



MODAPTO [101091996]: Modular Manufacturing and Distributed Control via Interoperable Digital Twins



1.1.2 Using the System Dashboard to Monitor Production Cell Performance and Identify Bottlenecks

2025-08-11



Production dashboards serve as the central interface for monitoring manufacturing operations, providing visual representations of performance metrics and enabling quick identification of bottlenecks and constraints. The MODAPTO monitoring dashboard is built using a multi-layered architecture comprising an Angular frontend and a backend service. This architecture supports various levels of monitoring and analysis—from high-level system overviews to fine-grained operational metrics—and is seamlessly integrated within the broader MODAPTO system

Dashboard Architecture and Structure

The MODAPTO monitoring dashboard provides:

1. Overview Layer: High-level visibility of all production cells with key indicators and status information
2. Cell Detail Layer: Comprehensive information about specific production cells
3. Action Layer: Facilitates response to identified issues through notifications and recommendations

Monitoring Multiple Production Cells

The “Monitor All Cells” view provides a comprehensive overview of the production system, displaying:

- Cell ID and Production Step
- Capacity and Utilization percentages
- Current Status with color-coded indicators
- Quick navigation links to detailed cell information

This overview enables rapid assessment of the entire production system, highlighting potential issues through status indicators and utilization metrics.

Identifying Bottlenecks Through Dashboard Analysis

Bottlenecks represent constraints in the production process that limit overall throughput. The system dashboard provides several methods for identifying bottlenecks:

1. Direct Bottleneck Indicators:
 - Cells with utilization rates exceeding 90%
 - Explicitly labeled “Critical – Bottleneck” status
 - Alert notifications for bottleneck conditions
2. Flow Analysis Techniques:
 - Comparing upstream production rates with downstream capacity



- Identifying growing queues between production steps
- Examining wait times for products between steps
- 3. Pattern Recognition Methods:
 - Persistent high utilization in specific cells across shifts
 - Recurring bottlenecks at predictable times
 - Historical trend analysis showing developing constraints

Taking Action on Dashboard Insights

The dashboard supports decision-making through:

- Integrated notification systems for critical conditions
- System-generated suggestions for bottleneck resolution
- Resource reallocation tools and recommendations
- Performance tracking for implemented changes

Real-time monitoring is a foundational element in modern modular manufacturing. It supports smarter decision-making, higher production efficiency, and improved quality control. As manufacturing systems become increasingly digital and interconnected, the role of real-time monitoring will continue to expand. Mastering the principles and technologies involved is essential for anyone working in a production environment that demands speed, accuracy, and adaptability. With proper training and consistent application of best practices, real-time monitoring becomes not just a tool, but a key driver of operational excellence.

References

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