

# **Digital Codes or Digital Models?**

## **Which is better for machining**

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**STEP Tools, Inc.**

<http://www.steptools.com>

**MBE Summit – 2013-12-19**

## The standard for 40 years!

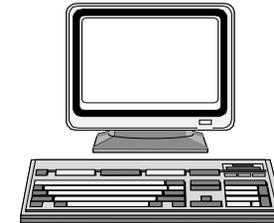
machine-specific part program with axis data generated by a postprocessor

vendor-specific extensions of the original standard

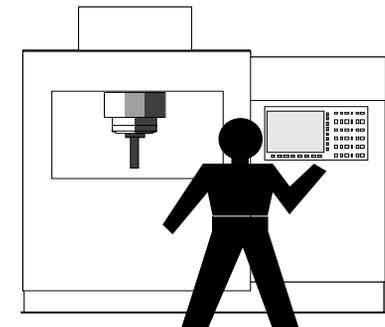
only primitive motion and switch commands

no standardized data format for spline processing and sophisticated NC technology

```
%  
N05 G54  
N10 G00 Z10.000  
N15 G91 G0 Z200  
N20 T5 D1 WW  
N30 G90 M5  
N35 G00 X0.000 Y-150.000  
N40 G00 Z5.000  
N45 M08  
N50 S3183.000  
N55 M03  
N60 F1477.000  
N65 G00 X60.000 Y-150.000  
N70 G00 Z5.000  
N75 G00 X60.000 Y-150.000  
N80 G01 Z-0.500  
...
```



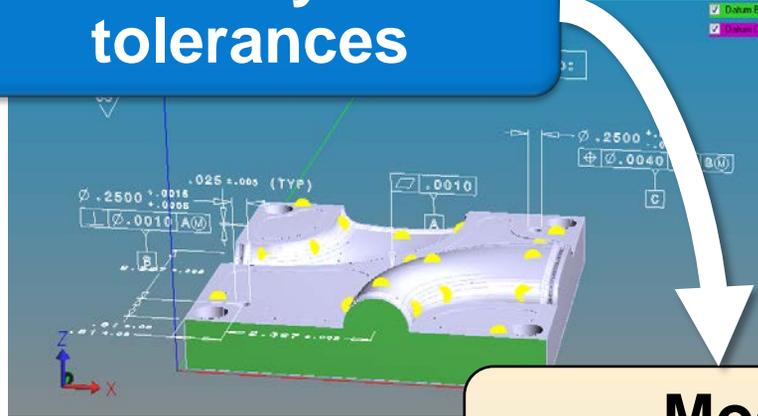
Ideal for Paper Tape!



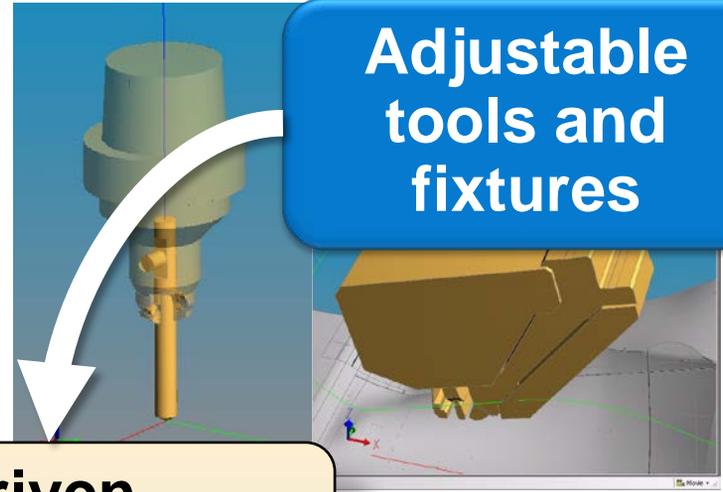
**STEP-NC** replaces this with a rich, integrated data format

Courtesy WZL RWTH Aachen

Geometry with tolerances

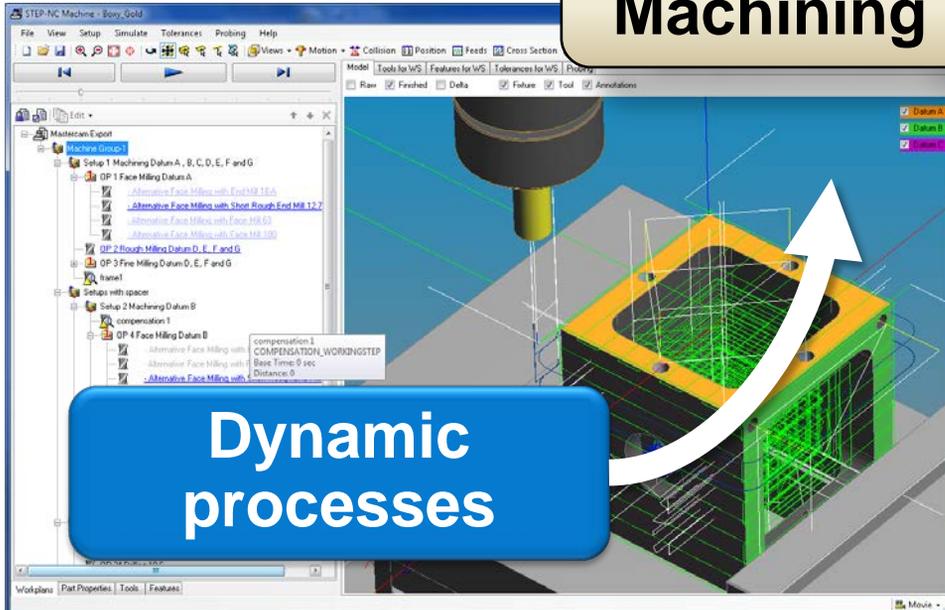


Adjustable tools and fixtures

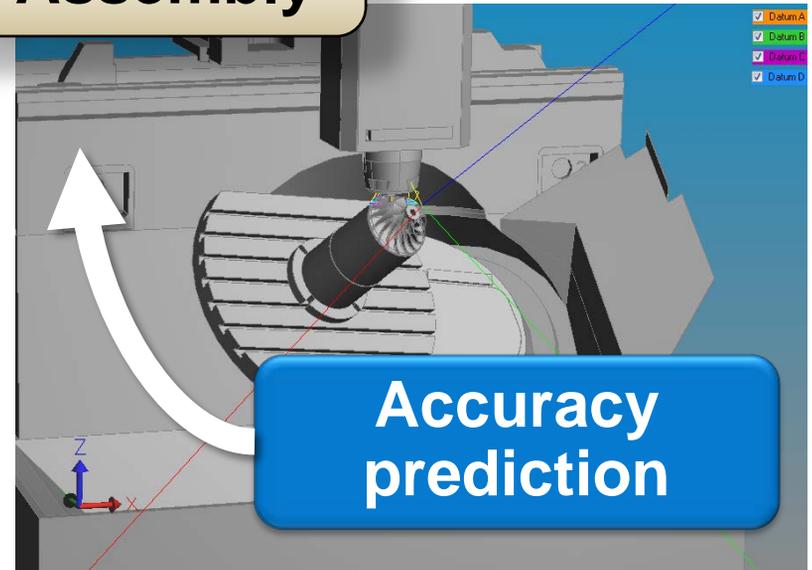


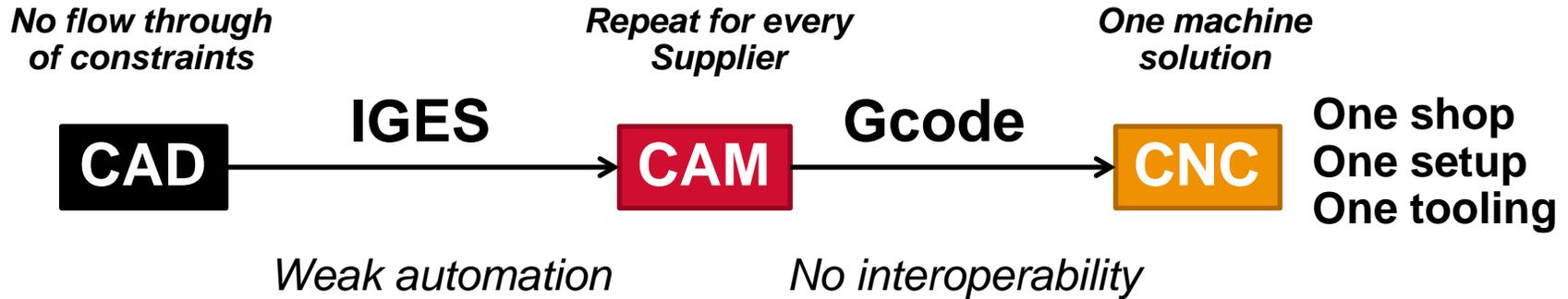
Model Driven  
Machining & Assembly

Dynamic processes

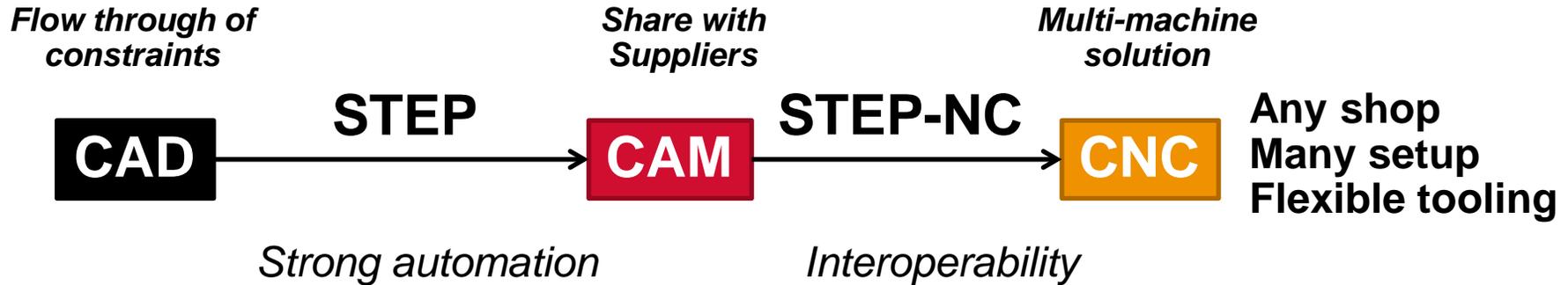


Accuracy prediction

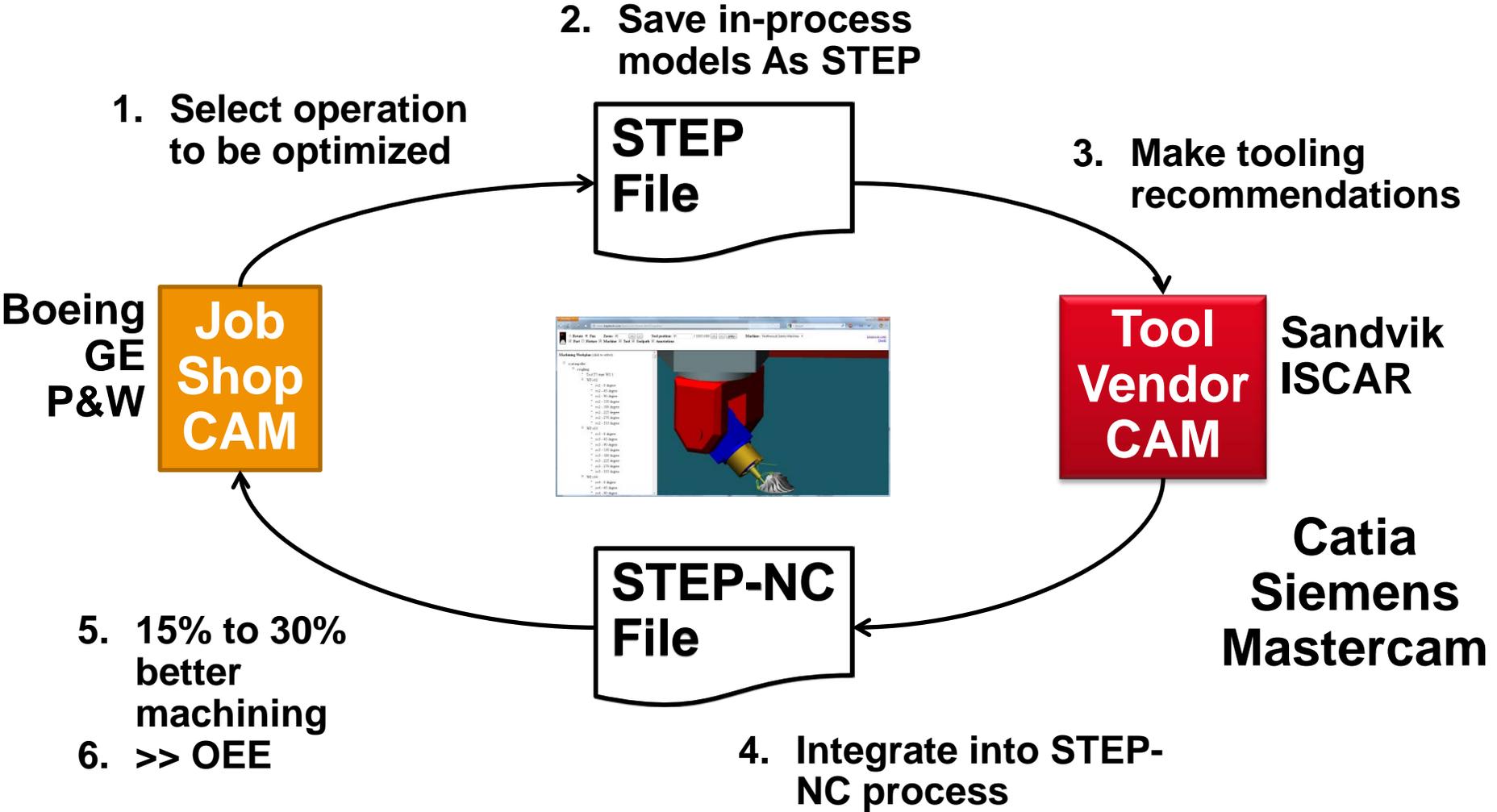




- **Visits to suppliers to explain models**
- **Repetitive, error prone data entry**
- **Misunderstandings over obscure symbols**
- **Maintenance of unnecessary machines**
- **Low shop floor flexibility**



- **Significant reduction in preparation and planning time**
- **Considerable increase in Overall Equipment Effectiveness**
- **Faster machining processes**
- **More flexibility on the shop floor**
  - Change feed/speeds, Change tooling
  - Change machines, Graphical restart
- **New shop floor solutions**
  - Adaptive fixtures
  - On machine measurement
  - Intelligent traceability
  - Long term data archiving



2013 to 2015

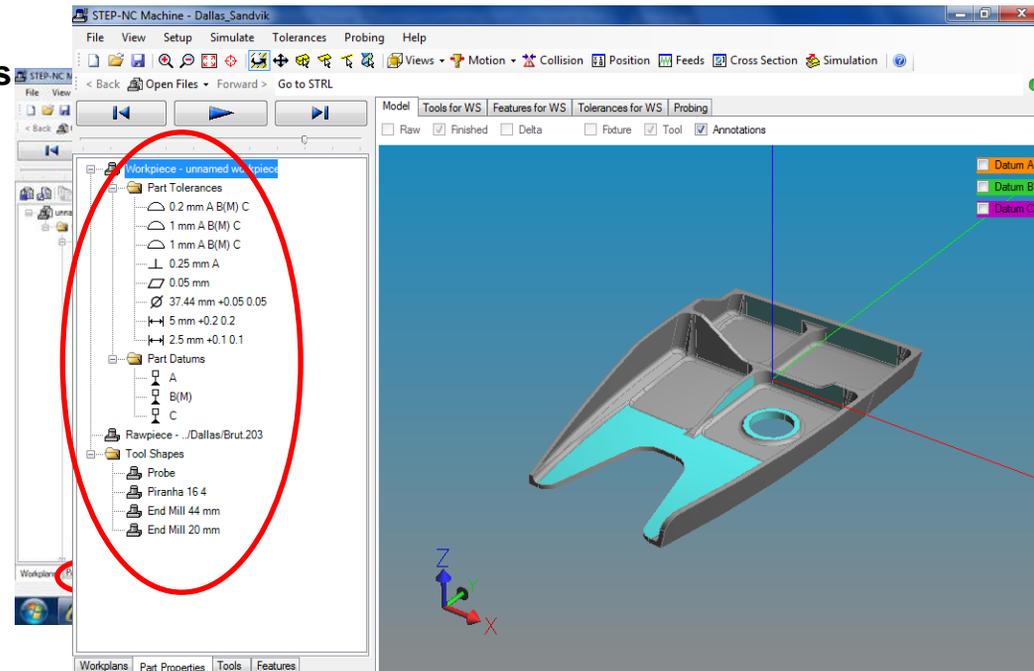
# What is ISO 10303-238 STEP-NC?

- **New information to make machining faster and more accurate**

- Supply chain interoperability
- On machine feed-speed/tool-wear optimization
- On machine simulation and collision detection
- Closed loop machining and measurement
- Feature based
- Platform independent
- Full fidelity simulation
- Plug and play with CAD and CAM systems

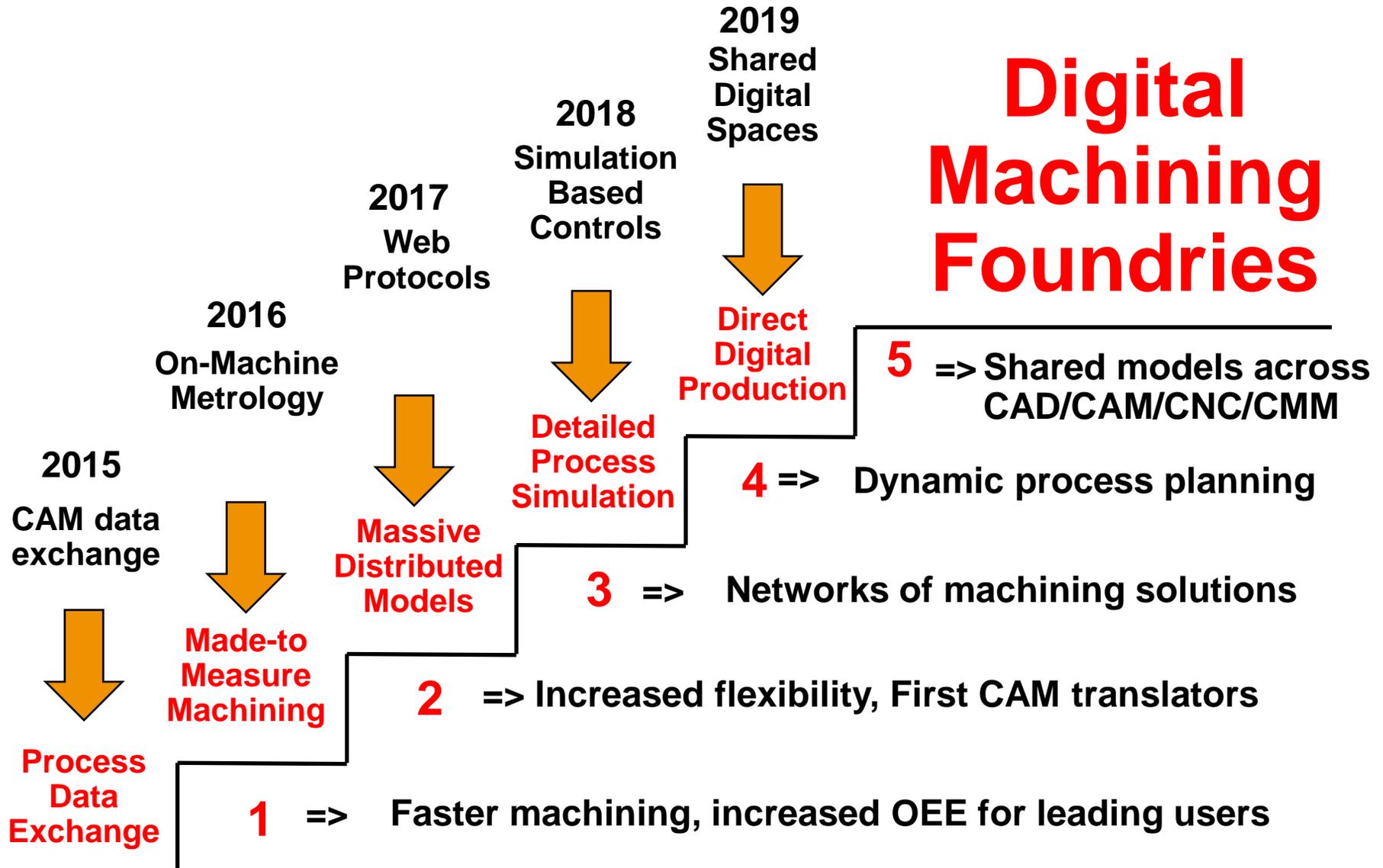


- **STEP-NC describes “what” not “how”**
  - Make this geometry from this stock
  - By removing these features
  - In this order
  - With these tolerances
  - And tools that meets these requirements
- **The old standard described “how”**
  - Move tool to this location
  - Move tool to this location
  - And so on for millions of commands



# How do we know it works - 10 years of testing





- **STEP-NC defines a technical data package for machining**
  - New automation
  - Portability and Interoperability
  - Fewer errors, more accurate simulations
  - Decade of testing, ready for deployment
- **Delivers large process savings and significant increases in shop floor flexibility**
  - Select parts
  - Translate to STEP-NC
  - Ask tooling vendors to optimize in return for new tool purchases