systems—for example, with Waste & Scrap Management—we also plan to implement **Manipulate to Light (M2L) technology**, which will visually guide operators when handling components.



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