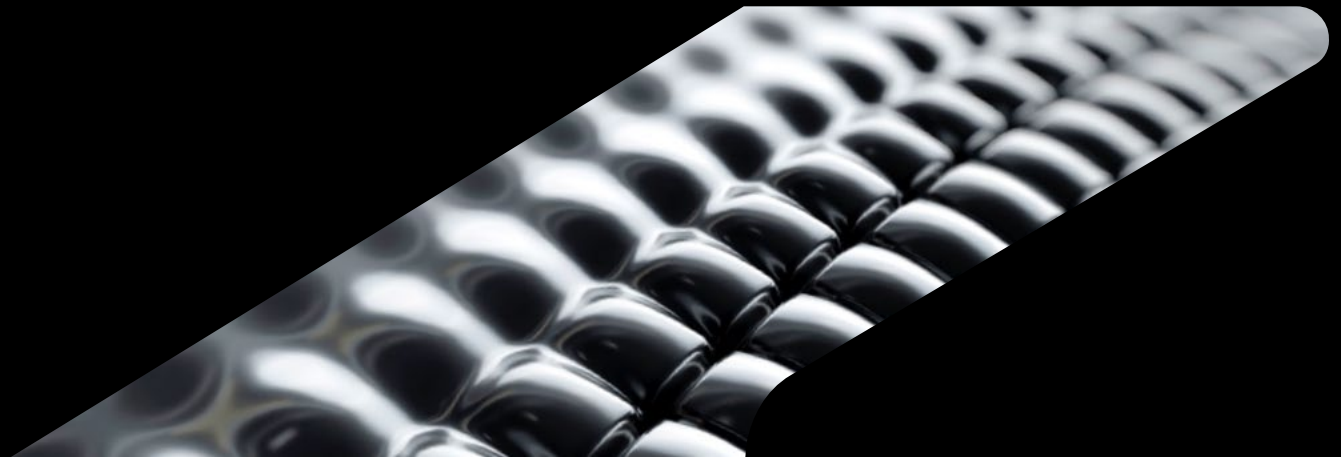
AUTODESK UNIVERSITY

Solving Your Manufacturing Business Challenges with Autodesk Fusion 360

MFG502655

Rob Walker
Manager, Technical Marketing



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About the speaker

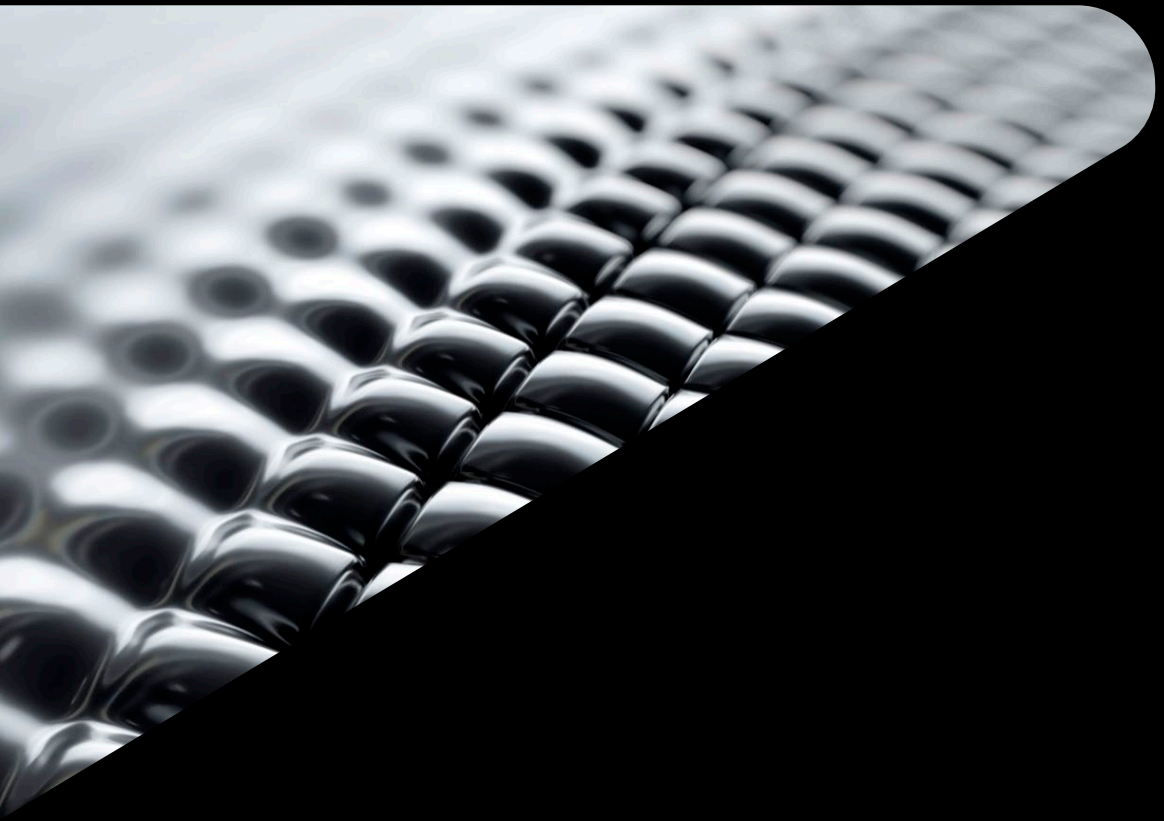
Rob Walker

Rob is the Manager of the Manufacturing Technical Marketing team at Autodesk, whose role is to help customers understand how they can achieve their manufacturing goals, using the advanced manufacturing solutions that Autodesk offers.

Rob graduated from the University of Liverpool with a Bachelor's degree in Aerospace Engineering and a Masters in Product Design and Management, before embarking on a career with Delcam as an Applications Engineer. Initially starting in the UK department, he trained and supported UK customers, before moving into an international role, where he assisted the global network of subsidiaries and resellers in both pre- and post-sales activities. Following the acquisition of Delcam by Autodesk in 2014, he moved to Technical Marketing, and is now in his 18th year of service.

Agenda

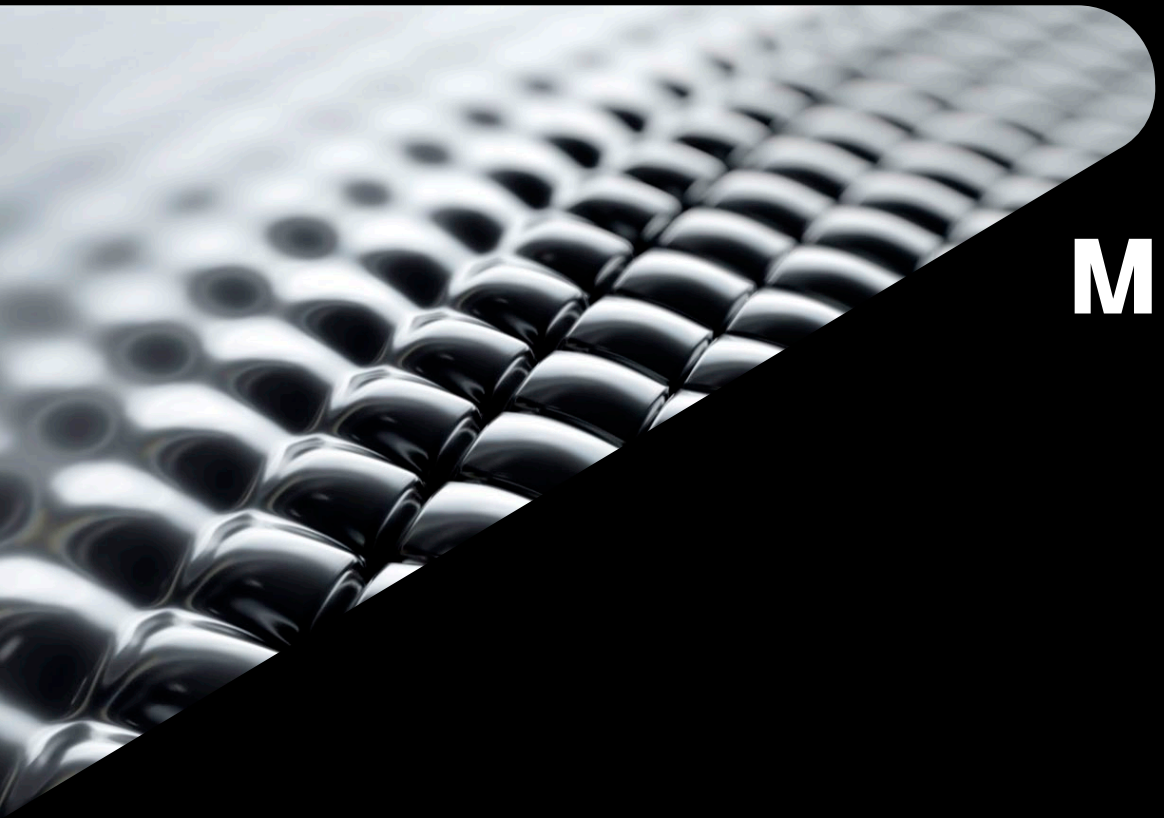
1. Introduction
2. Manufacturing department scenario
3. Business outcomes and challenges
4. Why Fusion 360?
5. Using Fusion 360 in manufacturing departments
6. Summary



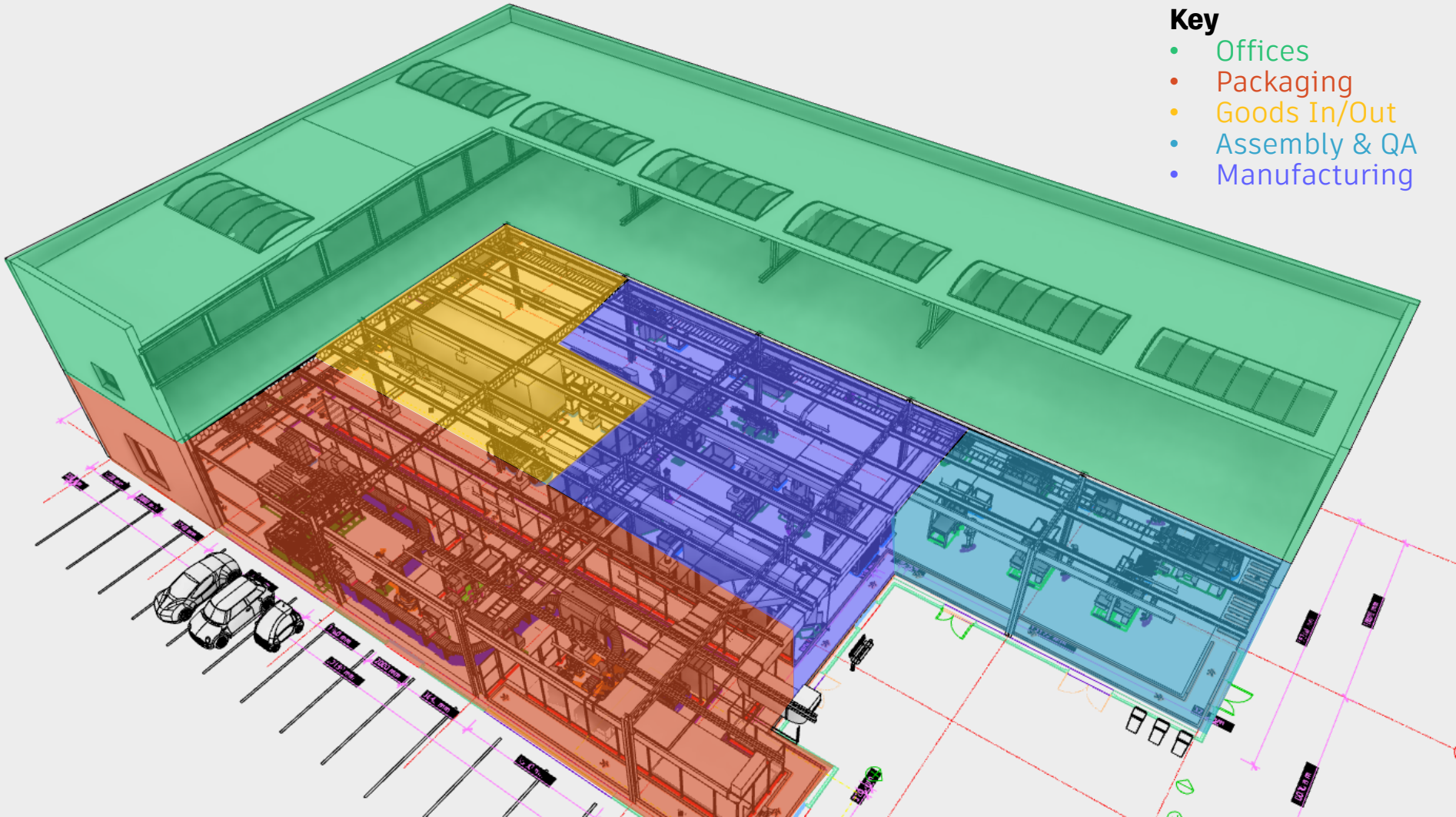
Introduction

Introduction

- Using Fusion 360 in Manufacturing Departments
- Learn how…
  - Using automation can reduce programming times to start machining sooner
  - The programming of expensive 5-axis CNC machines can be simplified
  - Using in-cycle inspection can improve part setup and avoid the need for costly re-work
  - Improving your use of data to help design and manufacturing teams to collaborate more effectively

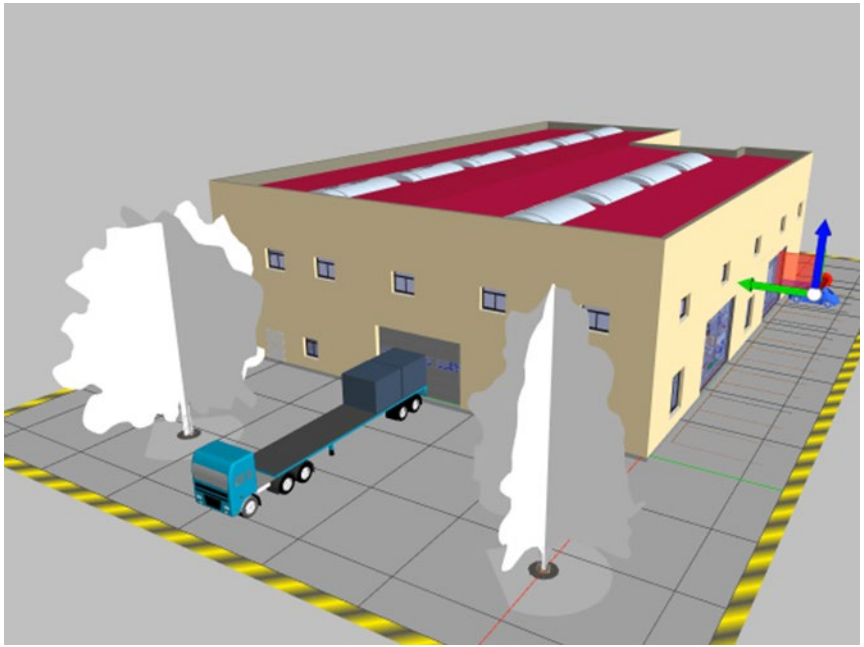


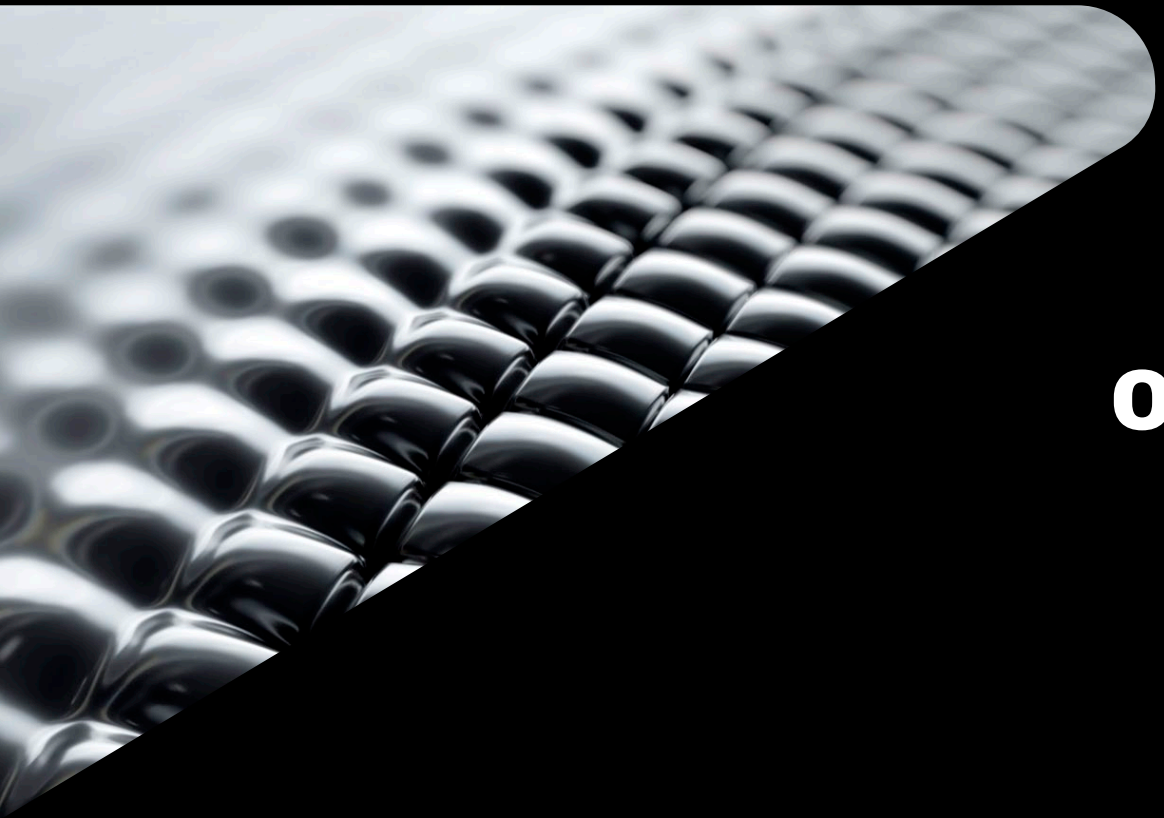
Manufacturing department scenario


Key
Offices
Packaging
Goods In/Out
Assembly & QA
Manufacturing

Manufacturing department definition

- Growing manufacturing organizations naturally establish separate departments
- Each department has a focus, e.g.:
  - Design
  - Production
  - Quality Control
  - Finance etc.
- Choosing the right manufacturing software can empower your team
- Unlock the full potential of your manufacturing department





Business outcomes and challenges

INDUSTRY
TRENDS

CREATE
BETTER
PRODUCTS

WIN
MORE
BUSINESS

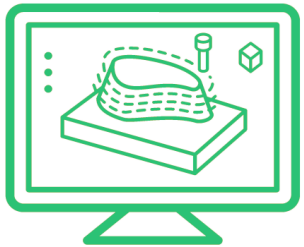
IMPROVE
OPERATIONAL
EFFICIENCY

ENABLE
INCREASED
INNOVATION

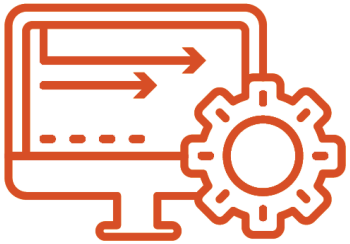
Business outcomes

- Improve collaboration
- Improve time to market
- Improve manufacturing throughput
- Reduce defects and non-conformities
- Reduce non-value added processes

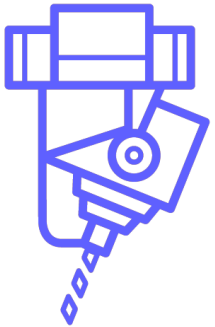
Challenges



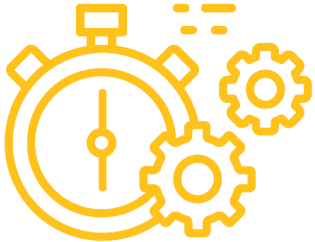
Design Changes



Need to Automate



Maximizing CNC Usage



Improve Quality

Fill Skills Gap

Design changes

- Design changes can be costly
  - Cost of not communicating changes?
- Software can help
  - Providing a direct link between design and manufacturing
  - Enabling effective communication between departments
- Improve collaboration

Need to automate

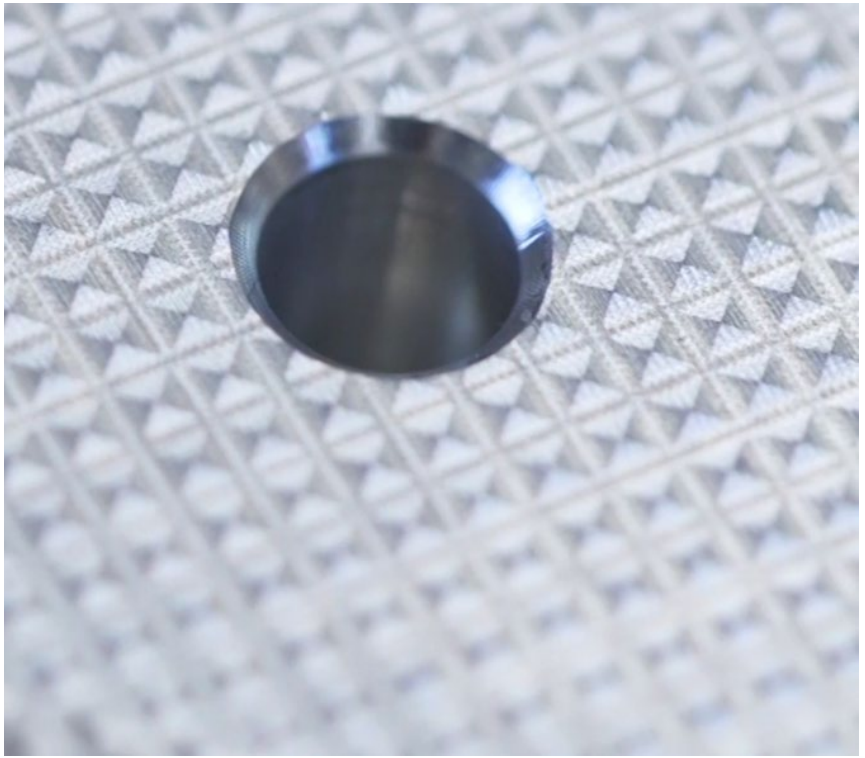
- What do we mean by “Automated”?
  - Many types of automation in manufacturing
- Focus on automation within design and manufacturing software
- Delivers repeatability and consistency
  - Improves quality and reliability
- Improve time to market

Maximizing CNC usage

- Important to maximize CNC usage to maximize return on investment
- Many ways to achieve this
  - Automated setup process
  - Full use of multi-axis machines
  - In-cycle probing for verification
- Software to produce safe, predictable NC code for your CNC machines
- Improve manufacturing throughput

Improve quality

- Linked to automation and CNC machine utilization
- Quality can affect profitability
  - Need for costly rework
  - Affect reputation
- Software can help improve quality
  - Better toolpath strategies
  - Multi-axis machining
  - Automated setup and verification
- Reduce defects and non-conformities



Fill skills gap

- Gap between skilled jobs and the skilled workforce available
- Skilled but aging workforce
  - Capturing knowledge is vital
- Use software which can capture this knowledge
  - Train others to follow the best practices
  - Refine over time
- Improve collaboration

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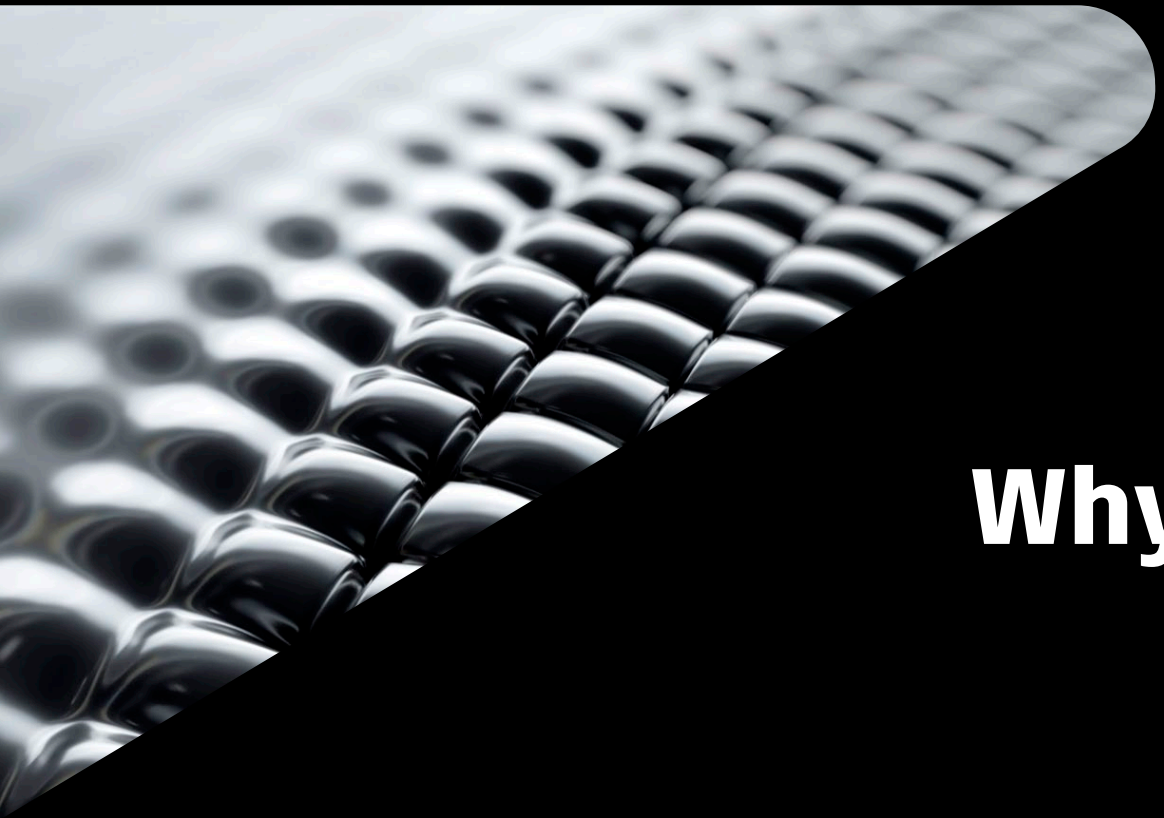
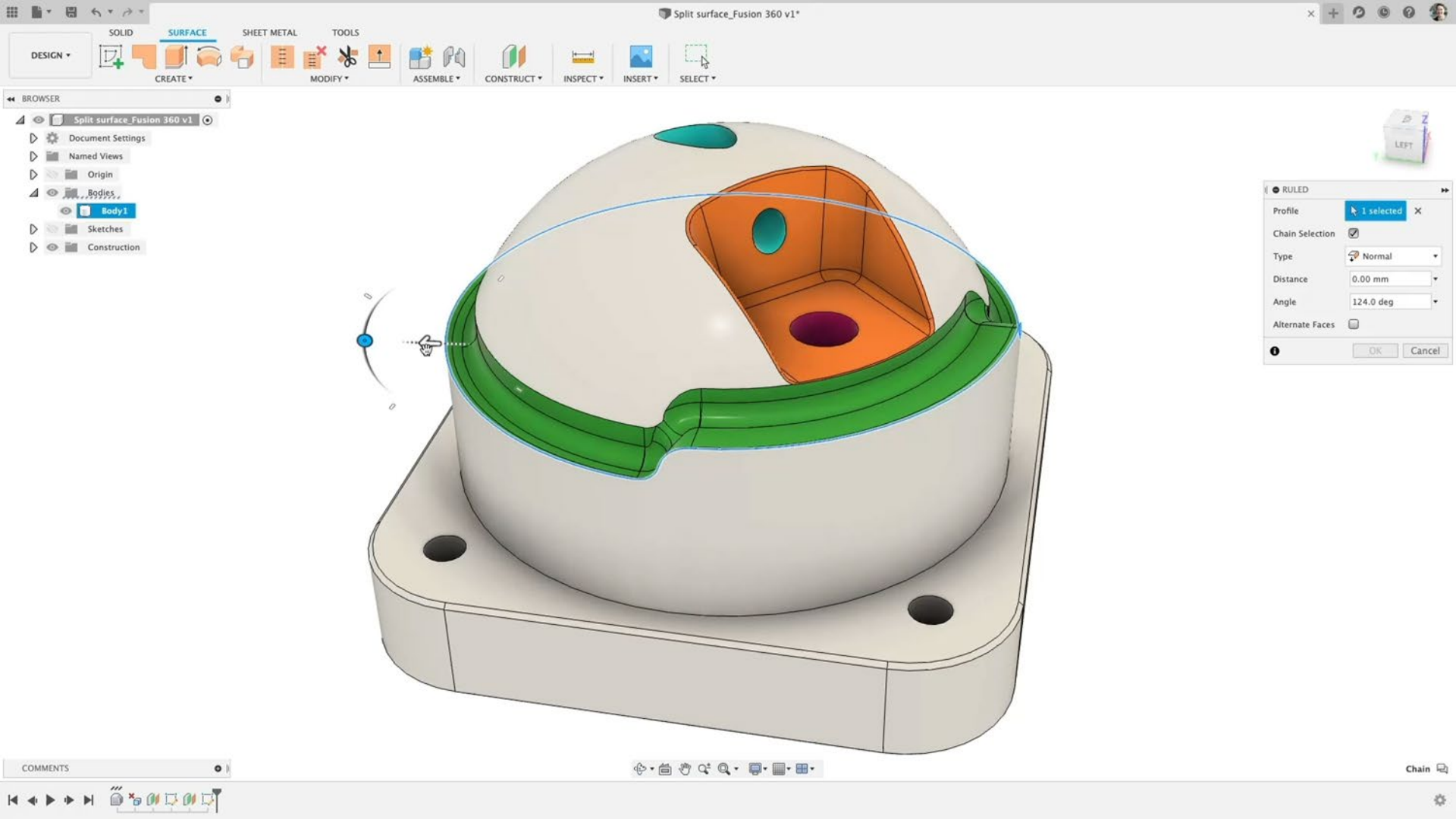
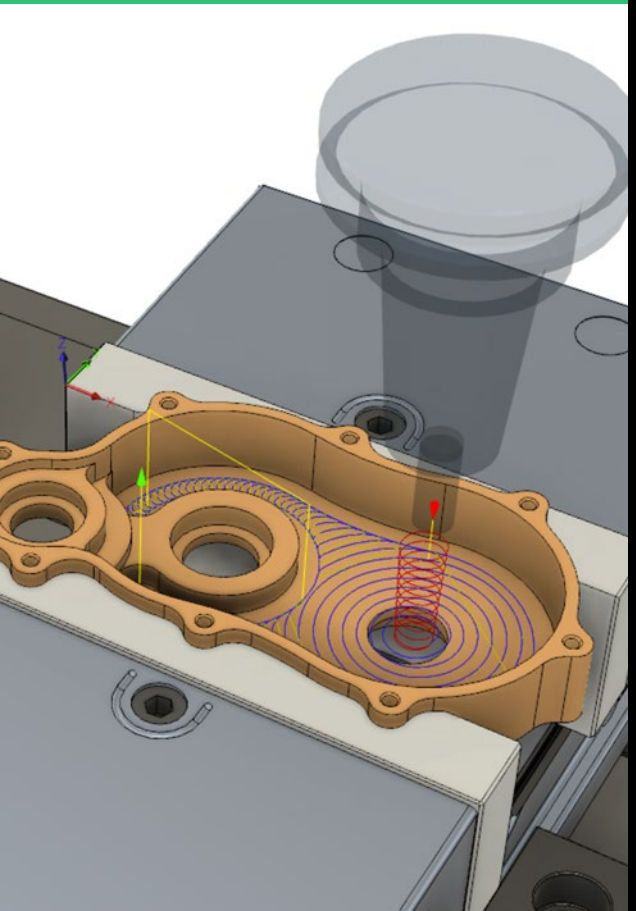
ONE TEAM 2022



Why Fusion 360?

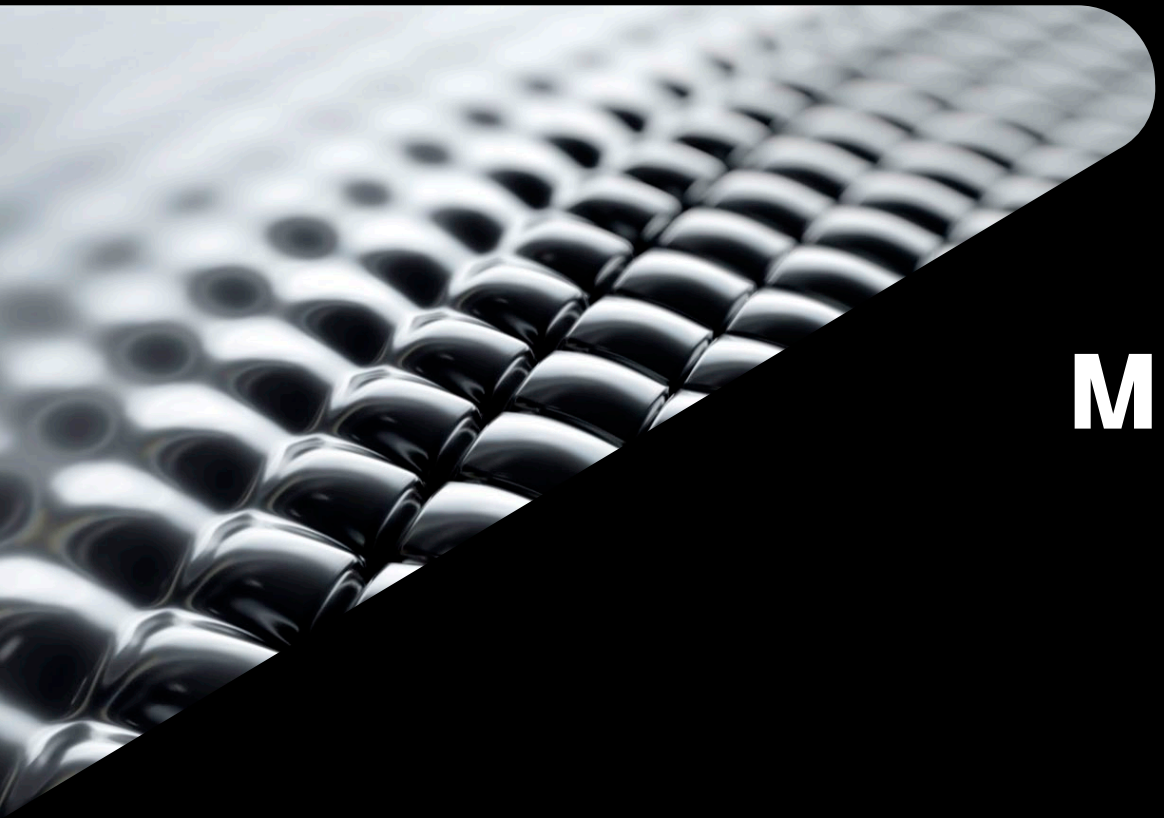

Split surface_Fusion 360 v1*
SOLID
SURFACE
SHEET METAL
TOOLS
DESIGN
CREATE
MODIFY
ASSEMBLE
CONSTRUCT
INSPECT
INSERT
SELECT
BROWSER
Split surface_Fusion 360 v1
Document Settings
Named Views
Origin
Bodies
Body1
Sketches
Construction
RULED
Profile
1 selected
Chain Selection
Type
Normal
Distance
0.00 mm
Angle
124.0 deg
Alternate Faces
OK
Cancel
LEFT
COMMENTS
Chain

Integrated



Collaborative

Accessible



Using Fusion 360 in a Manufacturing Department

Fusion 360

Fusion 360 (Core Functionality)

Design

- Product Design Extension
- Simulation Extension
- Generative Design Extension

Manufacturing

- Machining Extension
- Additive Build Extension
- Additive Simulation Extension
- Nesting and Fabrication Extension

Fusion 360

Fusion 360 (Core Functionality)

Design

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- Simulation Extension
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Manufacturing

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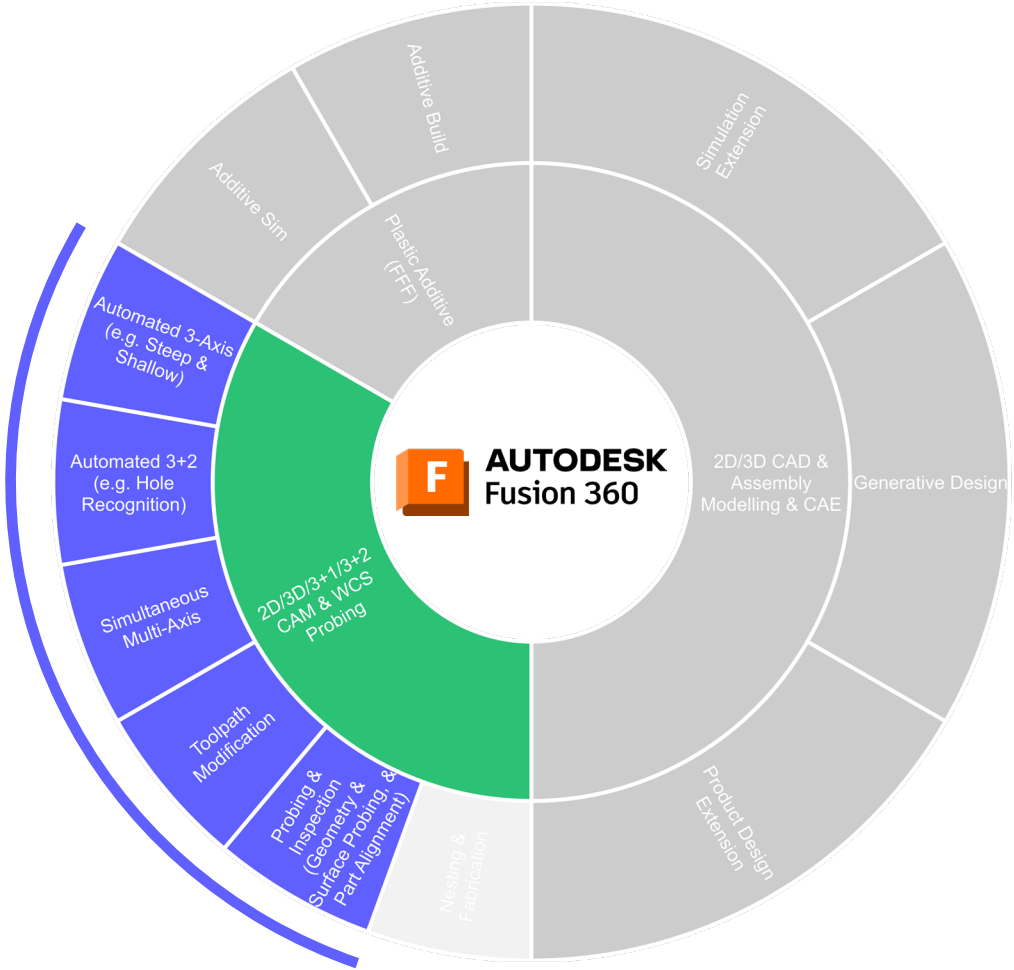
- Nesting and Fabrication Extension



How might it work in a manufacturing department?

Jan

Haas ST30
2-Axis Lathe

Sanjay

Fanuc Robodrill
3-Axis

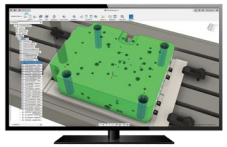
Lauren

Doosan DEM
3-Axis

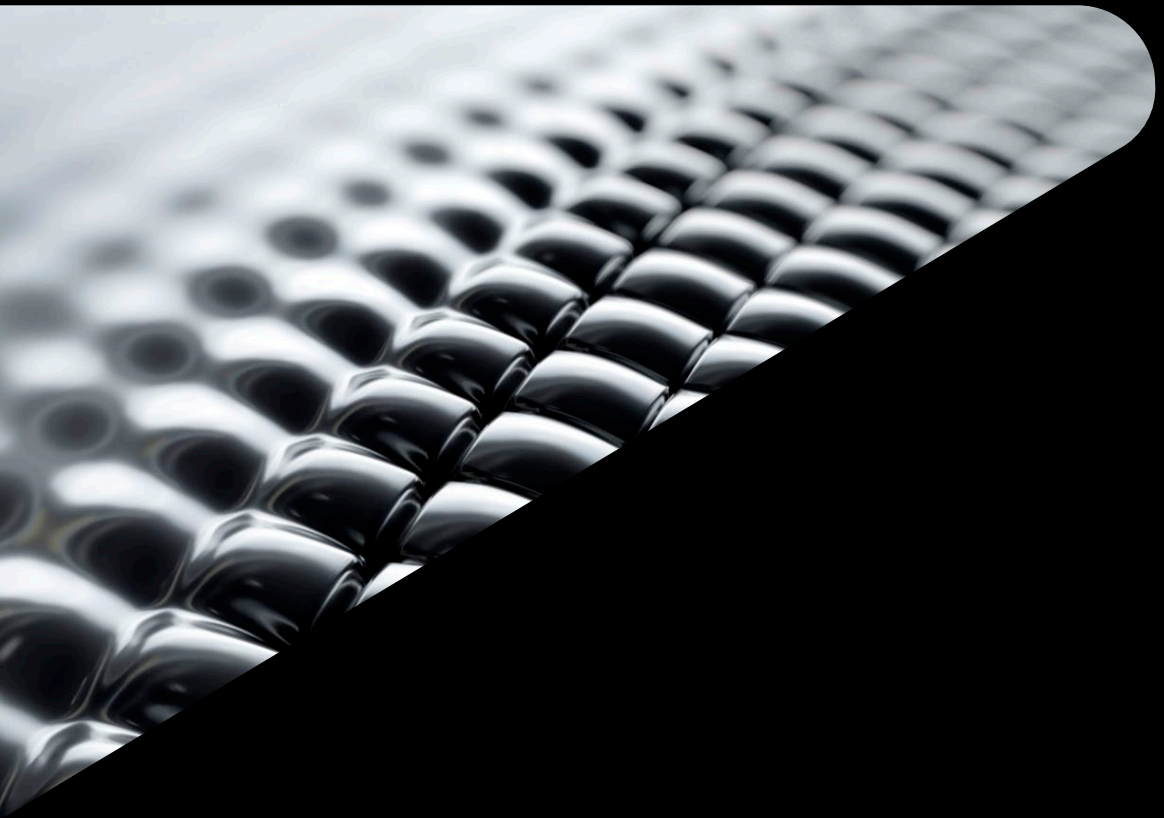
Patrick

Haas VF2
3-Axis

Carl



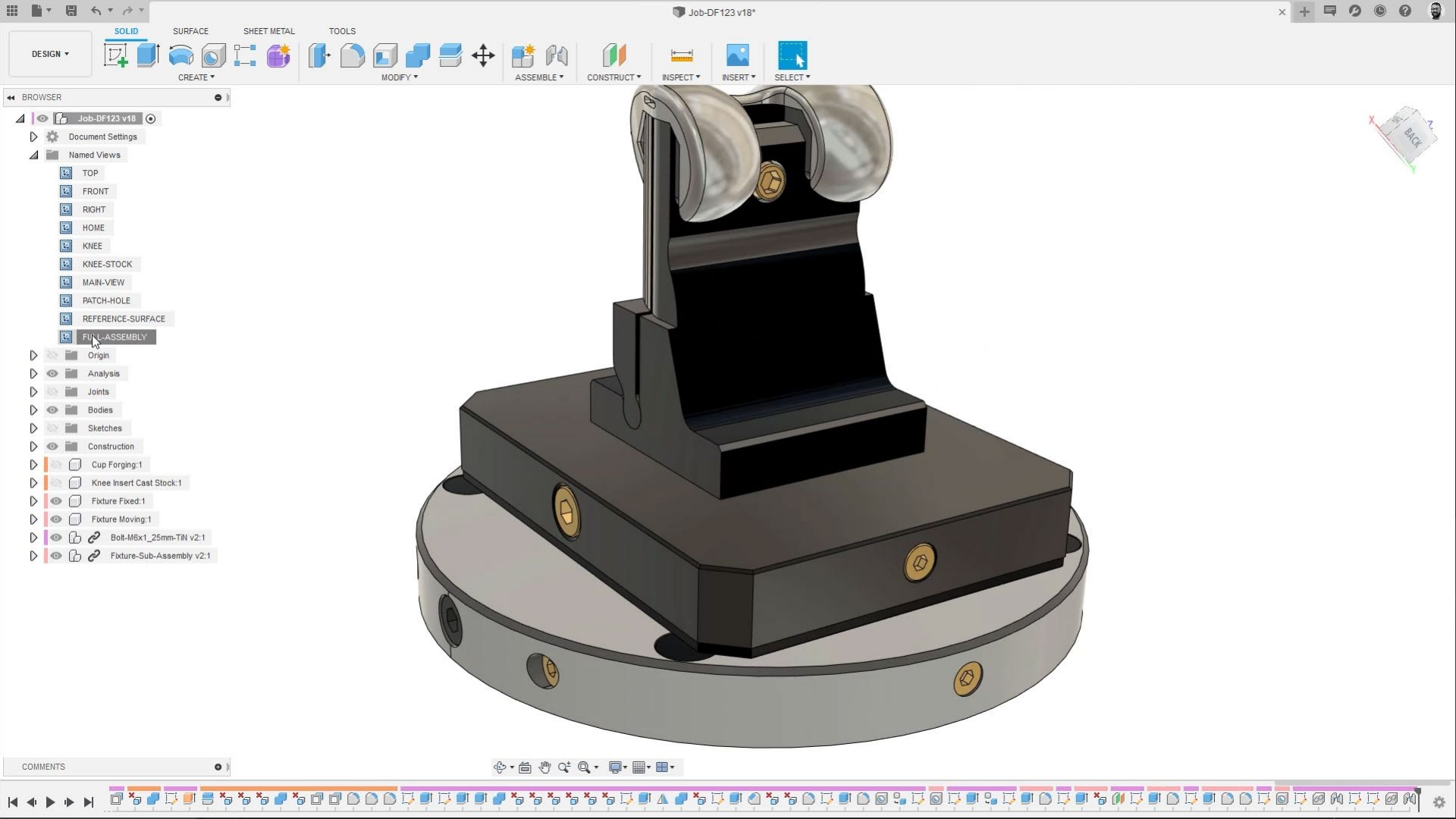
Programming
Office



Associative CAD/CAM

Integrated

- Go from design to machining faster
- Changes update associatively; no file conversions


Job-DF123 v18*
DESIGN
SOLID
SURFACE
SHEET METAL
TOOLS
CREATE
MODIFY
ASSEMBLE
CONSTRUCT
INSPECT
INSERT
SELECT
BROWSER
Job-DF123 v18
Document Settings
Named Views
TOP
FRONT
RIGHT
HOME
KNEE
KNEE-STOCK
MAIN-VIEW
PATCH-HOLE
REFERENCE-SURFACE
FULL-ASSEMBLY
Origin
Analysis
Joints
Bodies
Sketches
Construction
Cup Forging:1
Knee Insert Cast Stock:1
Fixture Fixed:1
Fixture Moving:1
Bolt-M6x1_25mm-TiN v2:1
Fixture-Sub-Assembly v2:1
BACK
COMMENTS

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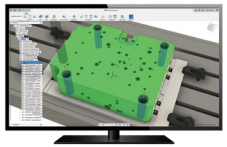

Programming
Office

How might it work in a manufacturing department?

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Fusion 360

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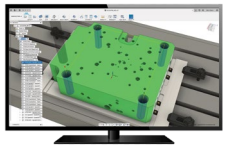
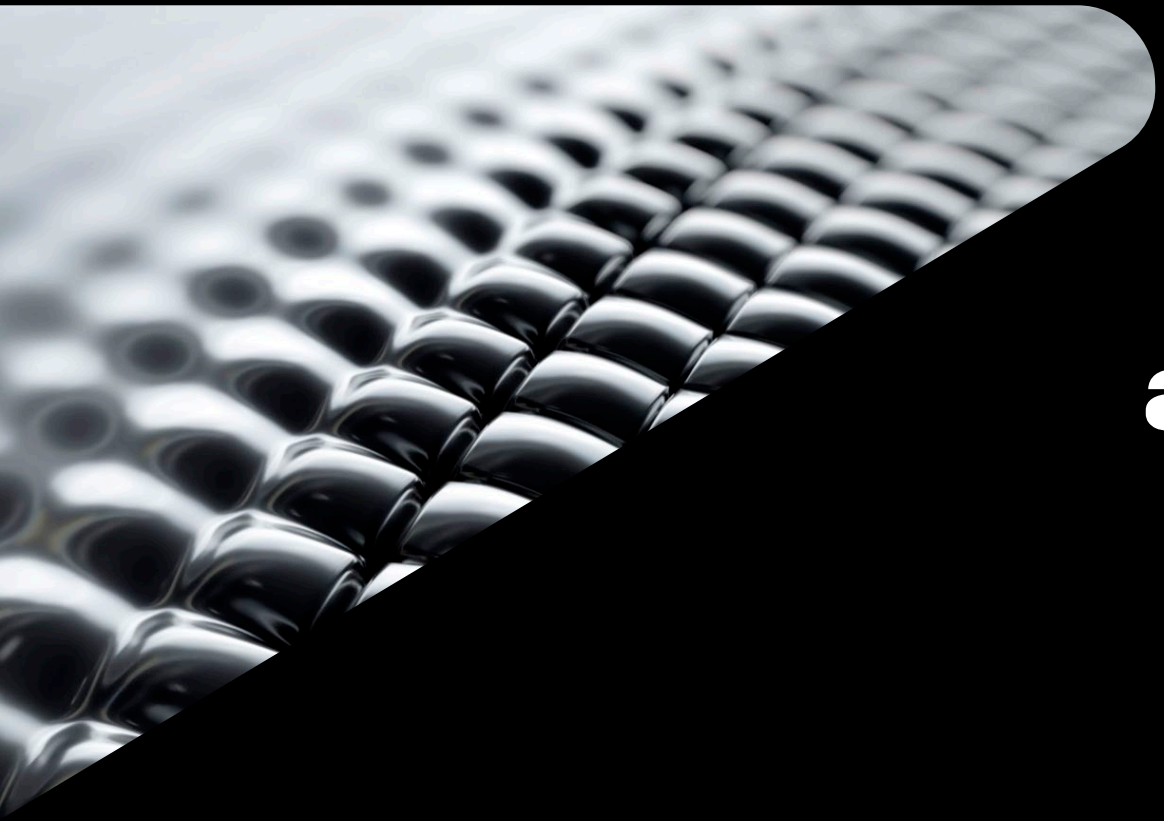


Programming
Office

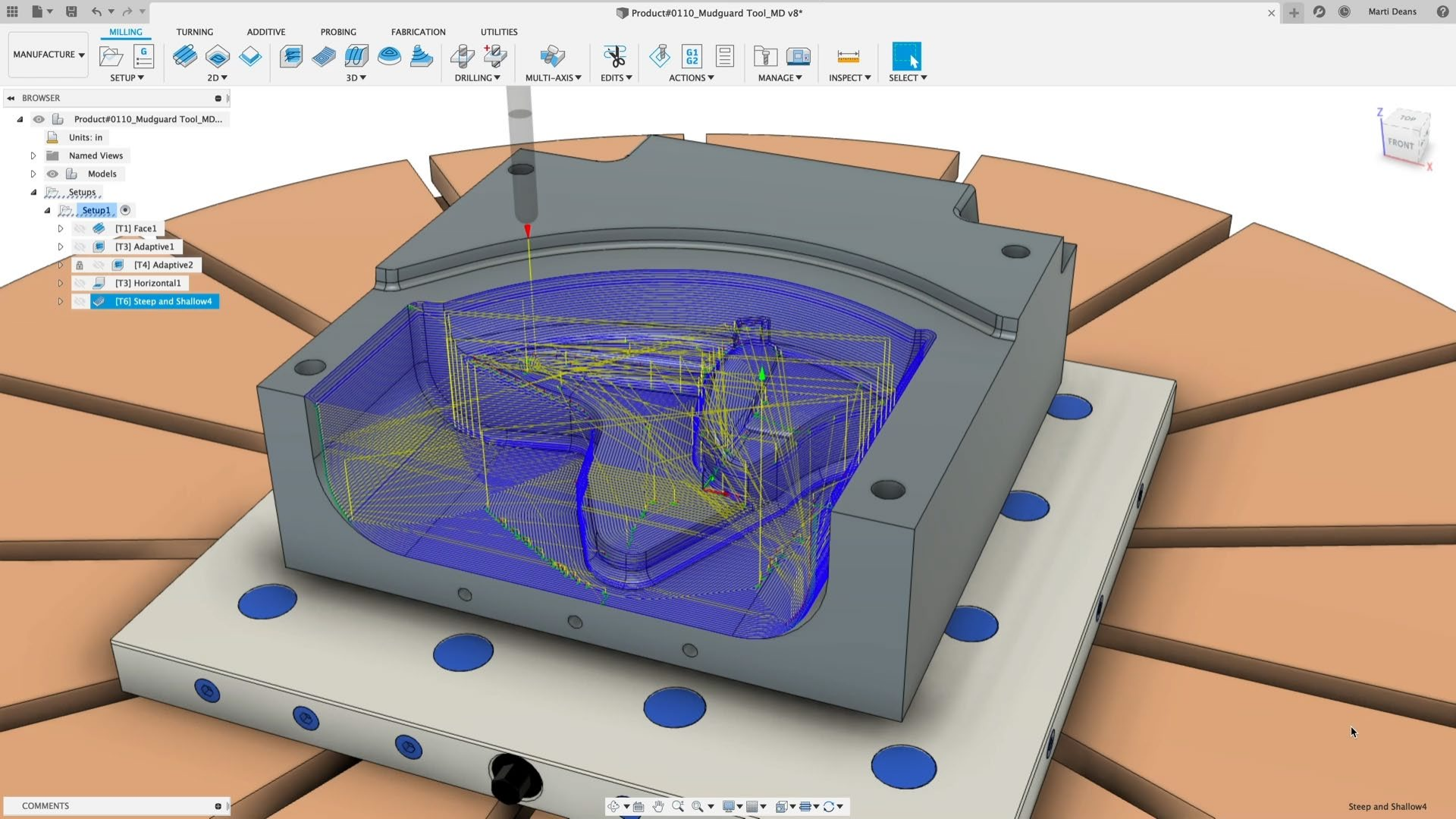
Fusion 360



Improved accuracy and part quality

Advanced toolpaths

- Need to produce accurate, high-quality parts, in as short a time as possible
- Toolpath strategies to speed up part programming and improve the final output


Product#0110_Mudguard Tool_MD v8*
Marti Deans
MANUFACTURE
MILLING
TURNING
ADDITIVE
PROBING
FABRICATION
UTILITIES
SETUP
2D
3D
DRILLING
MULTI-AXIS
EDITS
ACTIONS
MANAGE
INSPECT
SELECT
BROWSER
Product#0110_Mudguard Tool_MD...
Units: in
Named Views
Models
Setups
Setup1
[T1] Face1
[T3] Adaptive1
[T4] Adaptive2
[T3] Horizontal1
[T6] Steep and Shallow4
TOP
FRONT
Z
X
COMMENTS
Steep and Shallow4

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Fusion 360

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Doosan DEM
3-Axis

Fusion 360

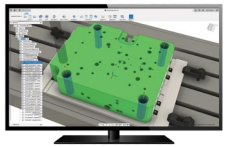
Patrick

Haas VF2
3-Axis

+ Machining Extension

Fusion 360

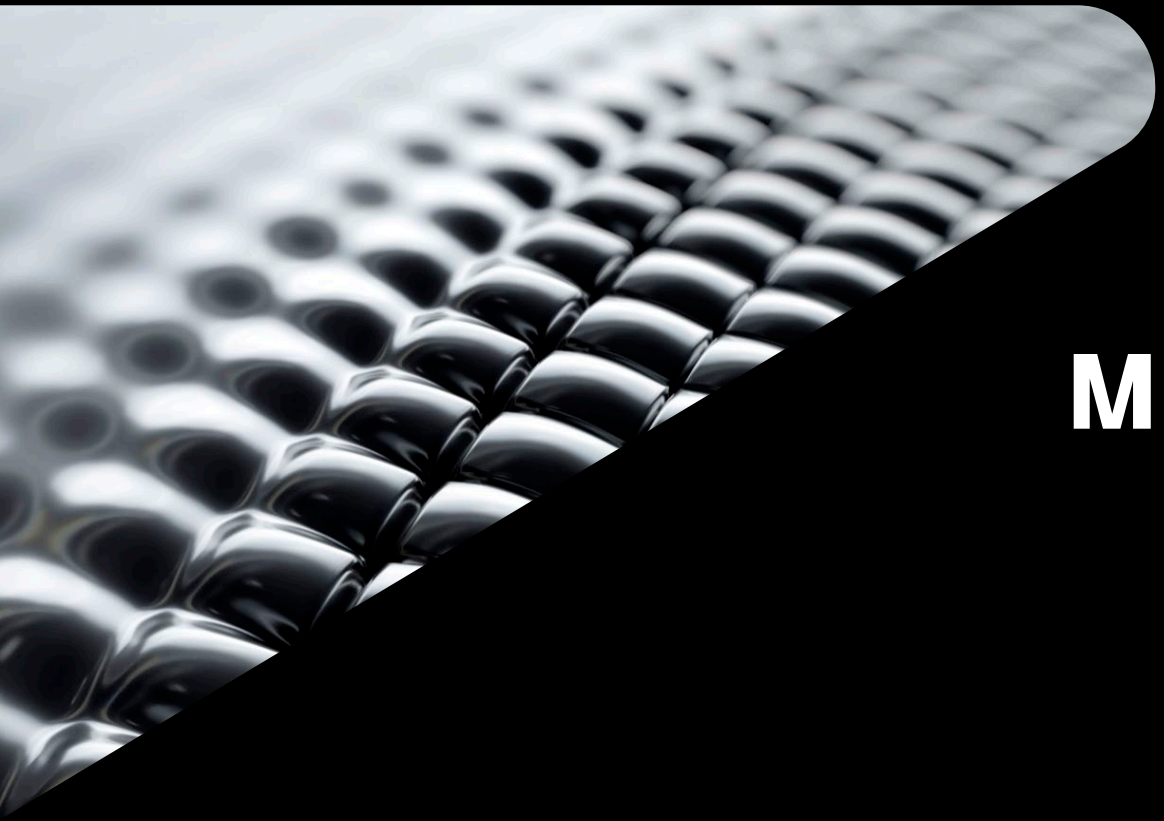
Carl



Programming
Office

+ Machining Extension

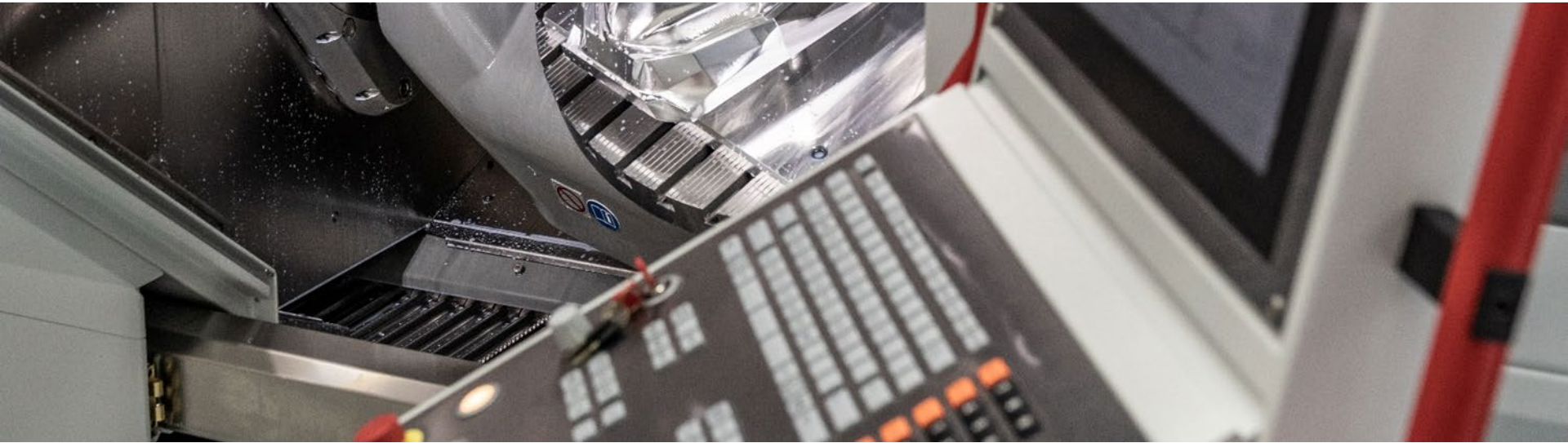
Fusion 360

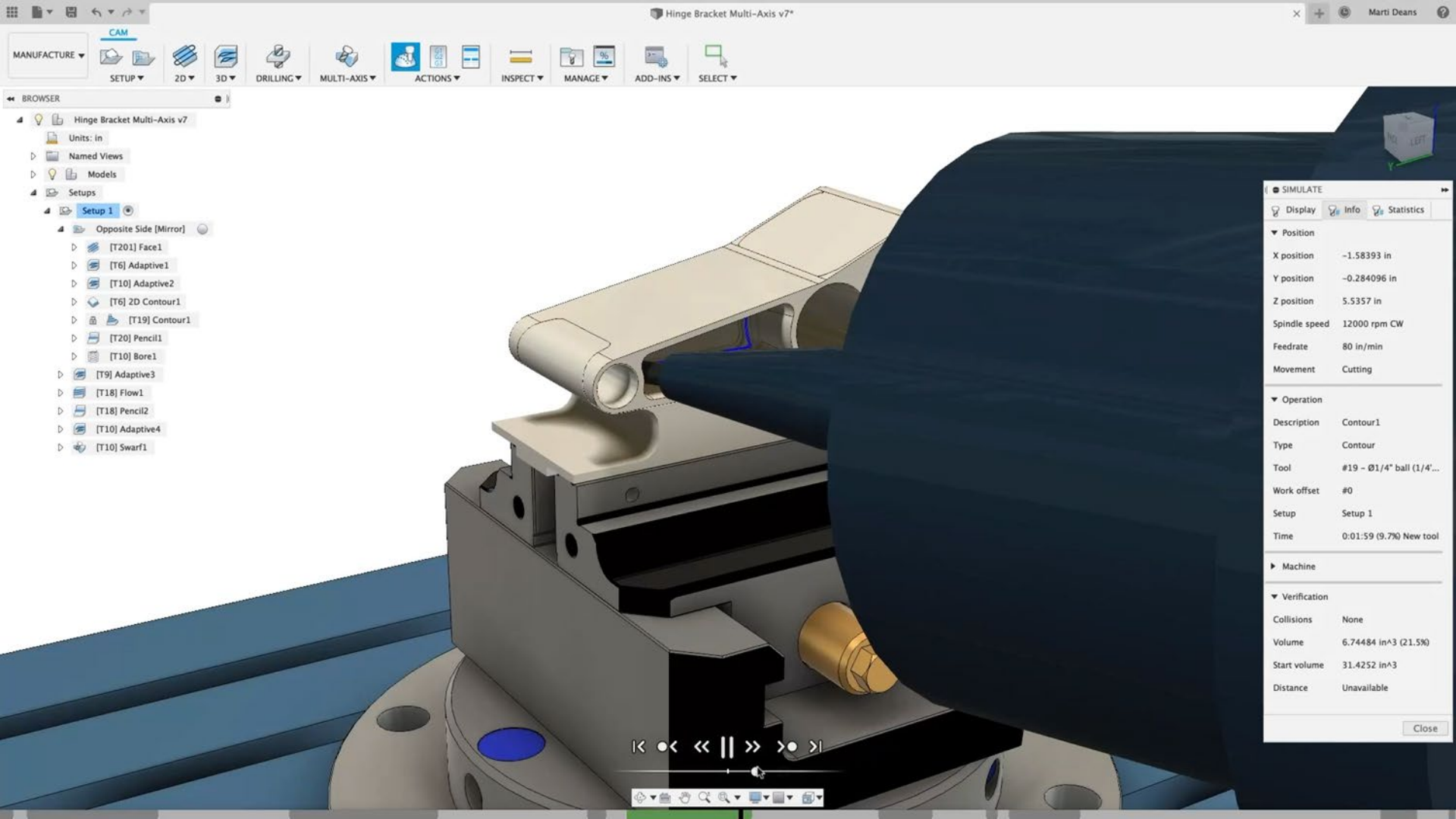


Multi-axis CNC machining

Multi-axis CNC machining

- Complex, high-value parts often contain features and details which cannot be produced using 3-Axis
- Need to create multi-axis operations to fully utilize machine tools




Hinge Bracket Multi-Axis v7*
Marti Deans
CAM
MANUFACTURE
SETUP
2D
3D
DRILLING
MULTI-AXIS
ACTIONS
INSPECT
MANAGE
ADD-INS
SELECT
BROWSER
Hinge Bracket Multi-Axis v7
Units: in
Named Views
Models
Setups
Setup 1
Opposite Side [Mirror]
[T201] Face1
[T6] Adaptive1
[T10] Adaptive2
[T6] 2D Contour1
[T19] Contour1
[T20] Pencil1
[T10] Bore1
[T9] Adaptive3
[T18] Flow1
[T18] Pencil2
[T10] Adaptive4
[T10] Swarf1
SIMULATE
Display
Info
Statistics
Position
X position -1.58393 in
Y position -0.284096 in
Z position 5.5357 in
Spindle speed 12000 rpm CW
Feedrate 80 in/min
Movement Cutting
Operation
Description Contour1
Type Contour
Tool #19 - Ø1/4" ball (1/4'...
Work offset #0
Setup Setup 1
Time 0:01:59 (9.7%) New tool
Machine
Verification
Collisions None
Volume 6.74484 in^3 (21.5%)
Start volume 31.4252 in^3
Distance Unavailable
Close

How might it work in a manufacturing department?

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2-Axis Lathe

Fusion 360

Sanjay

Fanuc Robodrill
3-Axis

Fusion 360

Lauren

Doosan DEM
3-Axis

Fusion 360

Patrick

Haas UMC
5-Axis

+ Machining Extension

Fusion 360

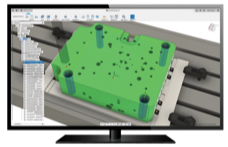
Aneka

Mazak Variaxis
5-Axis

+ Machining Extension

Fusion 360

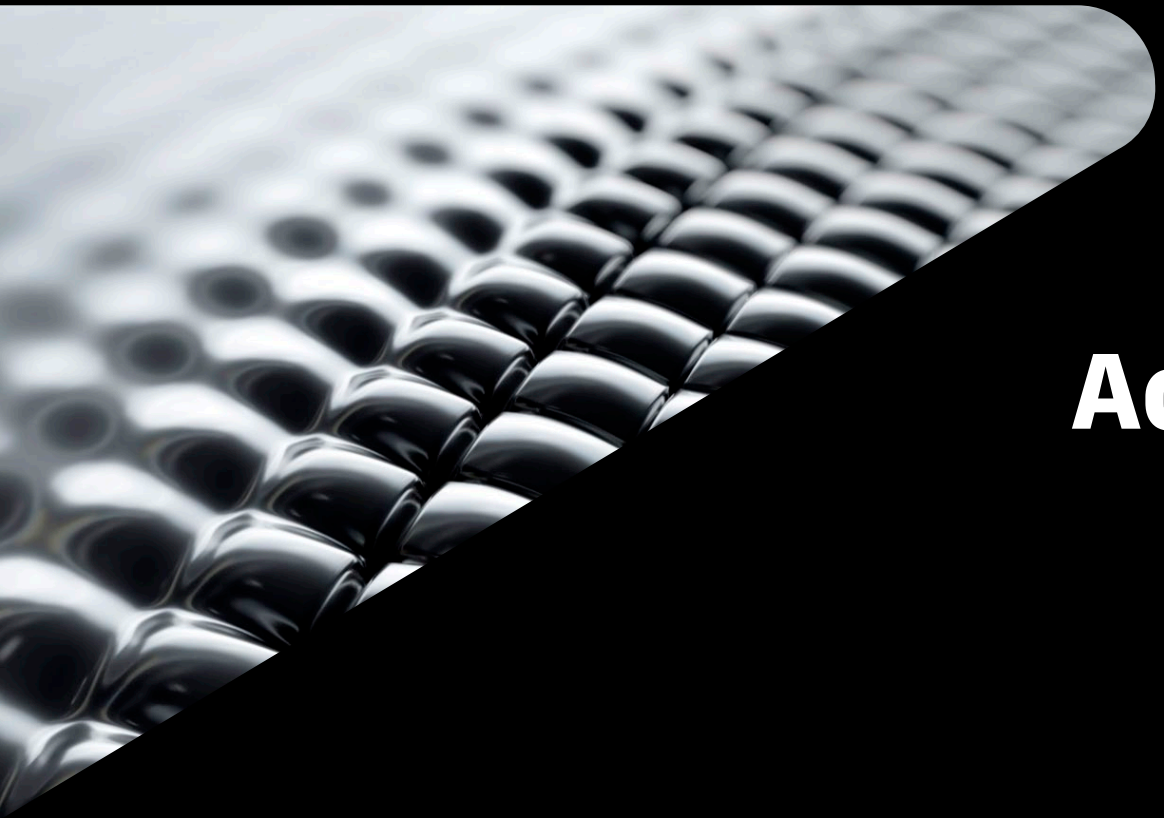
Carl



Programming
Office

+ Machining Extension

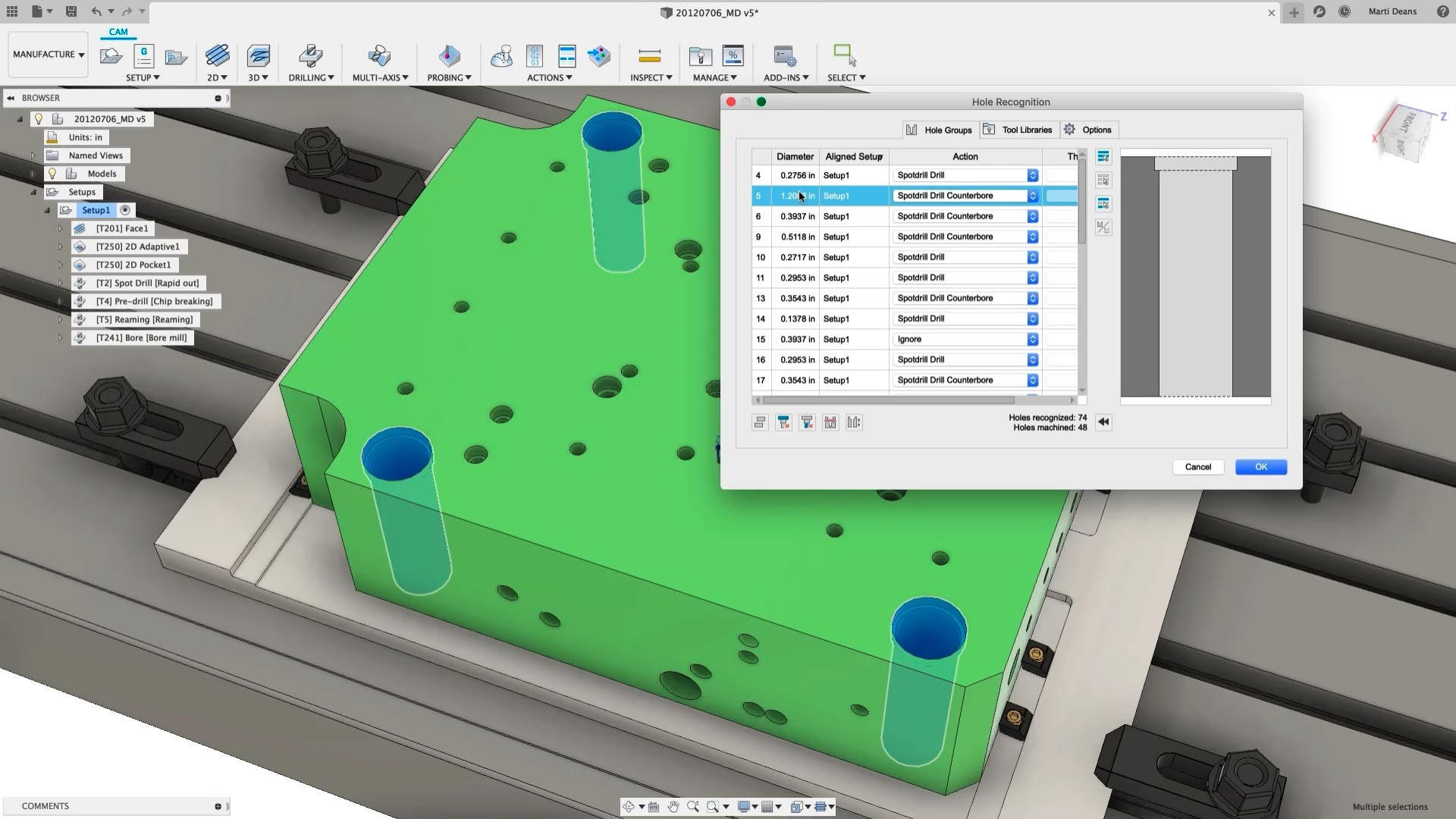
Fusion 360

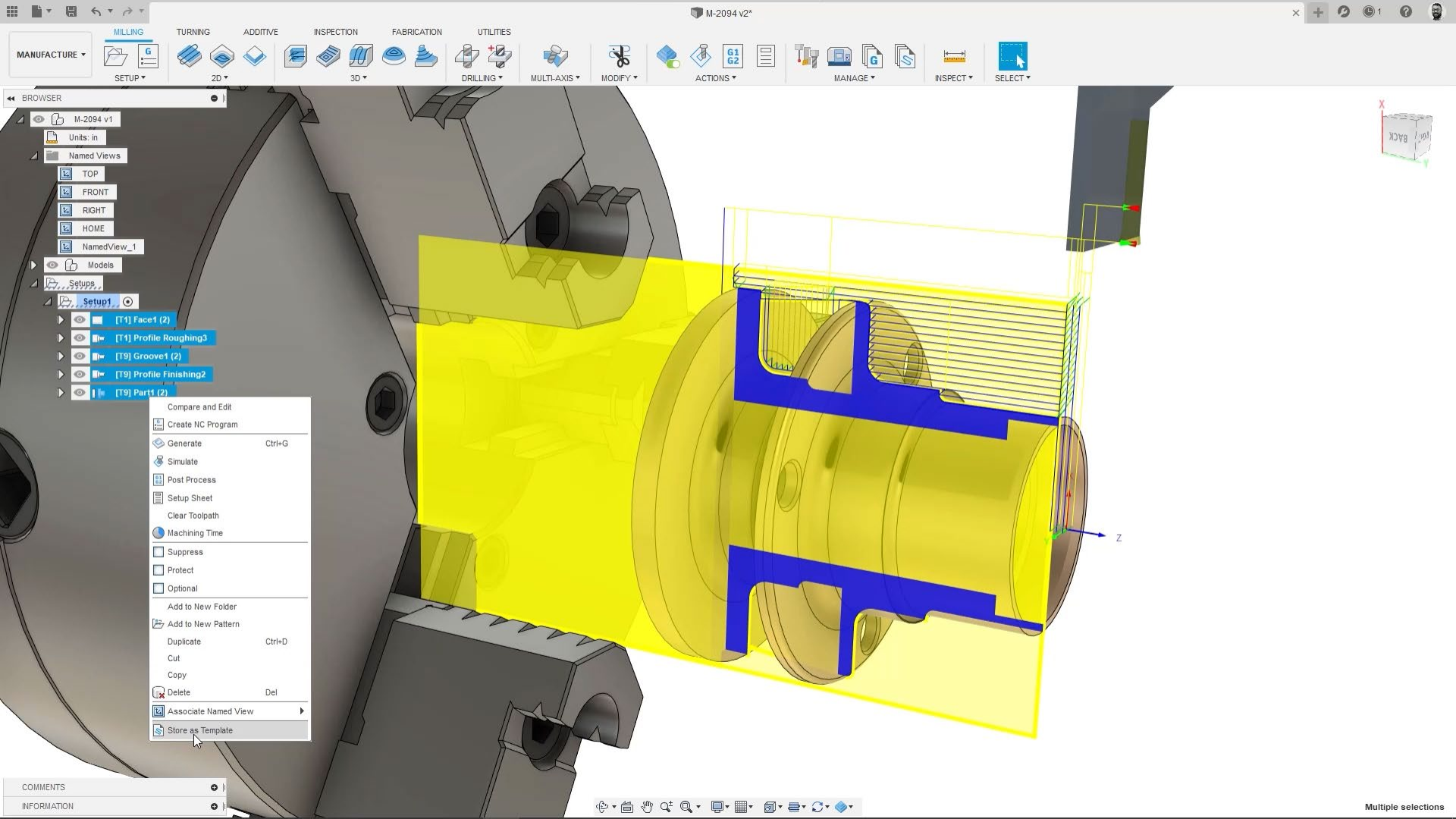


Advanced CAM automation

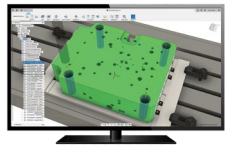
Advanced toolpaths

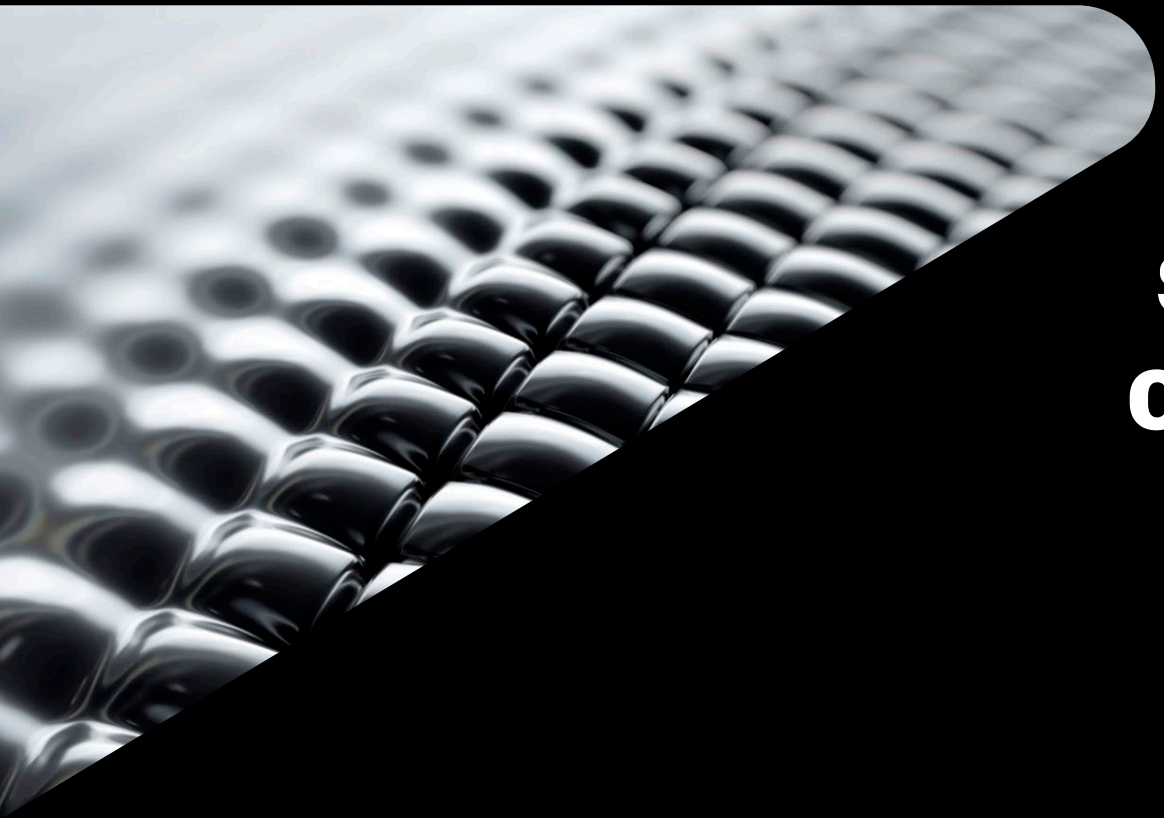
- Need to produce reliable parts, whilst minimizing time to market
- Automated tools to enhance processes, minimize waste and improve consistency


20120706_MD v5*
Marti Deans
MANUFACTURE
CAM
SETUP
2D
3D
DRILLING
MULTI-AXIS
PROBING
ACTIONS
INSPECT
MANAGE
ADD-INS
SELECT
BROWSER
20120706_MD v5
Units: in
Named Views
Models
Setups
Setup1
[T201] Face1
[T250] 2D Adaptive1
[T250] 2D Pocket1
[T2] Spot Drill [Rapid out]
[T4] Pre-drill [Chip breaking]
[T5] Reaming [Reaming]
[T241] Bore [Bore mill]
Hole Recognition
Hole Groups
Tool Libraries
Options
Diameter
Aligned Setup
Action
4 0.2756 in Setup1 Spotdrill Drill
5 1.20 in Setup1 Spotdrill Drill Counterbore
6 0.3937 in Setup1 Spotdrill Drill Counterbore
9 0.5118 in Setup1 Spotdrill Drill Counterbore
10 0.2717 in Setup1 Spotdrill Drill
11 0.2953 in Setup1 Spotdrill Drill
13 0.3543 in Setup1 Spotdrill Drill Counterbore
14 0.1378 in Setup1 Spotdrill Drill
15 0.3937 in Setup1 Ignore
16 0.2953 in Setup1 Spotdrill Drill
17 0.3543 in Setup1 Spotdrill Drill Counterbore
Holes recognized: 74
Holes machined: 48
Cancel
OK
COMMENTS
Multiple selections


M-2094 v2*
MANUFACTURE
MILLING
TURNING
ADDITIVE
INSPECTION
FABRICATION
UTILITIES
SETUP
2D
3D
DRILLING
MULTI-AXIS
MODIFY
ACTIONS
MANAGE
INSPECT
SELECT
BROWSER
M-2094 v1
Units: in
Named Views
TOP
FRONT
RIGHT
HOME
NamedView_1
Models
Setups
Setup1
[T1] Face1 (2)
[T1] Profile Roughing3
[T9] Groove1 (2)
[T9] Profile Finishing2
[T9] Part1 (2)
Compare and Edit
Create NC Program
Generate Ctrl+G
Simulate
Post Process
Setup Sheet
Clear Toolpath
Machining Time
Suppress
Protect
Optional
Add to New Folder
Add to New Pattern
Duplicate Ctrl+D
Cut
Copy
Delete Del
Associate Named View
Store as Template
COMMENTS
INFORMATION
Multiple selections

How might it work in a manufacturing department?

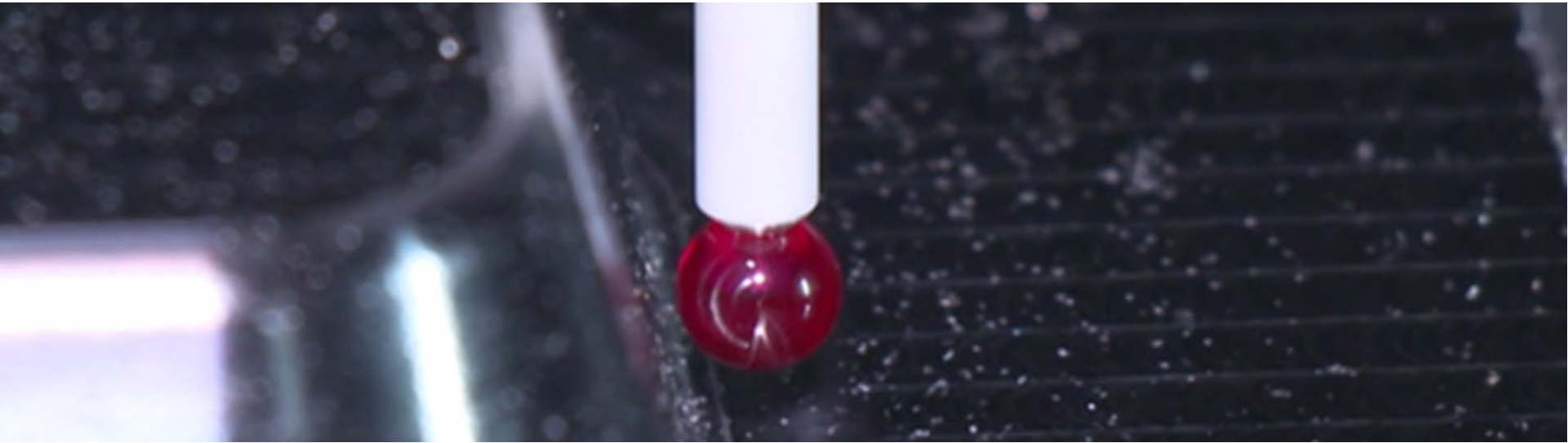
Jan	Sanjay	Lauren	Patrick	Aneka	Carl
					
Haas ST30 2-Axis Lathe	Fanuc Robodrill 3-Axis	Doosan DEM 3-Axis	Haas UMC 5-Axis	Mazak Variaxis 5-Axis	Programming Office
	+ Machining Extension		+ Machining Extension	+ Machining Extension	+ Machining Extension
Fusion 360	Fusion 360	Fusion 360	Fusion 360	Fusion 360	Fusion 360

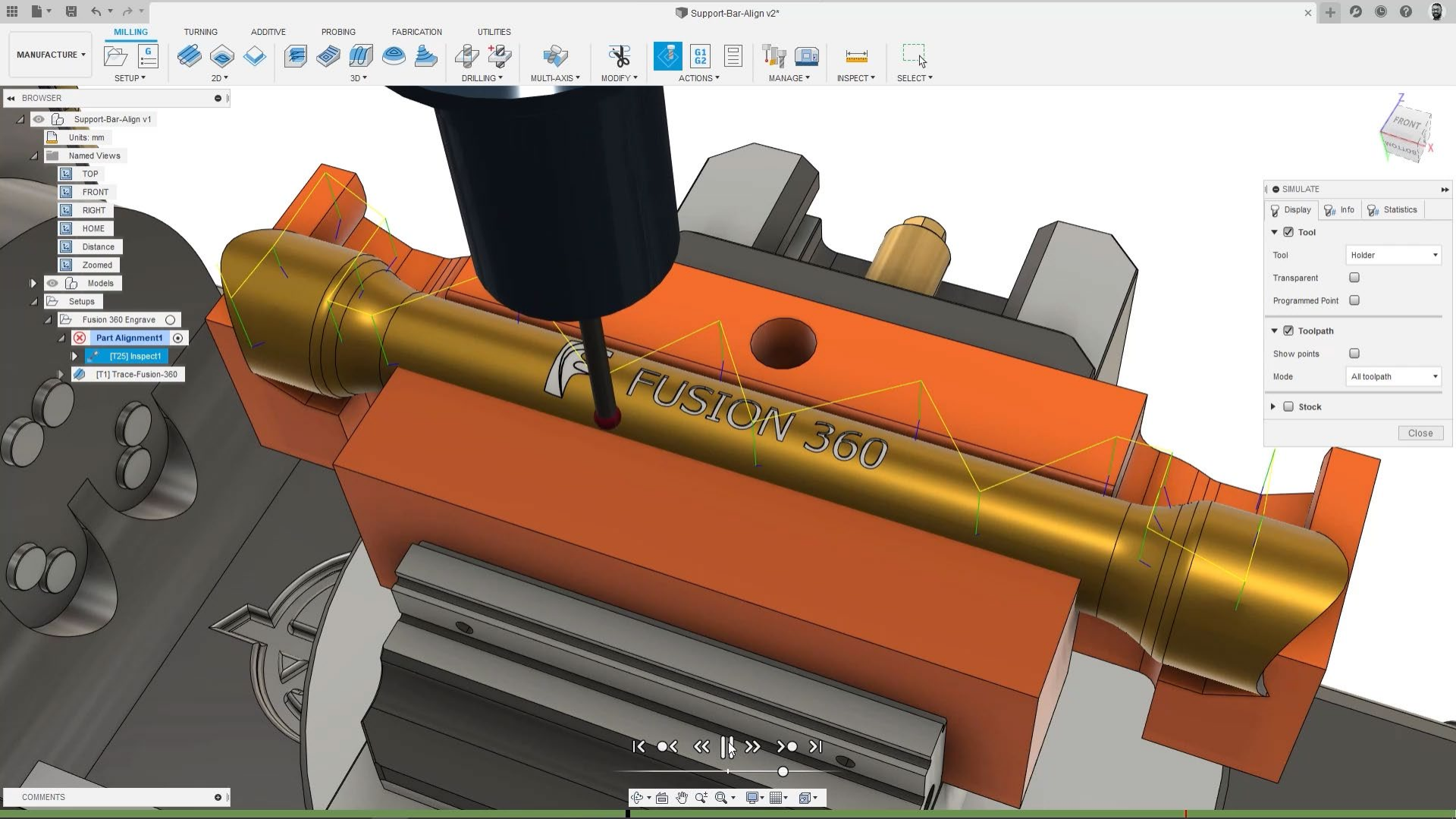


Automated setup and in-cycle process control

Automated setup and in-cycle process control

- Manual location is time-consuming and difficult to perform accurately
  - Machine is under-utilized with accuracy issues when repositioning
- Utilize spindle-mounted probe to perform automated setup and part verification




Support-Bar-Align v2*
MANUFACTURE
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TURNING
ADDITIVE
PROBING
FABRICATION
UTILITIES
SETUP
2D
3D
DRILLING
MULTI-AXIS
MODIFY
ACTIONS
MANAGE
INSPECT
SELECT
BROWSER
Support-Bar-Align v1
Units: mm
Named Views
TOP
FRONT
RIGHT
HOME
Distance
Zoomed
Models
Setups
Fusion 360 Engrave
Part Alignment1
[T25] Inspect1
[T1] Trace-Fusion-360
FUSION 360
SIMULATE
Display
Info
Statistics
Tool
Tool
Holder
Transparent
Programmed Point
Toolpath
Show points
Mode
All toolpath
Stock
Close
COMMENTS

How might it work in a manufacturing department?

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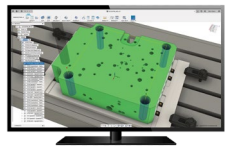
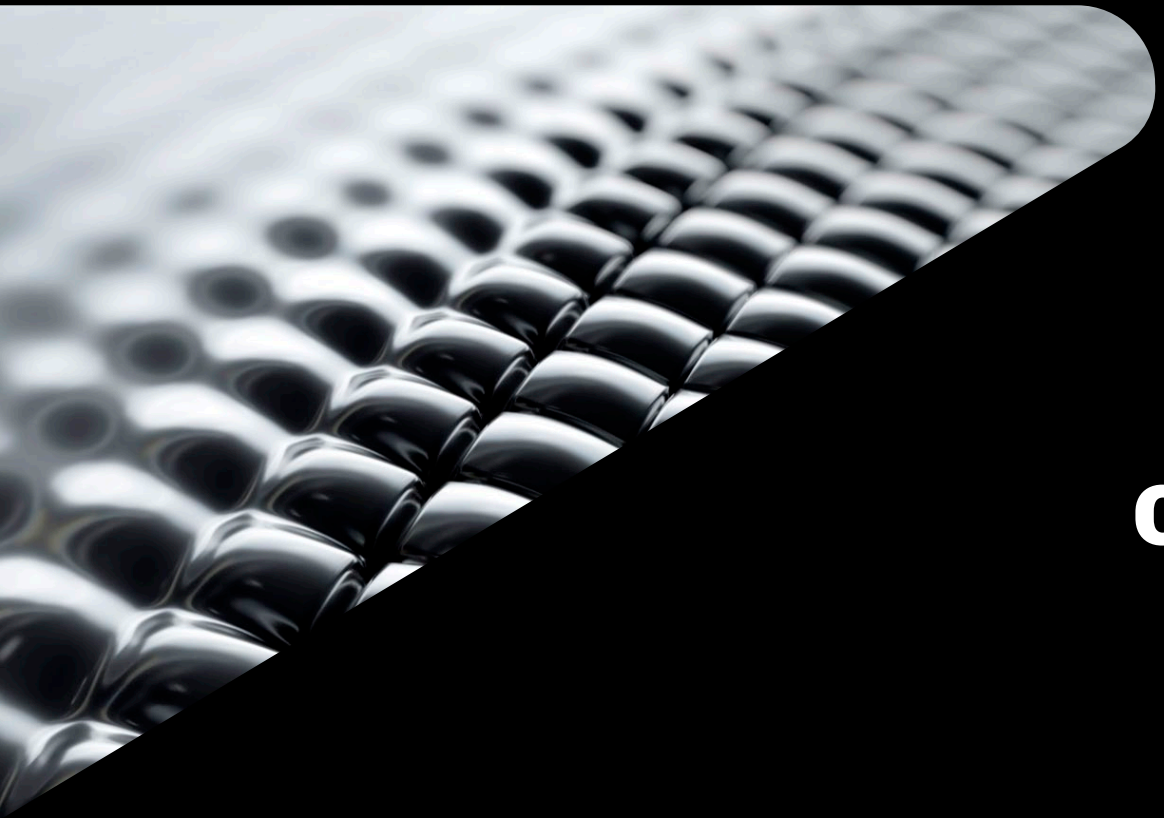
					
Haas ST30 2-Axis Lathe	Fanuc Robodrill 3-Axis	Doosan DEM 3-Axis	Haas UMC 5-Axis	Mazak Variaxis 5-Axis	Programming Office
		+ Machining Extension	+ Machining Extension	+ Machining Extension	+ Machining Extension
Fusion 360	Fusion 360	Fusion 360	Fusion 360	Fusion 360	Fusion 360



Cloud-based collaboration

Collaborative

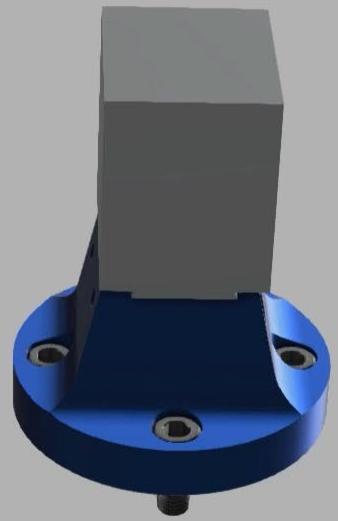
- Communicate faster
- With designers, engineers, and machine operators

RWP-001
Fusion 360 Design
Created On: Nov 10, 2020 1:02 PM

DMG Tech Marketing > ... > M-RS-1009 > RWP-001 Latest

Overview View

Open in Desktop



COMMENTS
2 comments in this version

Add a new comment

Version 2 (2 Comments)

2 KW Klaus Weiss
2:43 PM, Nov 10, 2020

Hi Rob,

Yes we have that fixture, how many do you need?

Klaus.

Reply

1 Robert Walker
2:26 PM, Nov 10, 2020

Hi Klaus,

Do you have this fixture available?

Cheers,

Rob.

Reply

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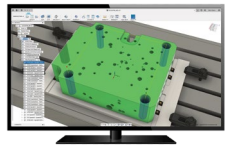
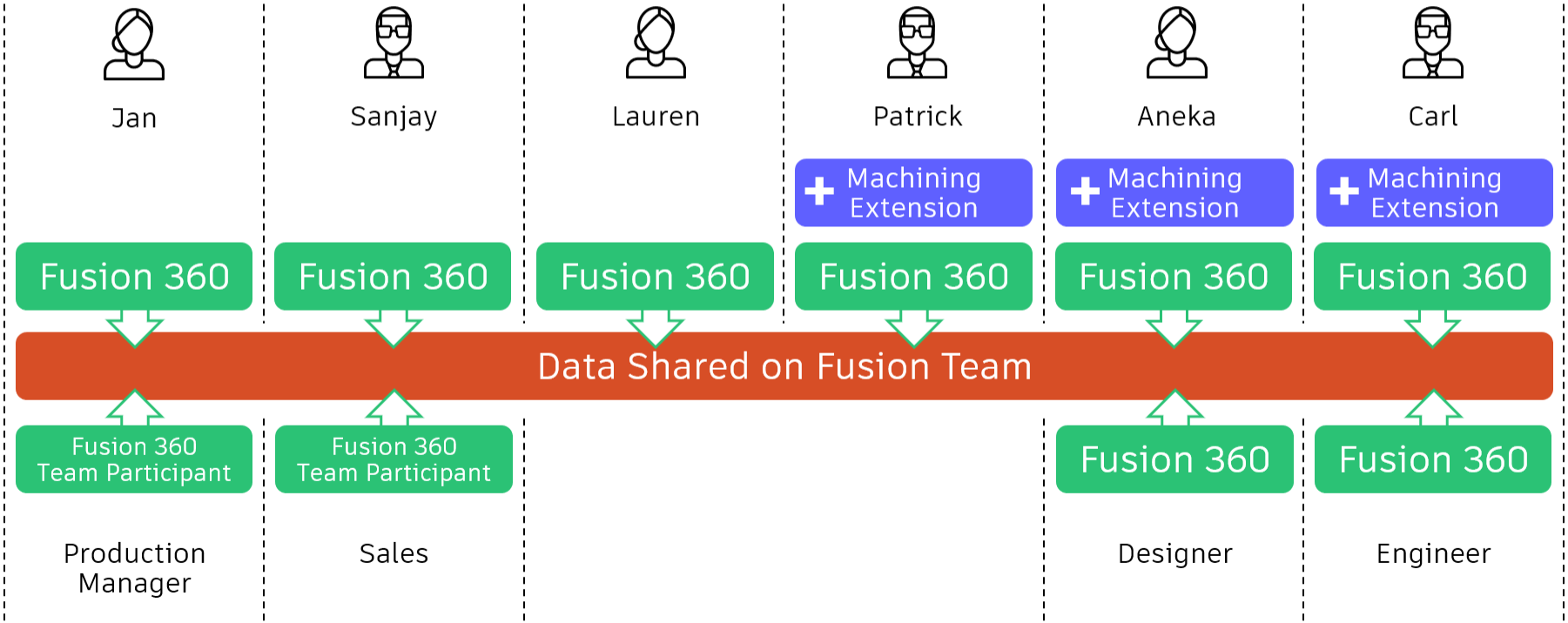
How might it work in a manufacturing department?

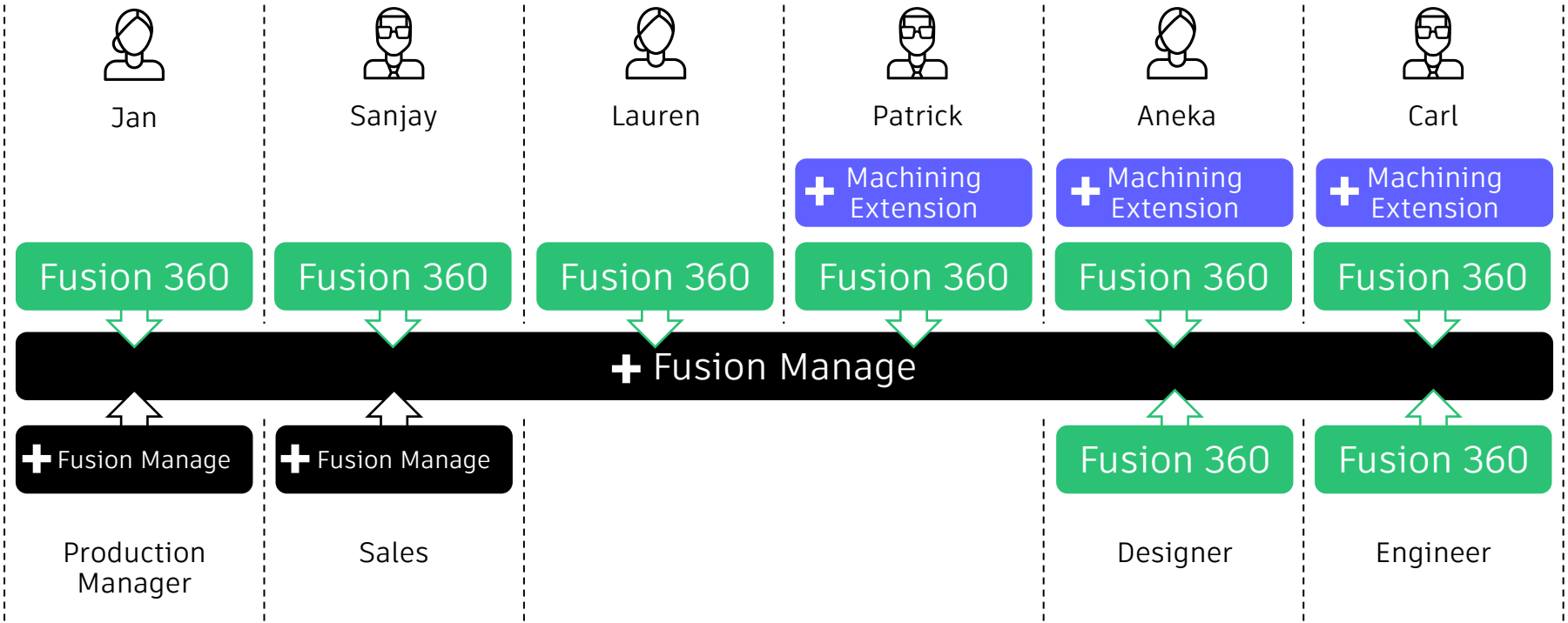
Jan	Sanjay	Lauren	Patrick	Aneka	Carl
					
Haas ST30 2-Axis Lathe	Fanuc Robodrill 3-Axis	Doosan DEM 3-Axis	Haas UMC 5-Axis	Mazak Variaxis 5-Axis	Programming Office
			+ Machining Extension	+ Machining Extension	+ Machining Extension
Fusion 360	Fusion 360	Fusion 360	Fusion 360	Fusion 360	Fusion 360

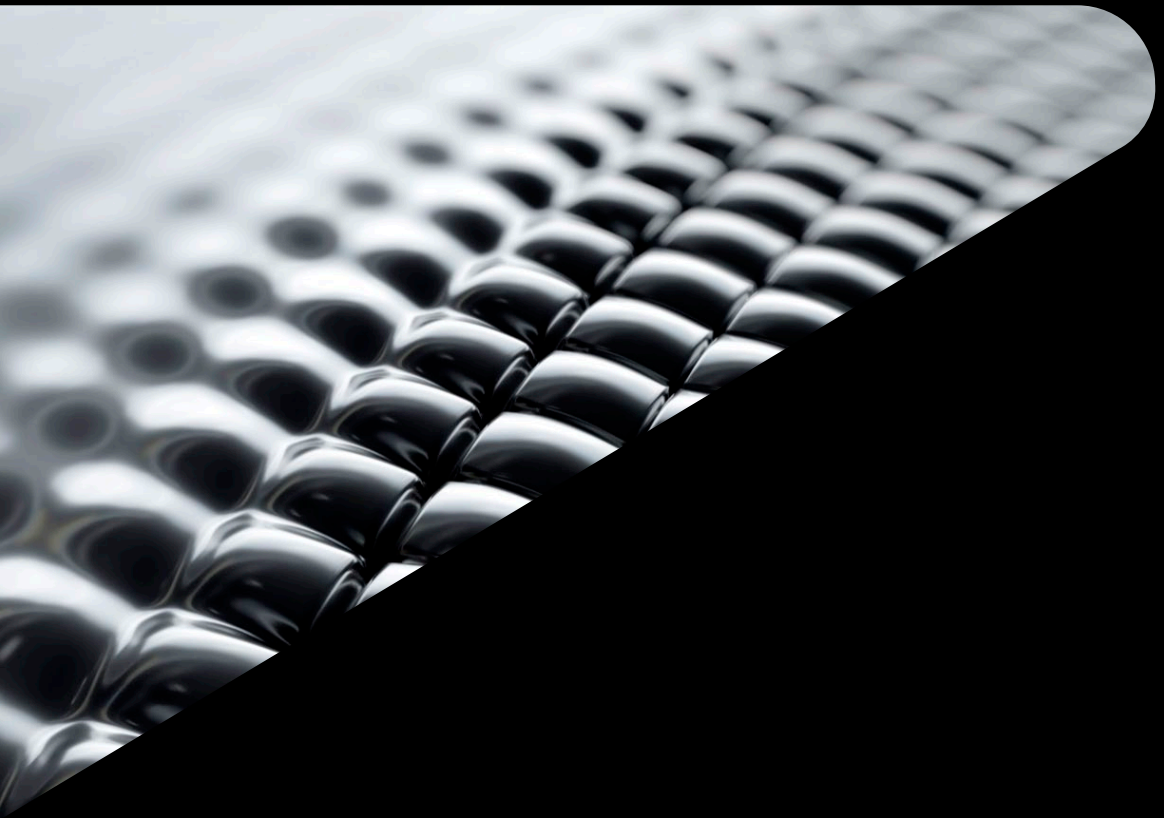
Data Shared on Fusion Team

How might it work in a manufacturing department?



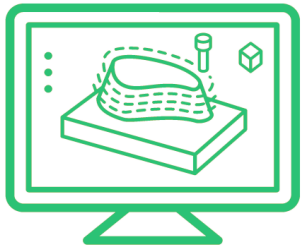
How might it work in a manufacturing department?



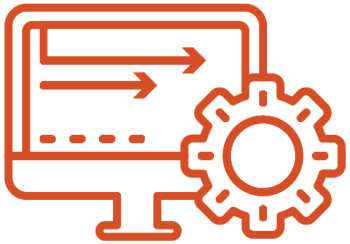


Summary

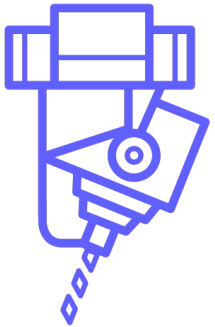
Challenges



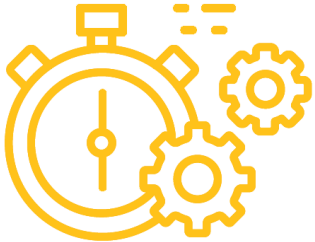
Design Changes



Need to Automate



Maximizing CNC Usage



Improve Quality

Fill Skills Gap

Business outcomes

- Improve collaboration
- Improve time to market
- Improve manufacturing throughput
- Reduce defects and non-conformities
- Reduce non-value added processes

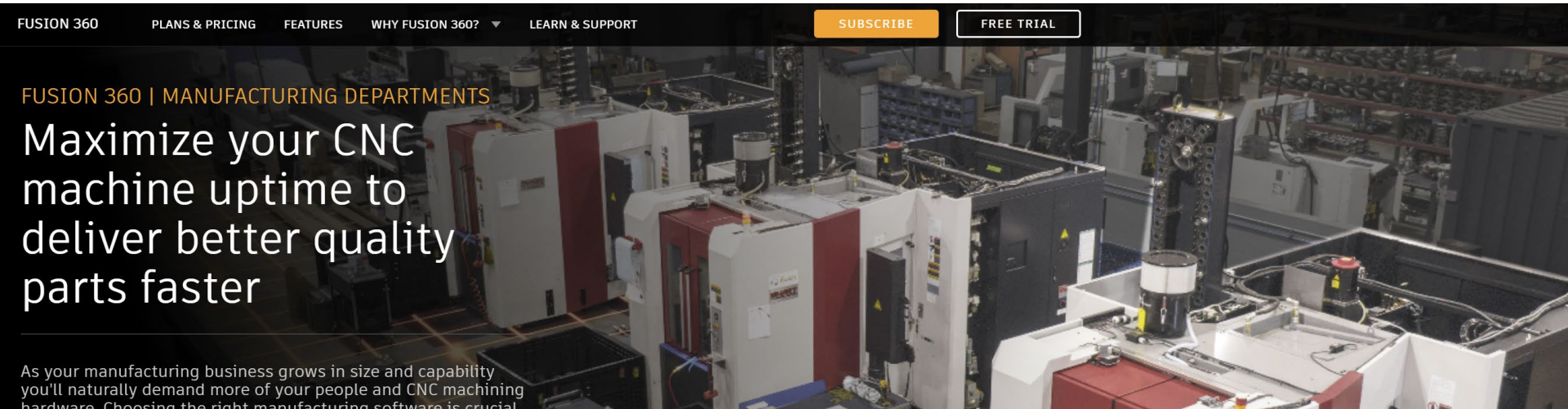
Increase size of wheel. Please design a new fender for the larger wheel
AUTODESK Fusion 360

Want to know more?

- Visit the dedicated Manufacturing Departments page:

  https://www.autodesk.com/fusion-360-manufacturing-departments

- See how Autodesk can help you Maximize your CNC machine uptime to deliver better quality parts faster



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