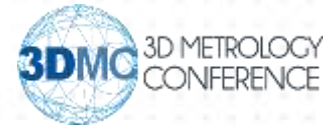




Metrology Challenges of Providing Positional Awareness for Robots

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Chief Executive Officer



15th -17th November 2022, Aachen

Smart Factories and autonomous data-driven manufacturing is the future

Our focus is developing sensor technology to control the manufacturing process itself rather than simply inspecting parts at the end of the line



“The factory of the future will have two employees: a human and a dog.

The task of the human will be to feed the dog.

The task of the dog is to bite the human if he tries to touch the controls”

- Warren Bennis



What's the problem we're trying to solve?

- Manufacturing is demanding greater automation, flexibility and more autonomous solutions – “Advanced Robotics”.
- Industrial robots moving into more challenging applications
- Typically, industrial robots are not accurate ($>\pm 1\text{mm}$)
- Currently simulation does not match reality which is a barrier to ‘digital twin’ implementation
- Sensor information is typically 1D (encoders, force/torque, time, etc.)
- Robots can have positional drift over time - process variation and uncertainty.

Un-planned down-time can cost up to £10,000 per minute



Significant trend towards **Intelligent Automation**

Providing robots with context, awareness and feedback from the process and environment they are operating within.

- Greater Autonomy
- Enhanced Flexibility
- Improved Performance



“Artificial intelligence software in combination with vision and other sensing systems, allow robots to master difficult tasks.” - Dr Susanne Bieller, General Secretary of the IFR



Market Landscape



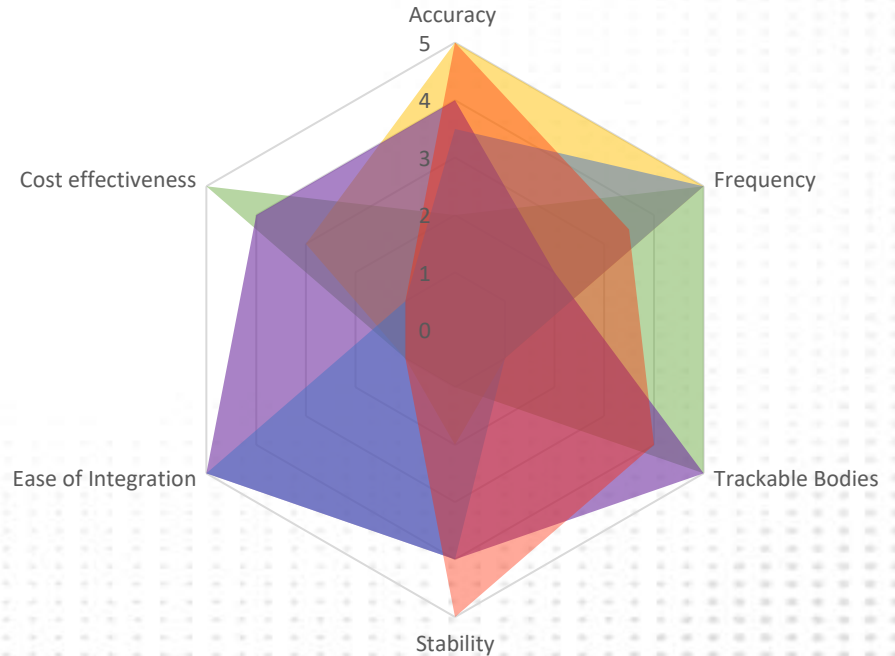
No single system is a perfect solution.

A 'perfect' metrology system will struggle to truly correct dynamic movement and is likely to be expensive and difficult to integrate.

An accurate robot will still lack an understanding of external factors such as the position of cell elements.

IONA was designed to strike a balance through these factors to give a rounded solution.

Mo Cap Laser Tracker IONA Accurate Robot Optimum



IONA: Metrology Built for Automation

Nodes:

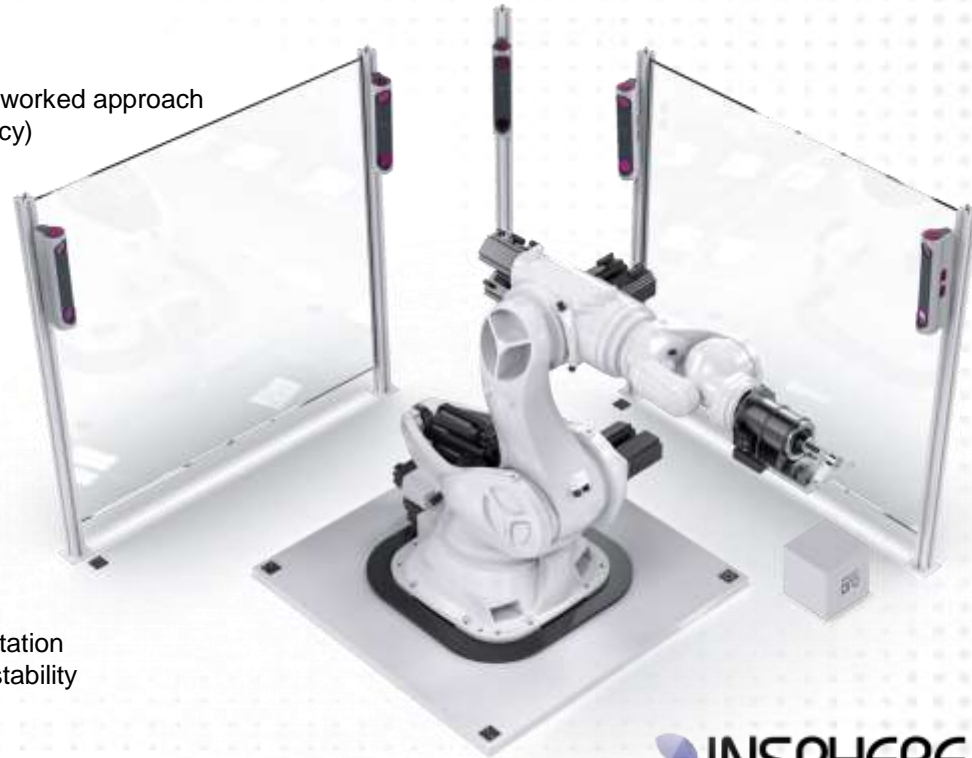
- No flashing light in the visible spectrum
- Improve accuracy of low-cost sensors through a networked approach
- Scalable network of sensors (line-of-sight redundancy)
- Active temperature control
- Low calibration overhead
- Always-on philosophy

Targeting:

- Passive
- Hot-swappable
- Low-cost
- Omni-directional
- Physically Measurable

Ease-of-Use:

- Quick & Easy Installation
- Able to mount on low-strength guarding in any orientation
- Resect node position every measurement to avoid stability requirements
- Wide FoV for close mounting
- Single COTS cable for both Power & Comms



Commissioning

- Initial set-up of automation infrastructure + programs
- Reduced manual interaction

Process Enabler

- Auto datum
- Auto correction
- Reduced takt time
- Improved quality

Process Control

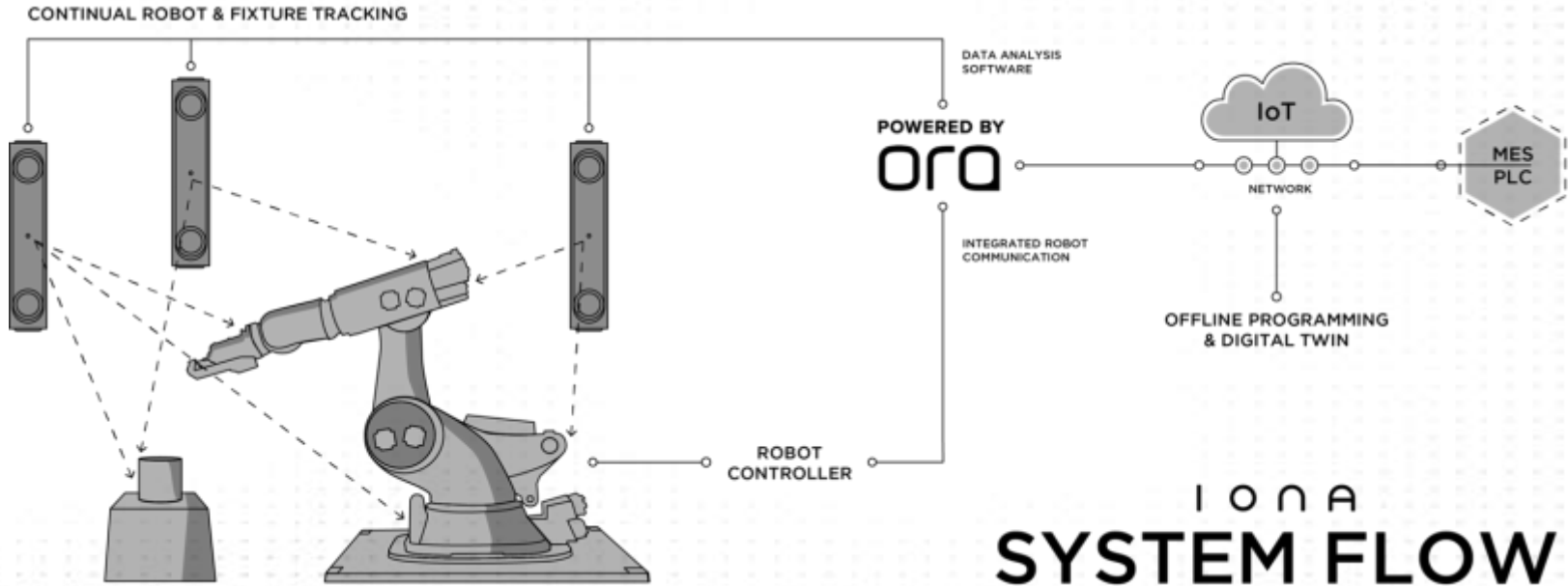
- Closed loop process control
- Correction and recovery
- Increased process confidence

Hardware is the enabler, but software is how the end-user interacts with the solution.

Robust, intuitive software is critical to adoption...

Automation engineers are not metrologists.

System Architecture



IONA
SYSTEM FLOW

Metrology data on-demand: providing 24/7 queryable data for multiple manufacturing data consumers

Demo Video



But we need to go further...

Creating an easy-to-use measurement system with a native robot API still does not completely close the knowledge gap...

We need to automatically output improved processes...

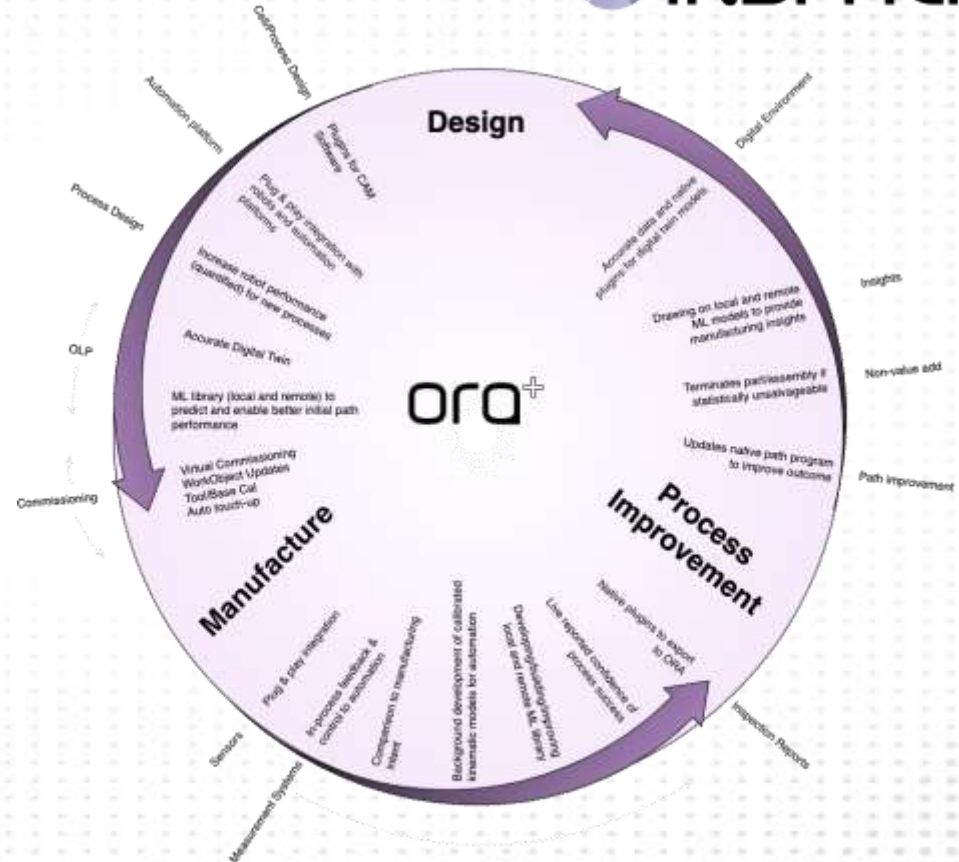
No matter what the robot application!



The Future: ORA+



- Application specific functionality
- Native CAD/CAM integration
- 3rd Party Instrument support
- Auxiliary Sensor Support
- Manufacturing insights & process improvement
- Machine Learning based process control



Thank you for listening...

any questions?

Get in touch:

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