

IO-LINK WIRELESS FOR SMART MACHINE TOOLING

Traditional tooling machines are quickly evolving into smart machines as part of the new industrial revolution. Novel and innovative applications driven by Industry 4.0 technologies allow the machines to reach much higher levels of efficiency and function. Arriving at these features requires integration of sensors and actuators all along the machine, to supply real time data and automation. Tooling machines, however, pose a unique challenge due to their rotating action. Integrating devices at the rotating end has been virtually impossible so far, as no cables could be attached. Gathering real time data from the actual point of processing has great value for efficiency, safety, productivity, and traceability.



IO-LINK WIRELESS - CABLE-GRADE CONTROL & MONITORING

A key ingredient that machine builders have been missing is wireless communication that can handle high performance and fast rotation applications. Conventional wireless solutions are not suitable for the harsh demands of low latency, scalability, and cable-grade reliability. IO-Link Wireless is designed specifically as a standard for high performance wireless factory automation communication, to address this need.

WIRELESS COMMUNICATION FOR SMART TOOLING

IO-Link Wireless is designed for real-time control and monitoring on fast rotating machine components in harsh factory environments. Therefore, it can be leveraged for a variety of applications throughout the design & development stages and daily operation of smart tooling machines with the following benefits:

Machine Builders

- Wireless communication for sensors and actuators that are mounted on the rotating end
- Unified wireless communication for the entire machine and its environment
- Wireless control and monitoring for the setup and calibration of the machine
- Real time control and monitoring during the actual tooling process
- Wireless sensor data collection for predictive maintenance, machine performance optimization and analytics

Manufacturers and End Users

- Setup of a machine for operation with exact setting parameters and precise feedback
- Monitor of the tooling process for quality and abnormalities
- Monitor workpiece quality and adjust process parameters in real time
- Reduce downtime through predictive maintenance
- Detect defective tooling early on
- Add process tracking parameters for QA
- Improve safety

SAMPLE APPLICATION - WIRELESS SMART CLAMPING

The integration of a force sensor in the clamping element provides a variety of smart advantages to the tooling machine:

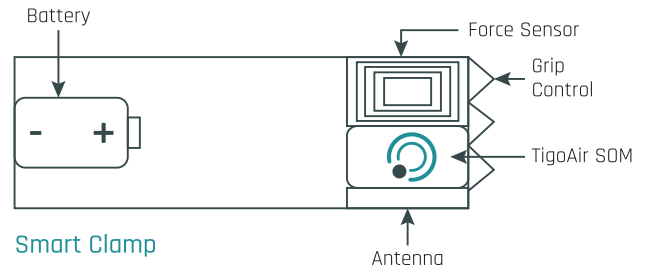
- At the clamping setup, accurate force readings allow the operator to perform precise clamping and avoid over-clamping that can damage the workpiece or under-clamping that can result in the workpiece getting loose or even ejected during processing
- During Tooling, monitoring the clamping force provides various valuable parameters both for the quality of tooling (as abnormal clamping force can indicate rejected parts or issues with processing) and for predictive maintenance (higher required force can indicate machine wear-and-tear)
- After Tooling, storing the clamping force data profile can add to the traceability of the manufacturing process and contribute to the quality control records and database

WIRELESS SENSING

Measuring a variety of parameters related to tooling such as temperature, vibration and humidity can help in the process of grinding, milling, drilling or other tooling functions. The tool operator can thus get real time information regarding both the process and the quality and make real-time and automated adjustments to compensate for process variation or even support abnormal workpieces and form factors.

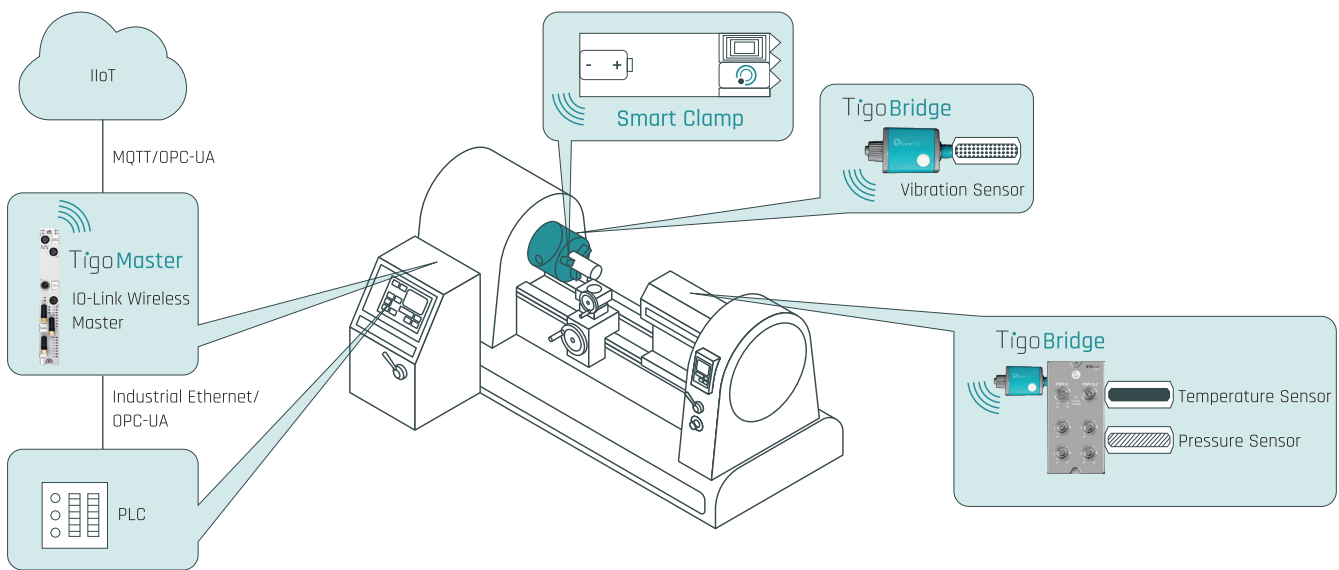
INTEGRATION OF THE IO-LINK WIRELESS SYSTEM

End device integration: CoreTigo's TigoAir SOM module can be integrated directly into the sensor device and connected to the sensor or actuator as in the case of a smart clamp. A specially designed antenna provides connectivity, and a battery provides the required power.



Machine integration: Numerous wireless devices (up to hundreds if needed) can be integrated within the machine: on the rotating end, the moving components, and the fixed platforms. Standard IO-Link devices can be connected via the TigoBridge, and other analog/digital devices can be connected via multiple port I/O hubs and the TigoBridge.

Complete Solution: All wireless devices communicate with the TigoMaster via the IO-Link Wireless protocol. The TigoMaster communication is done at the OT level with Industrial Ethernet protocols or OPC-UA to a PLC for automation purposes, and at the IT level to enterprise applications or the Cloud with MQTT or OPC-UA protocols for IIoT, data analysis and monitoring purposes.



SUMMARY

The value of wireless communication for machine builders manifests throughout the numerous stages of the machine design, development, delivery, deployment, and ongoing support at the manufacturer's facility. For smart tooling, reliable communication is a key and necessary component for connectivity to the rotating devices. IO-Link Wireless is the only industrial cable-grade technology to consider for such applications. It has 5msec deterministic low latency, a million (1e6) times better reliability and resilience to interferences than other wireless protocols (such as Wi-Fi, Zigbee and BLE) and field proven ability to withstand rotations of thousands of RPMs. A standardized protocol and part of the IO-Link offering, CoreTigo's IO-Link Wireless solutions provide the optimal technology for powering the next level of smart tooling.

ABOUT CORETIGO

CoreTigo is unbinding the industrial space by providing high-performance IO-Link Wireless communication solutions for machine builders, system integrators and industrial equipment manufacturers. CoreTigo's products enable the design and retrofit of machines and production lines that were not possible before. These solutions increase flexibility, adaptivity and modularity, resulting in cost effectiveness, increased productivity and downtime reduction. Embraced by industrial leaders, the IO-Link Wireless global standard, fit for harsh factory environments and motion control applications, provides cable-grade connectivity for millions of sensors, actuators and industrial devices worldwide.

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Solution Overview Smart Machine Tooling - English - Version 1.0 (SOSMT-EN-01)

