

# The Connected Machine Shop

## Bringing Industry 4.0 to the shop Floor

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MANUFACTURING<sup>™</sup>  
TECHNOLOGY SERIES



## Purpose

- Explore how Industry 4.0 can positively impact the shop floor
- Discuss ideas to get started

## • Agenda

- Intro to Industry 4.0
- Today's Pain Points
- Focus of Digital Technology
- Vision: "The Connected Machine Shop"
- Solutions to Get Started
- Key Takeaway
- Q&A



## Next phase in the industrial revolution



### 1<sup>st</sup> industrial revolution

Water and steam power paved the way for mechanical manufacturing facilities.



### 2<sup>nd</sup> industrial revolution

Follows the introduction of electricity-powered mass production based on the division of labor.



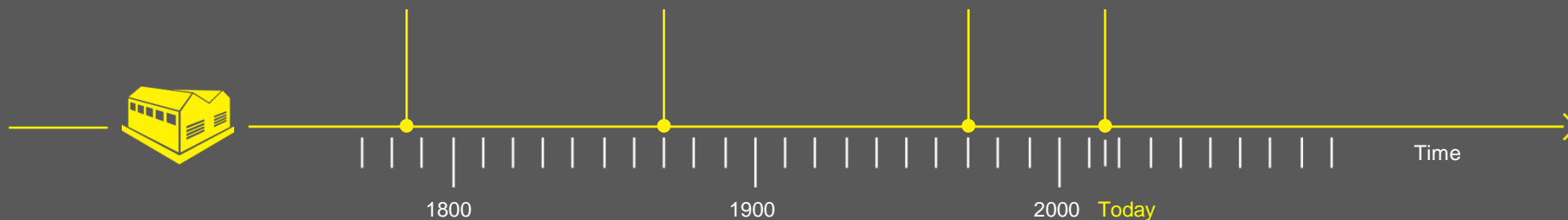
### 3<sup>rd</sup> industrial revolution

Electronics and IT to advance automation in manufacturing.



### 4<sup>th</sup> industrial revolution

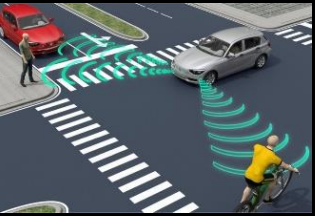
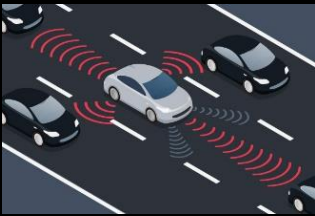
Based on Cyber-Physical Systems.





## Does I4.0 = Driverless Car?

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## Today's Machine Shop

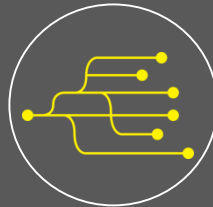
### Typical value stream



Design



Process  
Planning



Operations  
Planning



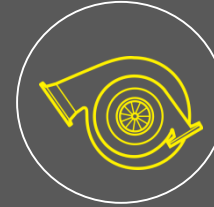
Production  
Logistics



Machining



Verification



Outbound  
Logistics

Design and Planning

In-Machining

Post-Machining

## Digital Technology Focus

### Reducing Waste in the Machine Shop

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#### Pre-machining productivity

Poor optimization of process and operation planning reliant on tribal knowledge



#### In-machining and asset utilization

<30% utilization of individual machines



#### Energy flow through machinery

Only 1/3 of energy used for actual forming of manufactured parts



#### Degree of automation

Key intelligence captured by experienced industrial practitioners who can't process data as effectively as algorithms



#### Traceability

Only a fraction of data is recorded – and even if it is, it's not often analyzed or used for improvement and prediction



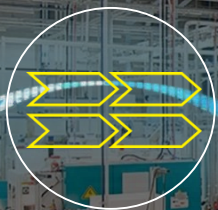
## Connected Machine Shop

Digital Thread Connecting the Value Stream

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Design



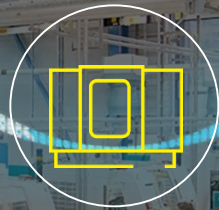
Process  
Planning



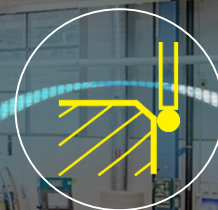
Operations  
Planning



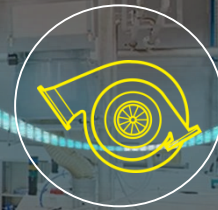
Production  
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Outbound  
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 **CoroPlus**<sup>™</sup>

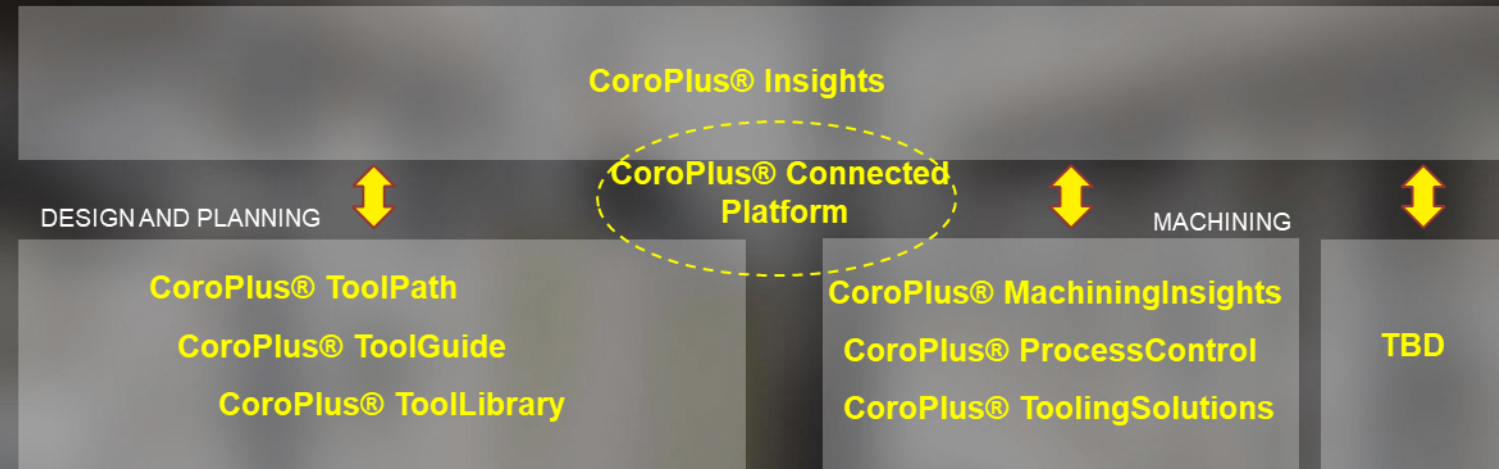
The Sandvik Coromant platform for  
The Connected Machine Shop



# CoroPlus<sup>®</sup> platform overview



ANALYTICS (IN A MACHINING AND MANUFACTURING CONTEXT)



Design



Process Planning



Operations Planning



Production Logistics



Machining



Verification



Outbound Logistics



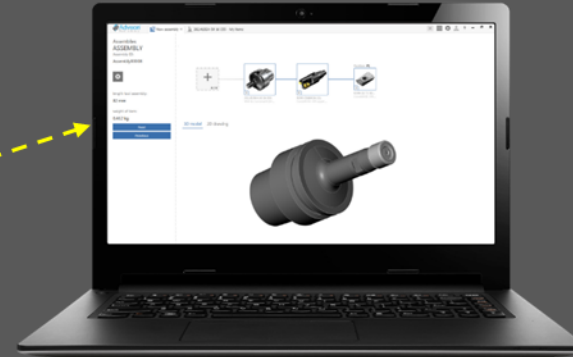


## Design and Planning Solutions

## CoroPlus® ToolGuide



## CoroPlus® ToolLibrary



Open API



CoroPlus® Tool Library, built on ISO 13399. Open for all cutting tool suppliers.

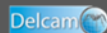
DWG MORI



New Integration



CAD/CAM Systems



edgecam





 CoroPlus™

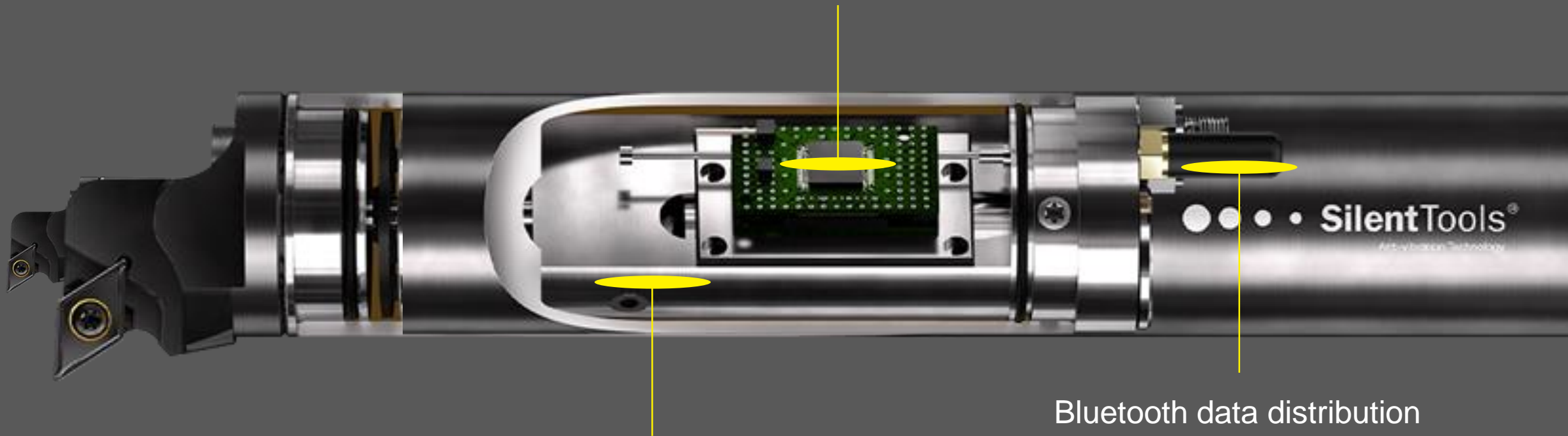
Digital Tooling Solutions

# Silent Tools™+

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Damped turning adaptors with embedded connectivity for process optimization

Sensors embedded  
in adaptor



Leading damping technology

Bluetooth data distribution

# Improved Set-up Efficiency and Precision



Quick set-up means time savings.



Easy center height adjustment.

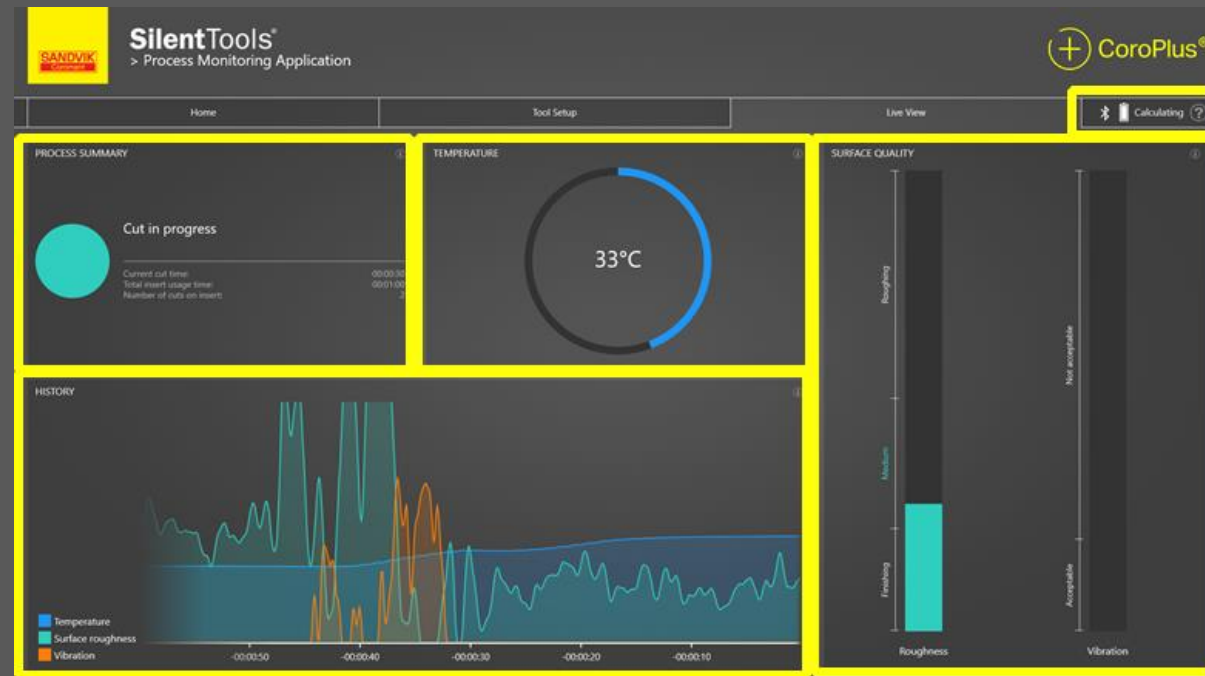




## Live Process View



- Surface quality indicator
- Vibration indicator
- Damping system temperature
- Battery status
- Cut recording
- In-cut indicator

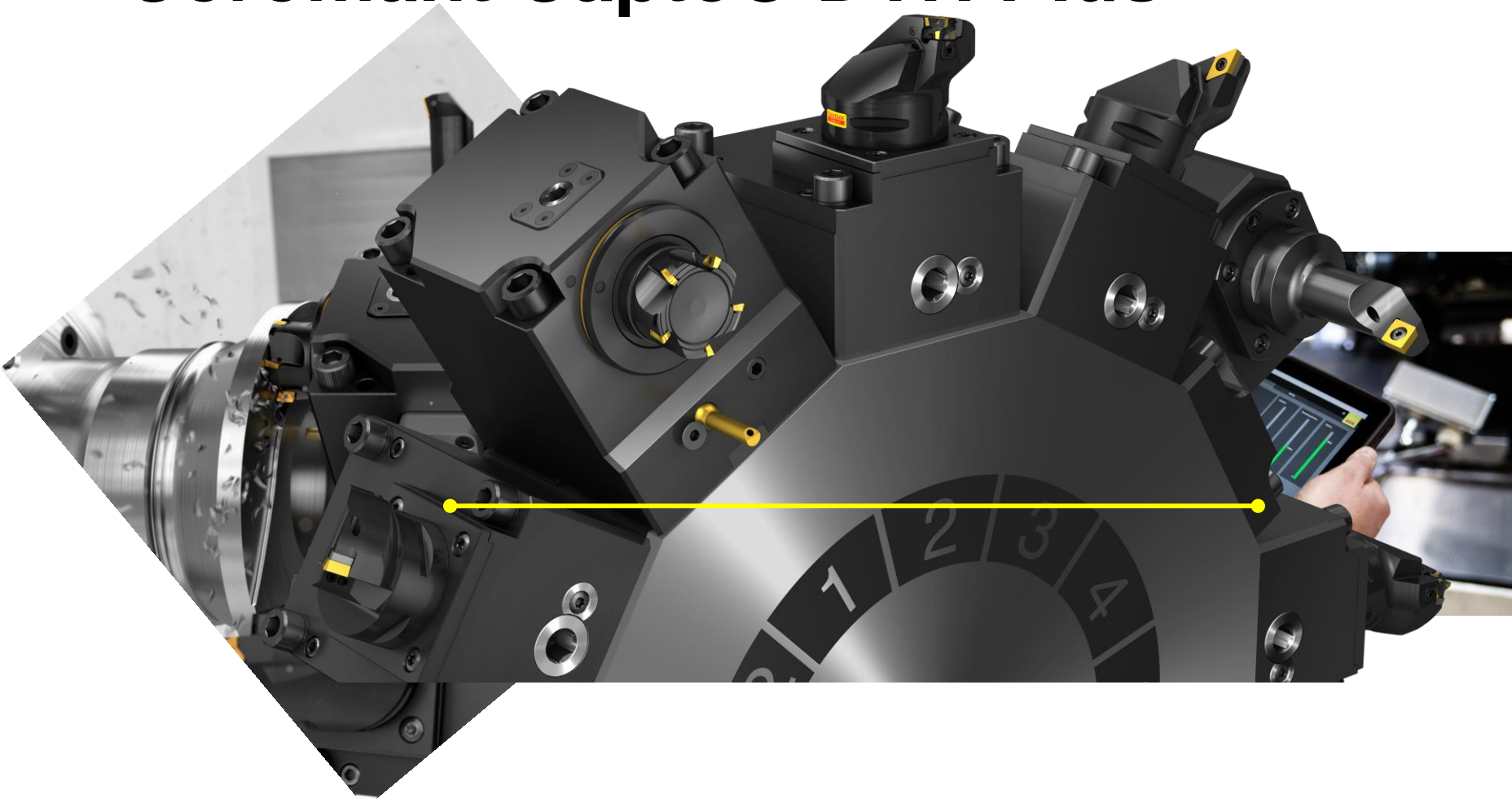


# Post Processing and Quality Control

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- Record and store cut data
- Quality control
- Trend graph

# Coromant Capto<sup>®</sup> DTH Plus



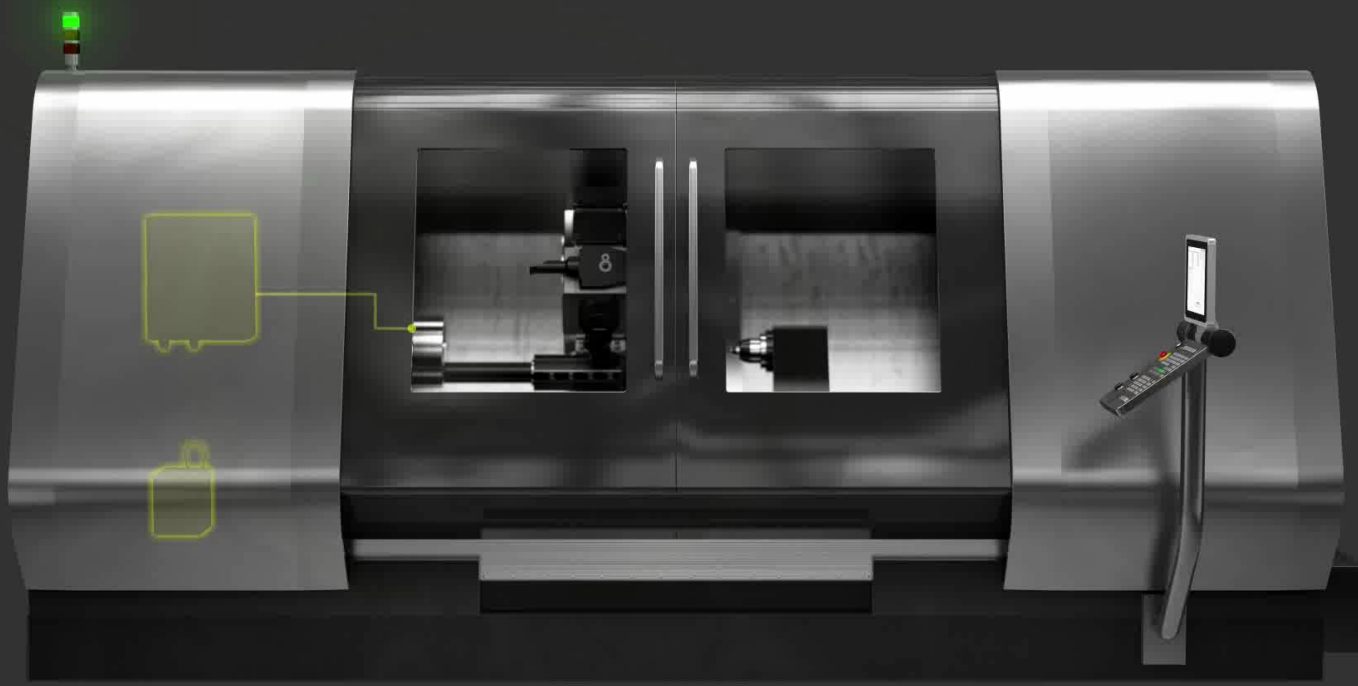


 **CoroPlus**<sup>™</sup>

**In-Machine Monitoring Solutions**

# CoroPlus<sup>®</sup> ProcessControl

## Machining Performance Monitoring



Efficiency created through continuous process control

# CoroPlus<sup>®</sup> ProcessControl

Automated Process Security and Efficiency



Collision detector



Tool guard



# Connected Machine Shop?

Is the Andon light telling you the whole story?



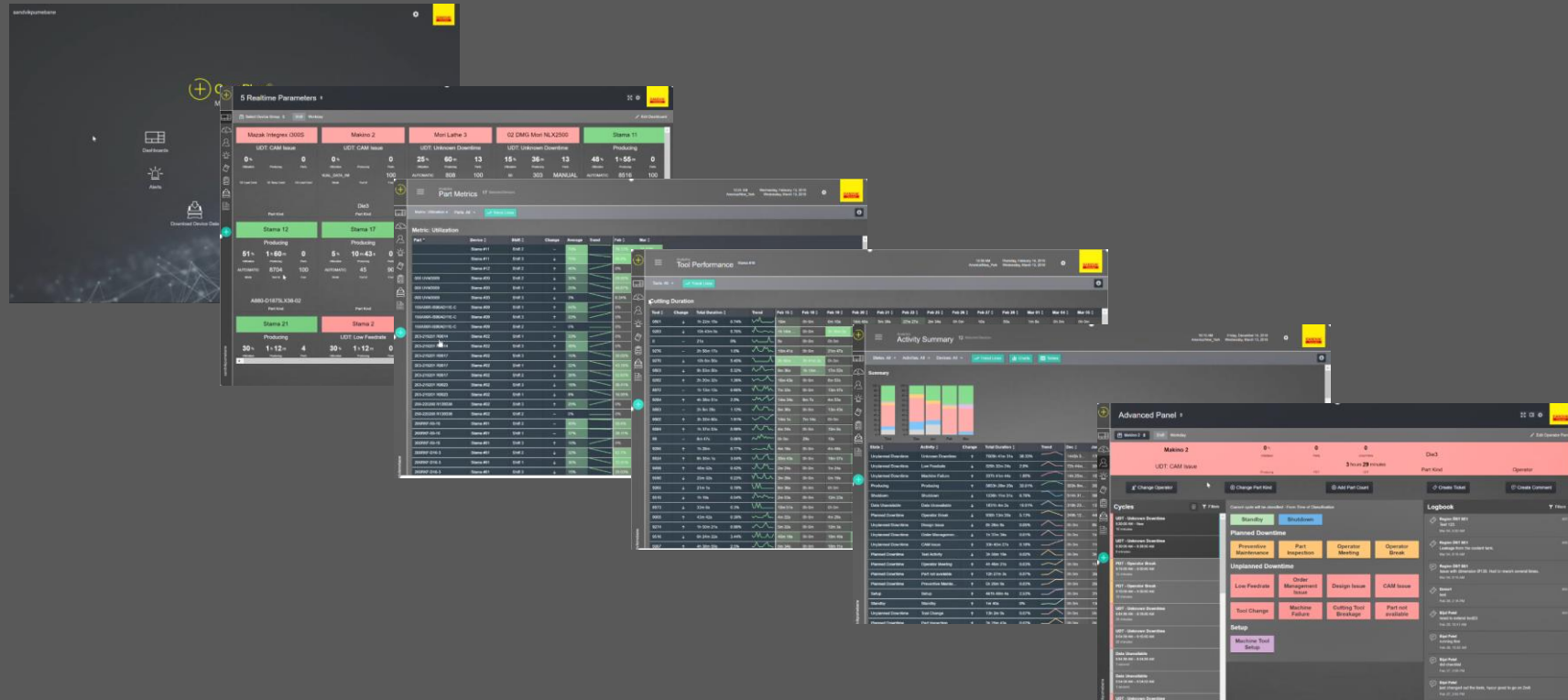
## CoroPlus® MachiningInsights

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From data to insights

Data collection from  
machine and operator

## CoroPlus® MachiningInsights Insights You Just Can't Get From an Andon Light



# CoroPlus® MachiningInsights

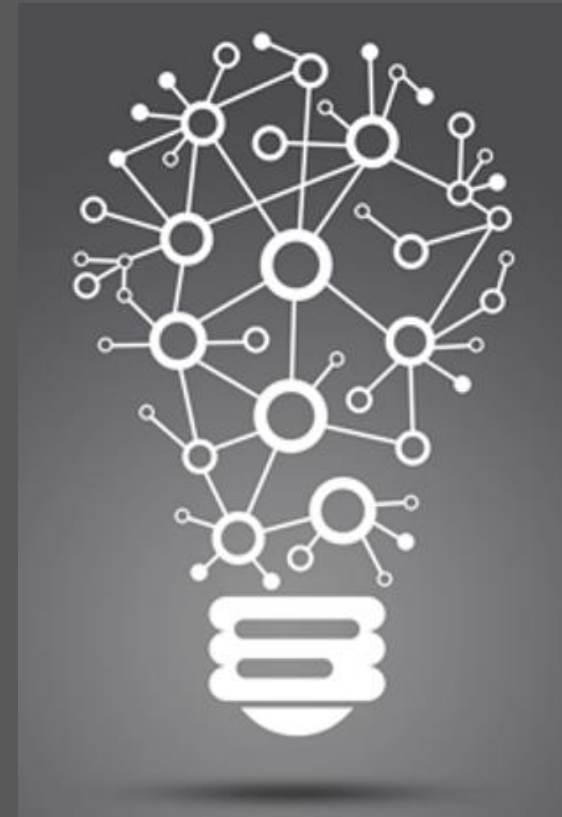
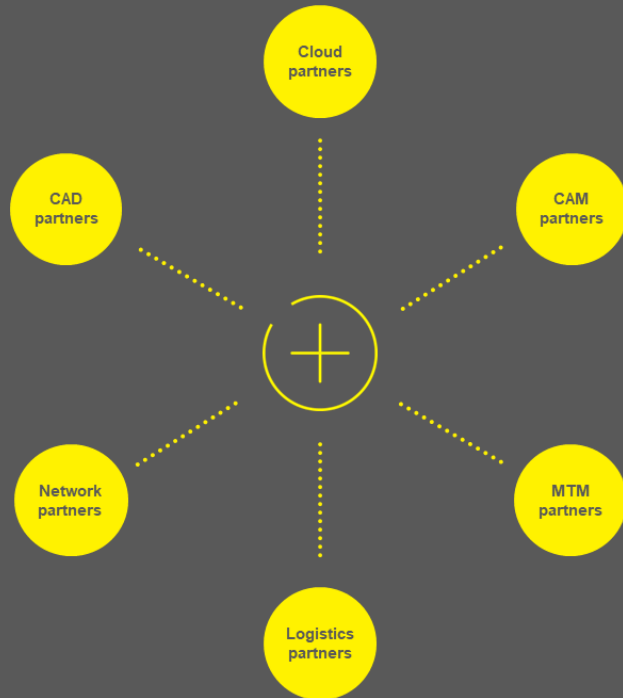
## Insights You Just Can't Get From an Andon Light

The screenshot displays the 'Advanced Panel' for 'Makino 2' in 'Shift' mode. The main title is 'Operator Input and Metrics'. Key metrics include: 0% Uptime, 0 Parts, 0 Good Parts, and 3 hours 29 minutes of UDT. A 'UDT: CAM Issue' is highlighted. The interface includes buttons for 'Change Operator', 'Change Part Kind', 'Add Part Count', 'Create Ticket', and 'Create Comment'. The 'Cycles' section lists various downtime events like 'UDT - Unknown Downtime' and 'PDT - Operator Break'. The 'Planned Downtime' section includes 'Preventive Maintenance', 'Part Inspection', 'Operator Meeting', and 'Operator Break'. The 'Unplanned Downtime' section lists 'Low Feedrate', 'Order Management Issue', 'Design Issue', 'CAM Issue', 'Tool Change', 'Machine Failure', 'Cutting Tool Breakage', and 'Part not available'. The 'Setup' section includes 'Machine Tool Setup'. The 'Logbook' section provides a detailed history of events, such as 'Region OST SE1 Test 123' and 'Bijal Patel need to extend toolQ23'.

## Key Take Away



Open platform solutions that connect to other eco-systems





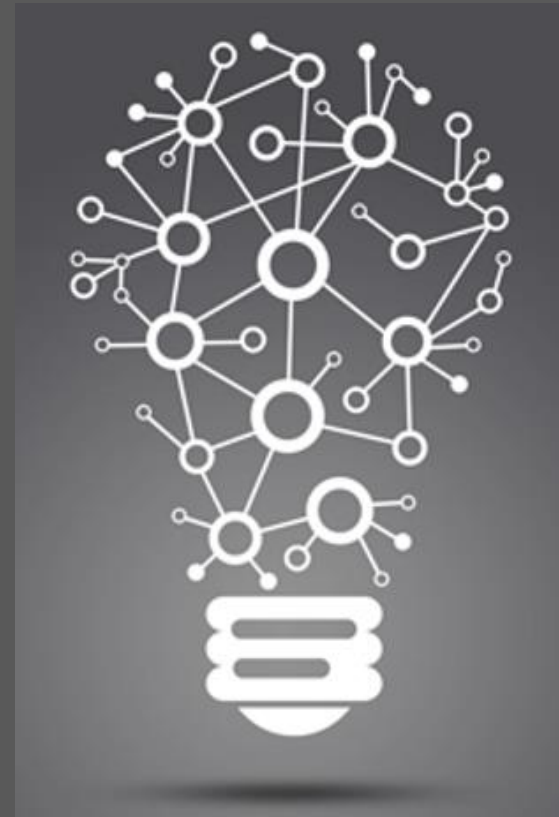
Key Take Away



**Think Big.**

Start Small.

Move Quickly.





Q&A

## CoroPlus® Solutions



### Digital Machining:

- [Digital Machining landing page](#)
- [Digital Machining and CoroPlus vision video \(IMTS interview\)](#)
- [Industry 4.0 from a machining perspective](#)

### CoroPlus:

- [CoroPlus landing page](#)
- [CoroPlus "Intelligence" video introduction](#)

### Design and Planning:

- [CoroPlus Design and Planning Solutions landing page](#)
- [CoroPlus Design and Planning software introduction video](#)
- [CoroPlus ToolGuide landing page](#)
- [CoroPlus ToolGuide introduction video](#)
- [CoroPlus ToolLibrary landing page](#)
- [CoroPlus ToolLibrary feature video](#)

### In-Machining:

- [In-Machining Solutions landing page](#)

### CoroPlus ProcessControl:

- [CoroPlus ProcessControl landing page](#)
- [CoroPlus ProcessControl overview video](#)

### CoroPlus MachiningInsights:

- [CoroPlus MachiningInsights landing page](#)
- [CoroPlus MachiningInsights introduction video](#)
- [CoroPlus MachiningInsights functionality video](#)

### Silent Tools Plus:

- [Silent Tools Plus landing page](#)
- [Silent Tools Plus detailed functionality demonstration video](#)

### Coromant Capto DTH Plus:

- [Coromant Capto DTH Plus landing page](#)

# southtec®

A Manufacturing Technology Series Event

