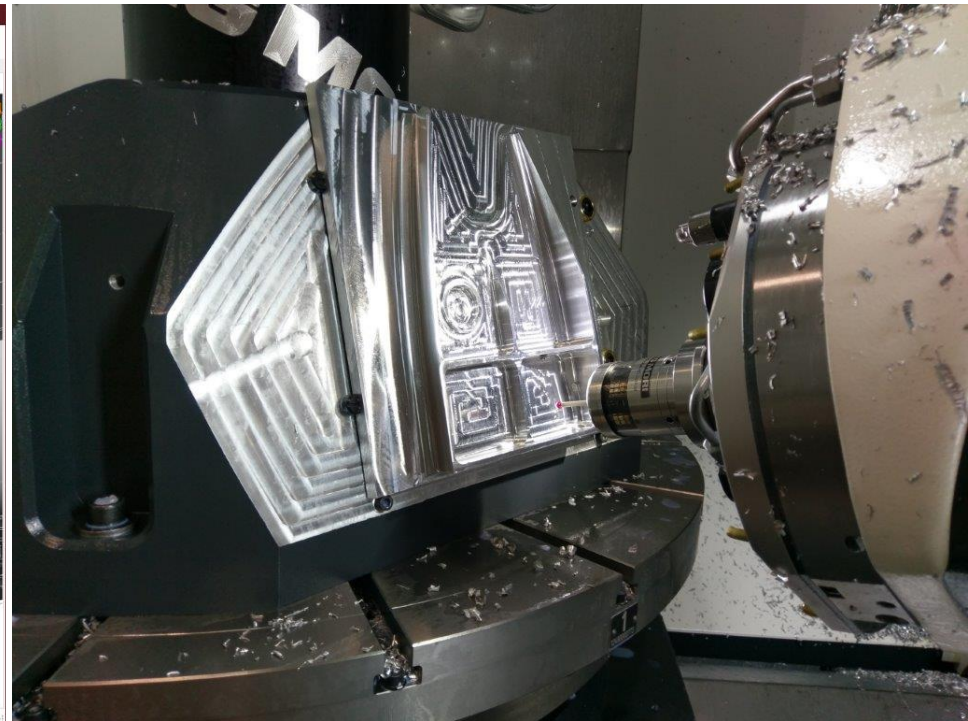
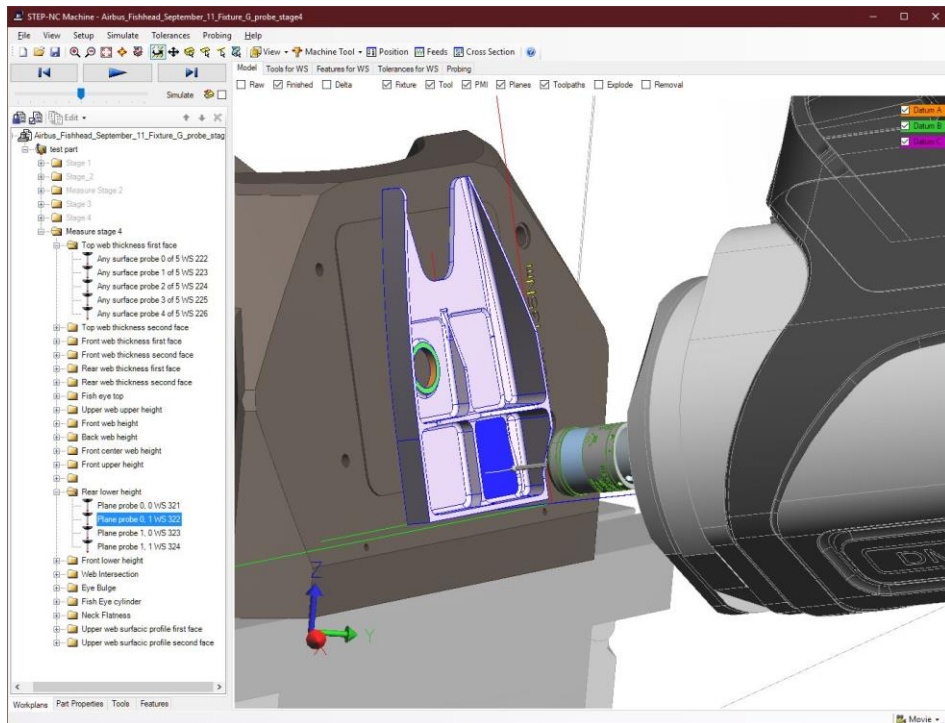




WG15

# WG15 Digital Manufacturing



1 million unique parts programmed and machined in 2019



WG15

# Attendees

Martin Hardwick, STEO Tools, USA  
Bengt Olsson, Sandvik, Sweden  
Bob Lipman, NST, USA  
Darya Botkin, KTH, Sweden  
David Loffredo, STEP Tools, USA  
Jan De Nijs, Lockheed Martin, USA  
Eric Truffet, IOT Management, France  
Erwan Livolant, Boost Conseil, France  
Fred Richter, Boeing, USA  
Fumiki Tanaka, Hokkaido U, Japan  
Gordon Shao, NIST USA  
Haibo Duan, Peraglobal, China  
Hyunjeong Lee, ETRI, Korea  
Robert Swindells, Ferrodax Ltd, UK  
Russ Wadell, MTConnect Institute, USA  
R. Stahl  
Pierre Duchier, Airbus, France  
Hiroyuki Hiraoka, Chuo U, Japan  
David Odendahl, Boeing, USA  
Mikael Hedlind, KTH, Sweden

Sangjeun Yoo, ETRI, Korea  
Shaurabh Singh, MTConnect Institute, USA  
Will Sobel, Vimana, USA  
Norm Swindells, Ferrodax Ltd, UK  
Jonas Rosen, EuroSTEP, Sweden  
Kevin Le Tutor, Boost, France  
Larry Maggiano, Mitutoyo, USA  
Liming Li, JSL, USA  
Mark Thomas, DMSC, USA  
Max Ungerer, ProSTEP, Germany  
Allison Bernard-Feeney, NIST, USA  
Afina Lupulescu, ASM International, USA  
Ben Urick, Nvariate, USA  
Christian Callet, Datakit, France  
Curtis Brown, DMSC, USA  
Daniel Campbell, Capvidia, USA  
Sid Venkatesh, Boeing, USA  
Tom Kramer, NIST, USA  
Jin Lee, ETRI, Korea  
Sung Hei, ETRI, Korea



WG15

# WG15 Digital Manufacturing

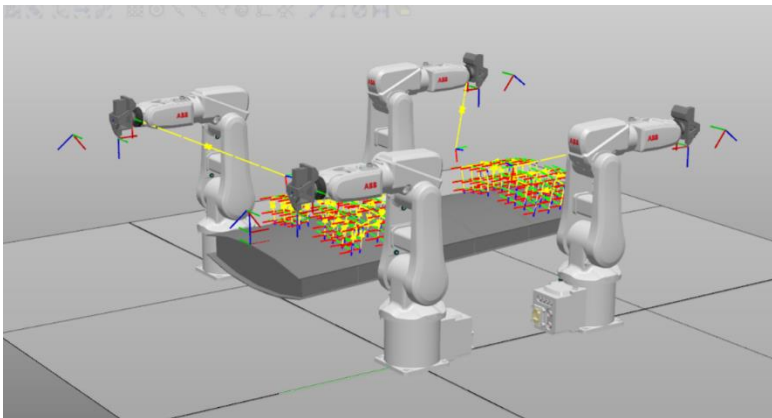
- Accomplishments in Cyberspace
  - Resolved AP238 e2 DIS ballot comments
  - Completed DIS text for ISO 23247
  - Requested registration of STEP/QIF mapping project



WG15

## AP238 Edition 2

- Resolved DIS ballot comments
- Requesting 9 month extension to complete FDIS by validating
  - Drill and Fill operations for one-up assembly
  - Composite tape courses for AP242 ply features





WG15

# ISO 23247

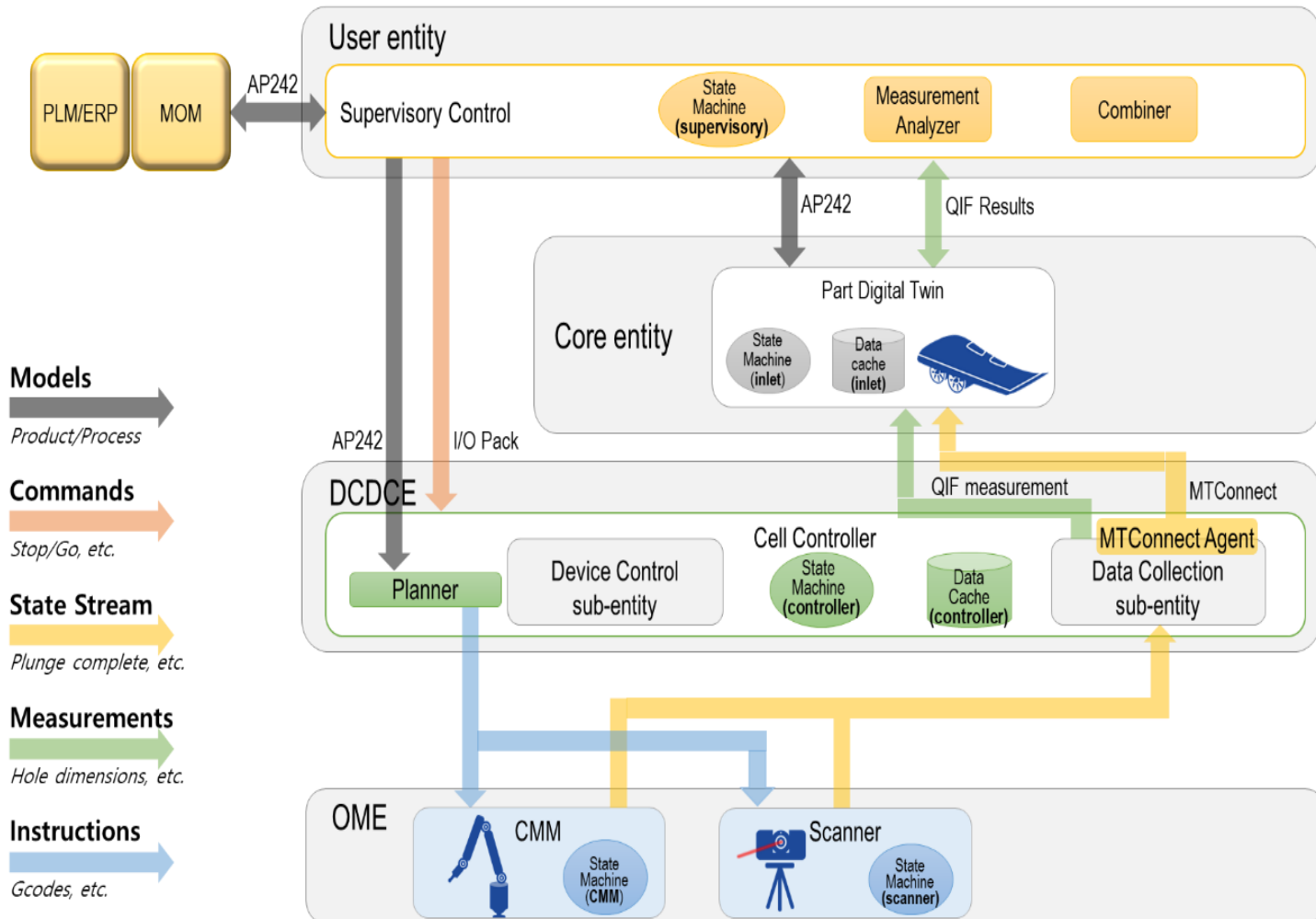
“Digital Twin framework for manufacturing”

- DIS ballot ready for submission on Monday
  - Part 1 – Overview
  - Part 2 – Architecture
  - Part 3 – Information modeling
  - Part 4 – Information exchange
- Three use cases in Part 4 to help DIS testing
  - Dynamic robot scheduling
  - Tool life optimization
  - Advanced metrology



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# Advanced Metrology Use Case

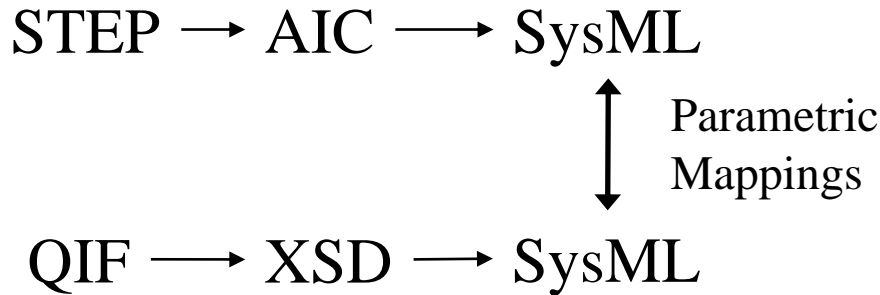




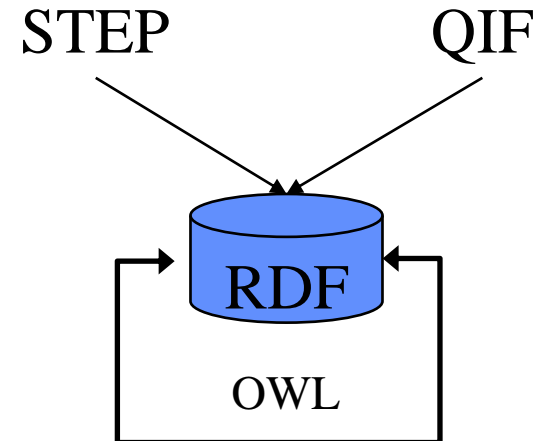
WG15

# STEP/QIF Mapping and Harmonization

- Formal mapping between STEP and QIF
  1. Using SysML as neutral form
  2. Using RDF/OWL as neutral form



Method 1



Method 2

Feasibility Studies





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## Next meeting

- September – hosted by Lockheed Martin
  - Reduce weight of fasteners in wing using digital twins and advanced metrology

