

Digital Twin Manufacturing

Fast, Flexible and Accurate

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Why digital twinning for manufacturing?

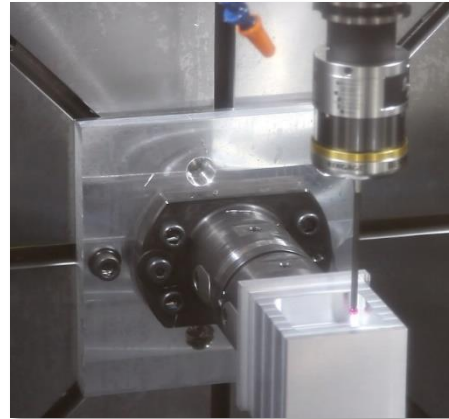
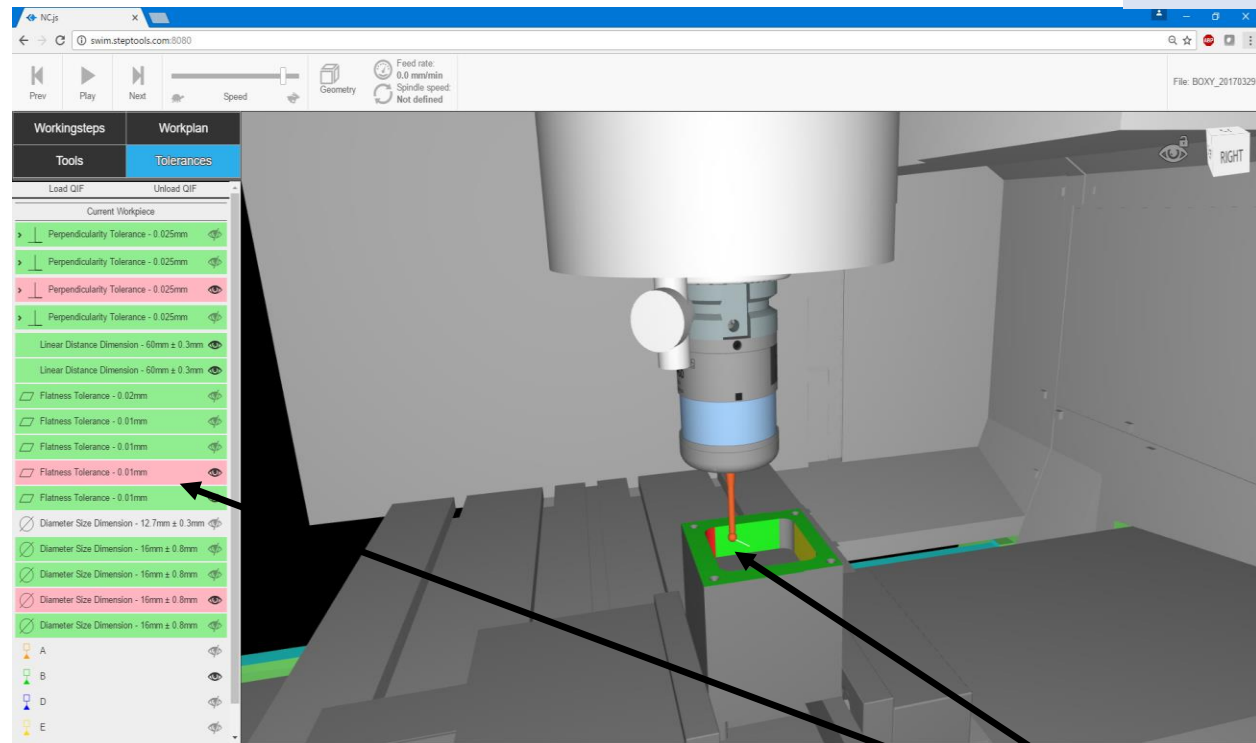
- Digital models of the production items
 - Machines, cutters, fixtures, robots
- Digital models of the production processes
 - Workpiece, workplans, rawpiece, stage models
- Why are the benefits?
 - Inclusion of semantic GD&T enables accuracy and flexibility
 - Inclusion of production kinematics enables accuracy and efficiency



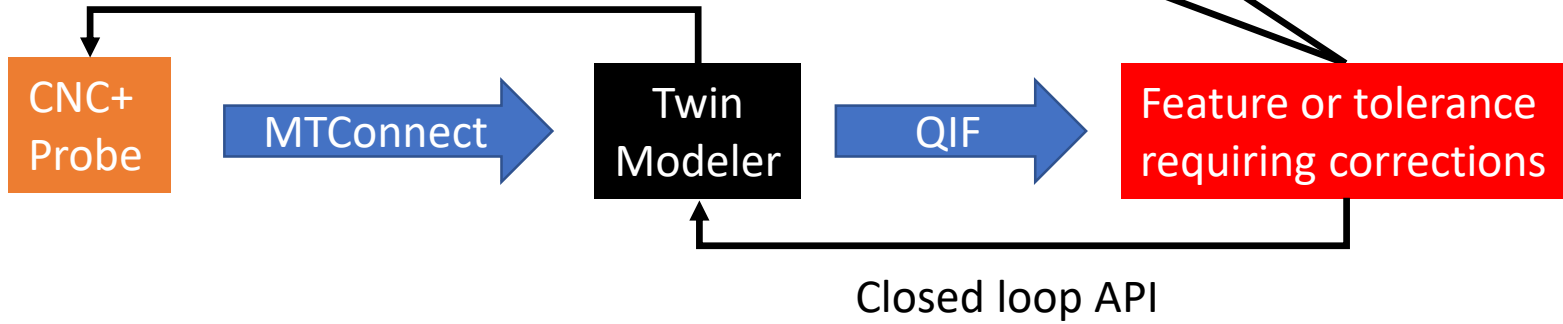
STEP for product definition
MTConnect for result streaming
QIF for quality reporting

Digital Twin manufacturing

NC.js

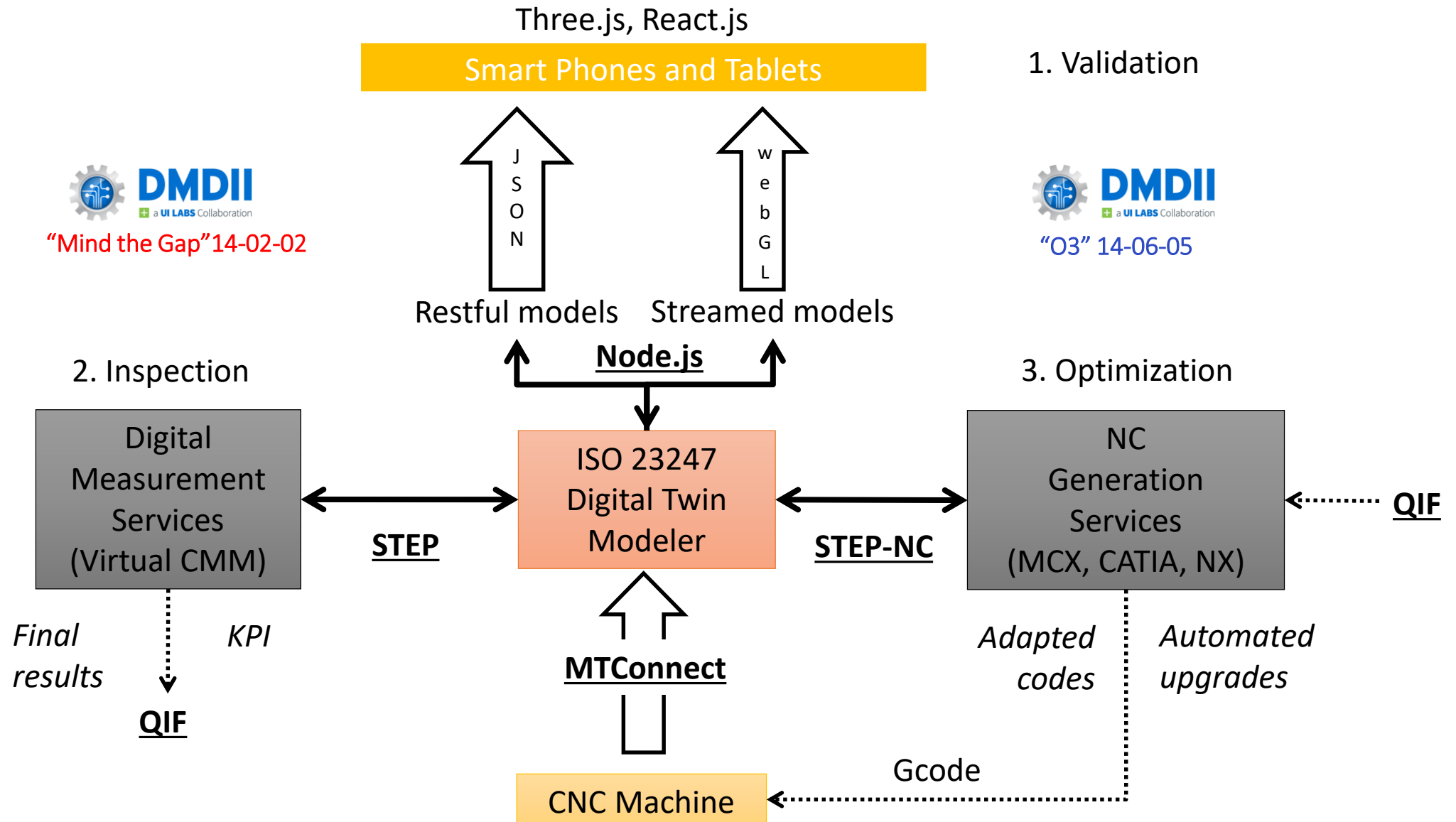


Just in time codes



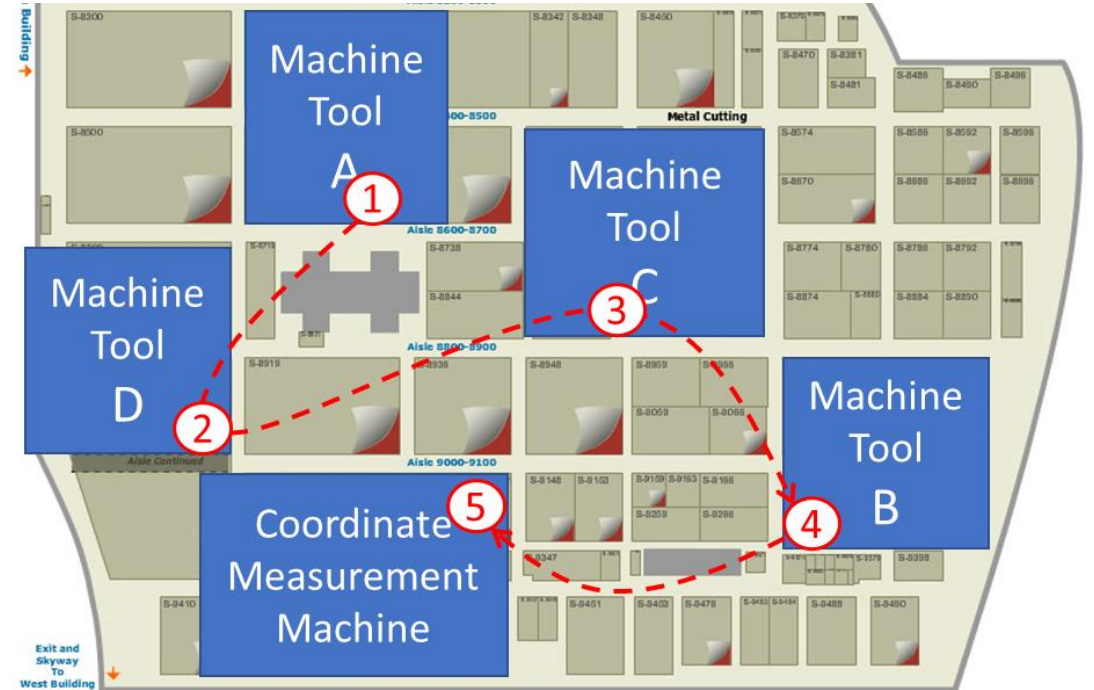
- Green good
- Red bad
- Yellow good and bad

Digital Twin framework – ISO 23247



Applications

- In-process measurement
 - Measure on the machine
- “Self driving” tools
 - Optimize feeds after tool changes
- Error free manufacturing
 - Prevent collisions on restarts
- Faster life cycle
 - Communicate issues and opportunities across the enterprise



Demonstrations at IMTS 2018
and JIMTOF 2018

IMTS and JIMTOF participants

- Participants and observers (* = contributing observer)

- Organizations

- ISO TC184/SC4
- OMAC
- NIST
- AMT/MTConnect
- DMSC/QIF

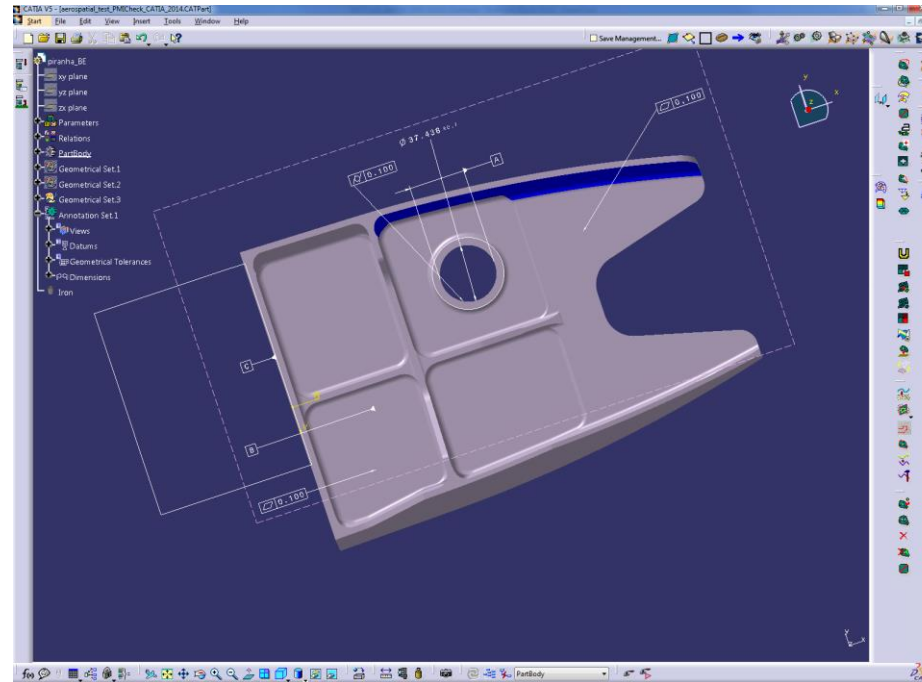
- Technology Providers

- STEP-Tools, Inc.
- Dassault *
- Autodesk *
- Capvidia

- Cutters/ HOLDERS

- Sandvik Coromant
- ISCAR *

CATIA



- Machine Tool Suppliers

- DMG Mori (IMTS, JIMTOF)
- Hyundai (IMTS)
- Makino (JIMTOF)
- Okuma *

- Metrology

- Mitutoyo
- Renishaw

- End Users

- Boeing
- Airbus

Participants add value to STEP, MTConnect or QIF

Digital Twin manufacturing – fast, flexible, accurate

- Fast with cloud-based optimization services
- Flexible with model-based adaptable programs
- Accurate with standards-based measurement



Questions?