

Fusion 360 Machining Extension – Effizienzsteigerung im CAM Bereich

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Agenda

- 1 | Überblick
- 2 | Erste Schritte
- 3 | Adaptive Clearing + Bohrfräsen
- 4 | Steep and Shallow
- 5 | Werkzeugwege editieren
- 6 | Bohrungserkennung
- 7 | Werkstück vermessen

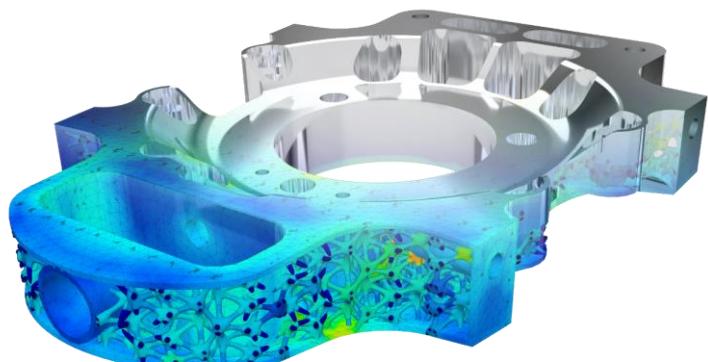
Überblick



Image courtesy of Briggs Automotive Company Ltd

Generativer Entwurf

Generatives Bauteil, optimiert für die CNC-Fertigung



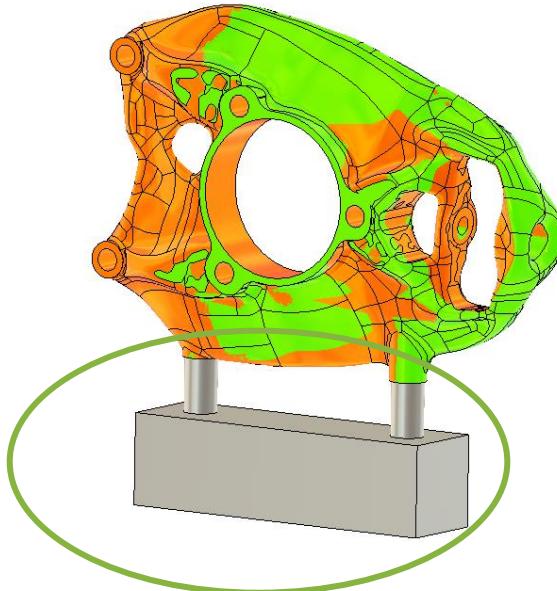
- Aluminium
- 1,69 kg
- 3-Achs Fräsbearbeitung

Erste Schritte

Erste Schritte

Vorbereitung des Rohteils und der Maschine

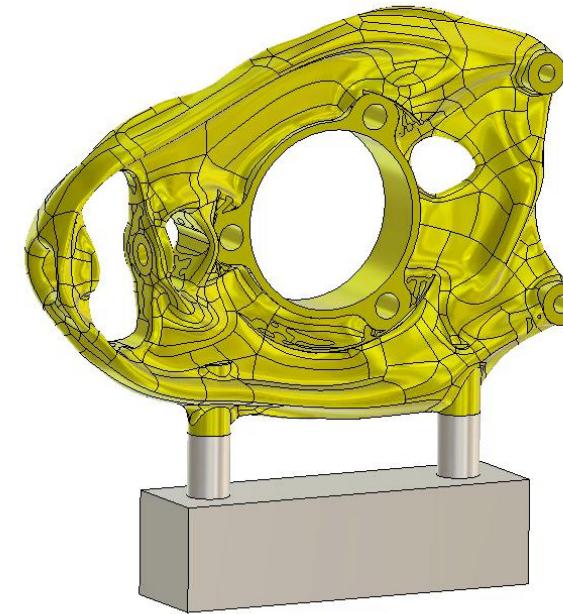
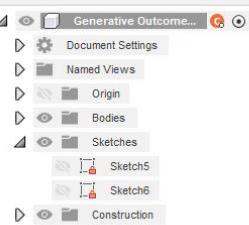
- Erstellung einer Einspannhilfe
- Bauteil prüfen auf Zugängigkeit des Werkzeugs
- Evaluierung des kleinsten Werkzeugdurchmessers
- Vorbereitung der Werkzeugbibliothek



Autodesk Fusion 360 interface showing a 3D model of a mechanical part in yellow wireframe mode. The model is a complex assembly with a central hole and various features. The interface includes a top menu bar with tabs for Assembly for Machining v7*, Generative Outcome for 3-Axis milling v4 v5, and Generative Outcome for 3-Axis milling v4 (1) v2*. The main toolbar has sections for DESIGN, CREATE, MODIFY, ASSEMBLE, CONSTRUCT, INSPECT, and SELECT. The BROWSER panel on the left lists the document structure: Generative Outcome..., Document Settings, Named Views, Origin, Bodies, Sketches (Sketch5, Sketch6), and Construction. A 3D view on the right shows the part with a coordinate system (X, Y, Z). The bottom toolbar includes a comments section and various tool icons. The taskbar at the bottom shows the Windows Start button, task icons for various applications, and the system clock indicating 12:06 on 25.04.2021.

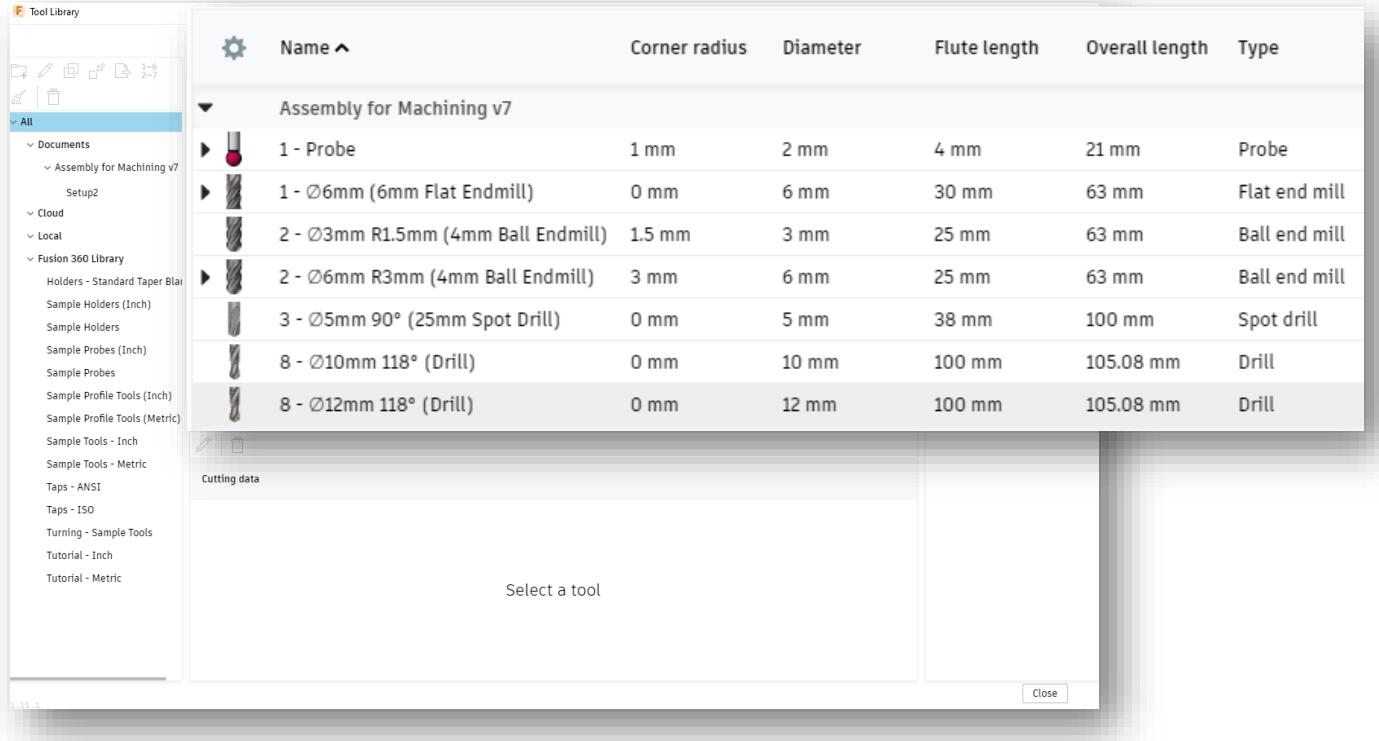


BROWSER



Werkzeugbibliothek

Anlegen der notwendigen Werkzeuge



The screenshot shows the 'Tool Library' dialog box in Fusion 360. The left sidebar lists categories like 'All', 'Documents', 'Setup2', 'Cloud', 'Local', and 'Fusion 360 Library'. The 'Fusion 360 Library' section is expanded, showing 'Holders - Standard Taper Bla', 'Sample Holders (Inch)', 'Sample Holders', 'Sample Probes (Inch)', 'Sample Probes', 'Sample Profile Tools (Inch)', 'Sample Profile Tools (Metric)', 'Sample Tools - Inch', 'Sample Tools - Metric', 'Taps - ANSI', 'Taps - ISO', 'Turning - Sample Tools', 'Tutorial - Inch', and 'Tutorial - Metric'. The main table lists the following tools for 'Assembly for Machining v7':

	Name	Corner radius	Diameter	Flute length	Overall length	Type
▶	1 - Probe	1 mm	2 mm	4 mm	21 mm	Probe
▶	1 - Ø6mm (6mm Flat Endmill)	0 mm	6 mm	30 mm	63 mm	Flat end mill
▶	2 - Ø3mm R1.5mm (4mm Ball Endmill)	1.5 mm	3 mm	25 mm	63 mm	Ball end mill
▶	2 - Ø6mm R3mm (4mm Ball Endmill)	3 mm	6 mm	25 mm	63 mm	Ball end mill
▶	3 - Ø5mm 90° (25mm Spot Drill)	0 mm	5 mm	38 mm	100 mm	Spot drill
▶	8 - Ø10mm 118° (Drill)	0 mm	10 mm	100 mm	105.08 mm	Drill
▶	8 - Ø12mm 118° (Drill)	0 mm	12 mm	100 mm	105.08 mm	Drill

Below the table, a 'Cutting data' section is visible with a note 'Select a tool'. A 'Close' button is at the bottom right.

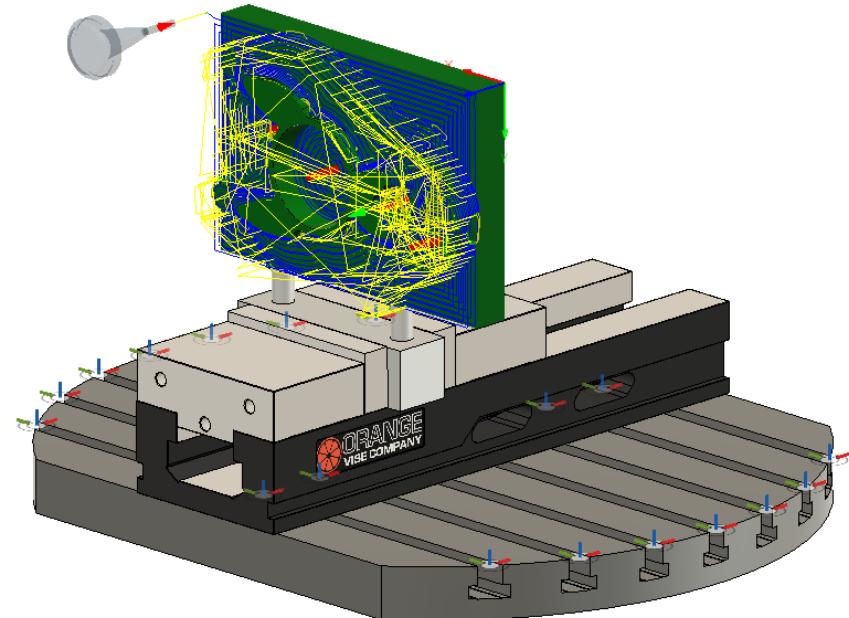


**Adaptive Clearing +
Bohrfräsen**

Adaptive Clearing

Trochoidales Fräsen für die erste Schrubbearbeitung

- Schnelles Abtragen großer Mengen an Material
- Konstante Schnittkräfte erhöhen die Standzeit
- Geringer Kühlungsbedarf – Wärmeabfuhr über die Späne
- Höchstes Potenzial bei besonders harten Materialen

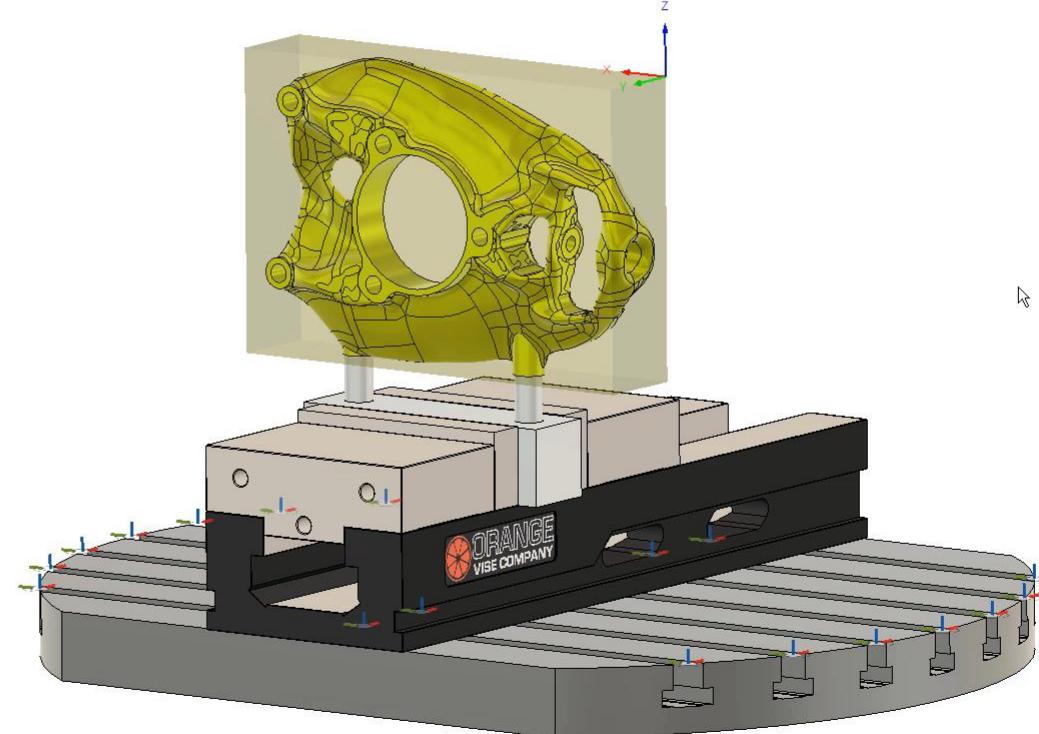




BROWSER

- Assembly for Machining 2 v0
 - Units: mm
 - Named Views
 - Analysis
 - Models
 - Setups
 - Setup2

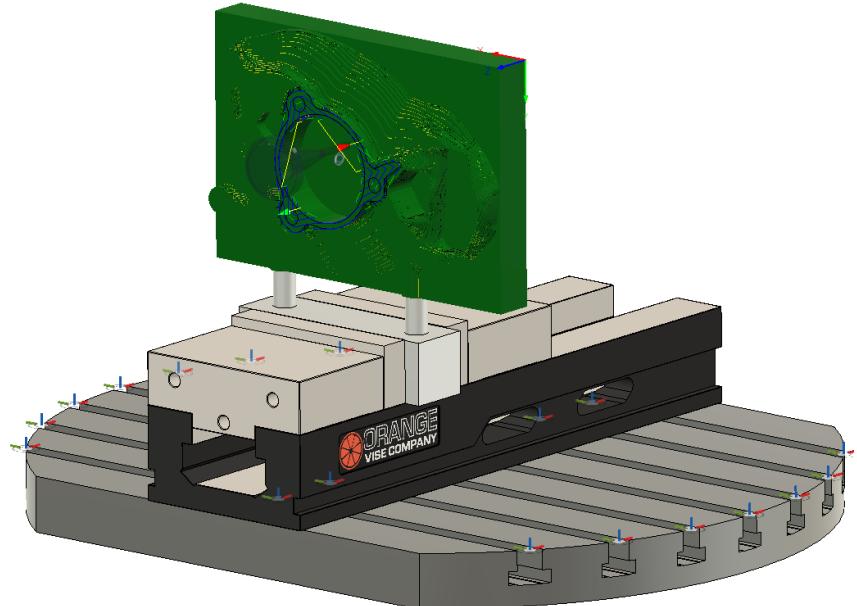
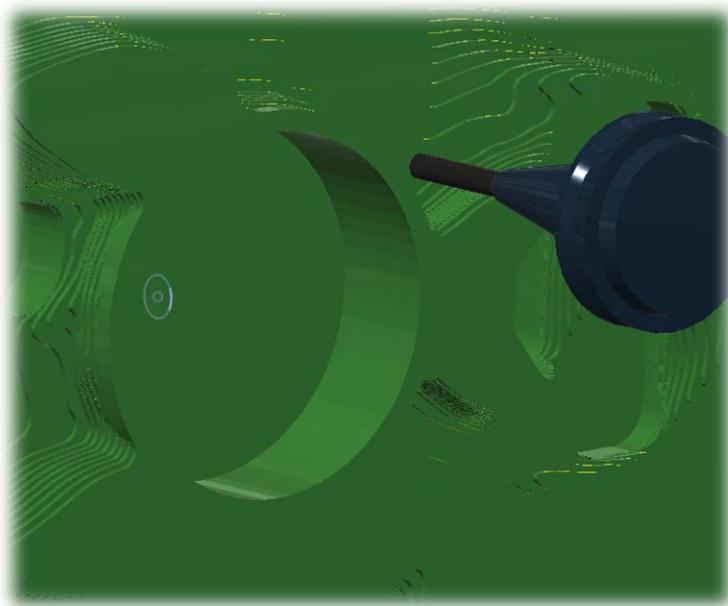
BACK LEFT Z



2D-Tasche

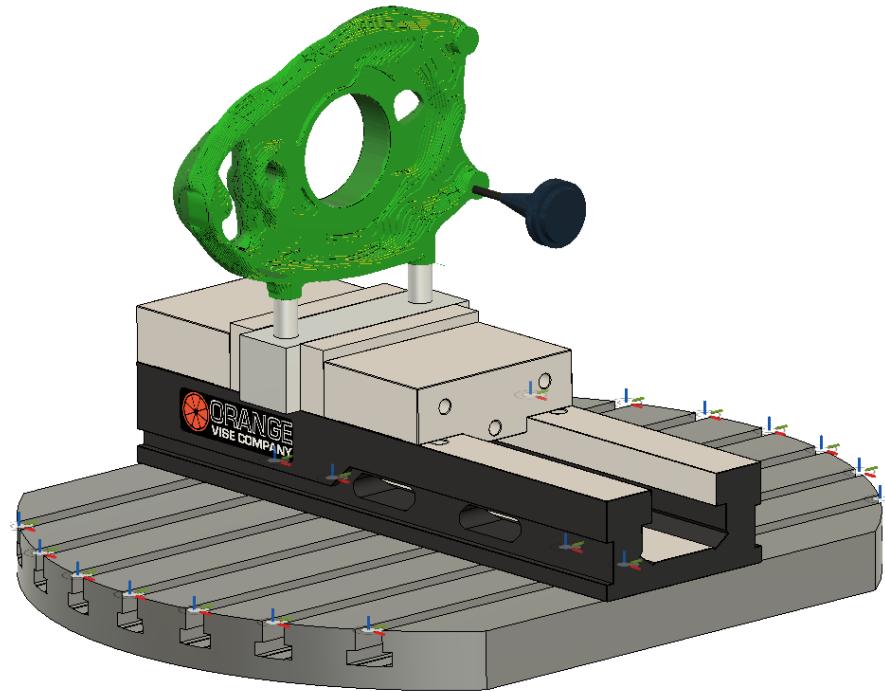
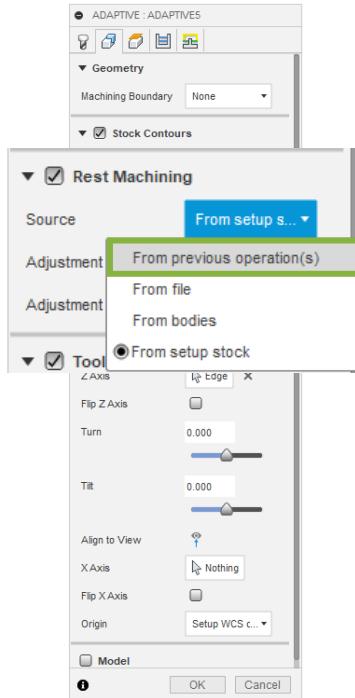
Taschenzyklus zur einfach Endbearbeitung

- Einsatz eines Schaftfräser für die entsprechende Oberflächengüte



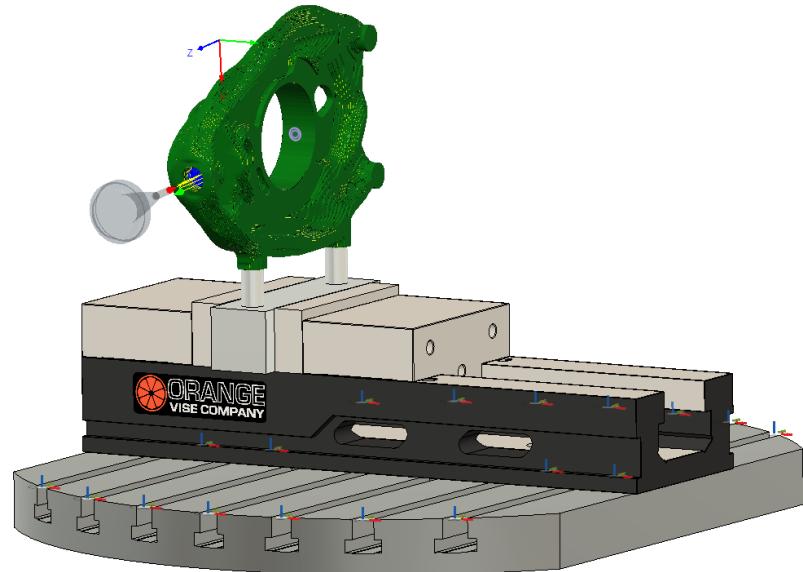
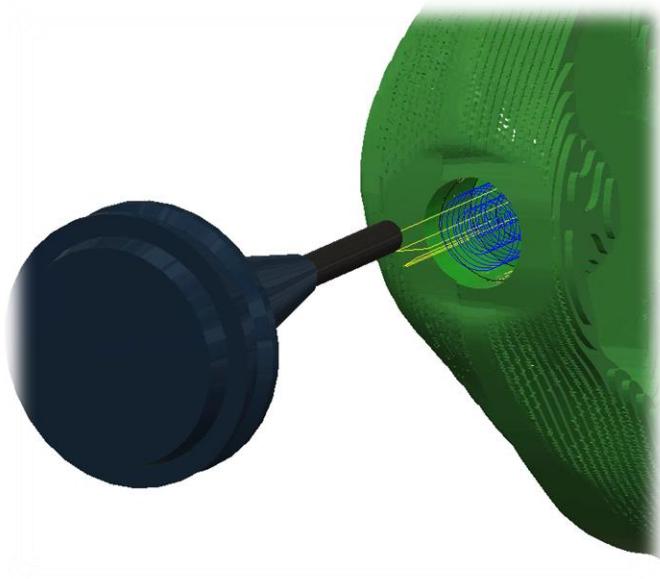
Wiederholung auf der Rückseite

Adaptive Clearing mit Restmaterialbearbeitung für die Rückseite



Bohrfräsen

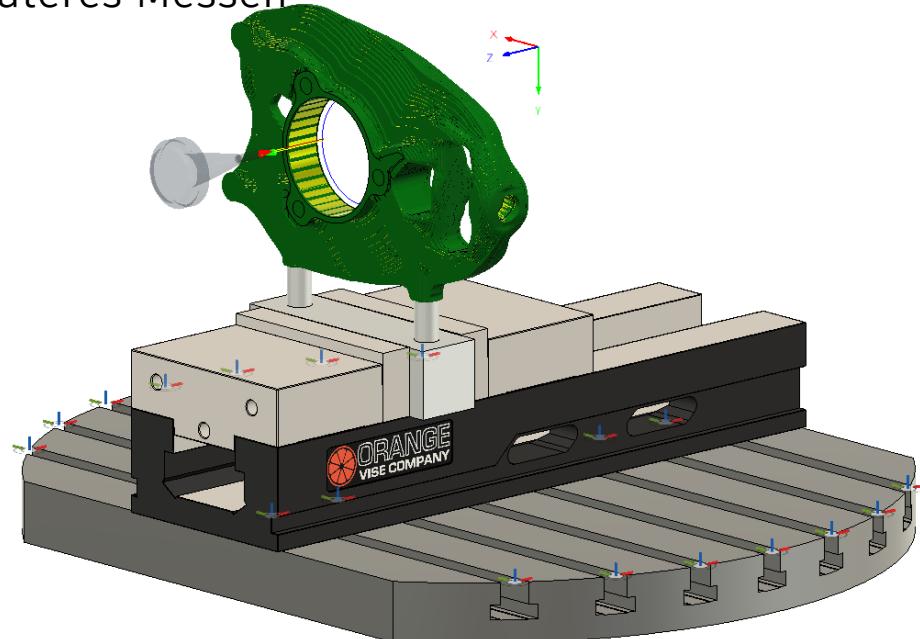
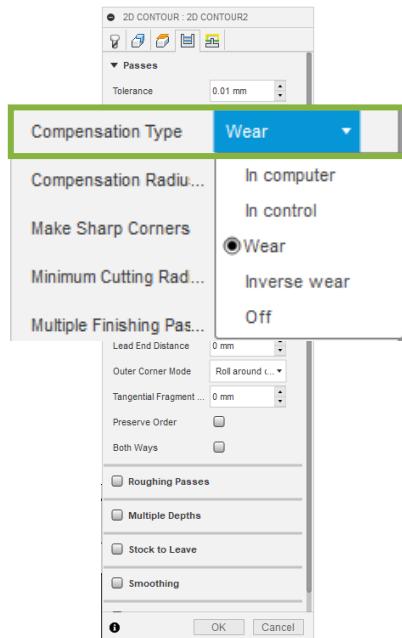
Automatisierter Zyklus für zylindrische Bohrungen



2D-Kontur

Schlichtzyklus und Vorbereitung für späteres Messen

- Kompensationstyp-> “Verschleiß” für späteres Messen



Steep and Shallow

Steep and Shallow

Bessere Oberflächengüte durch Kombination zweier Algorithmen

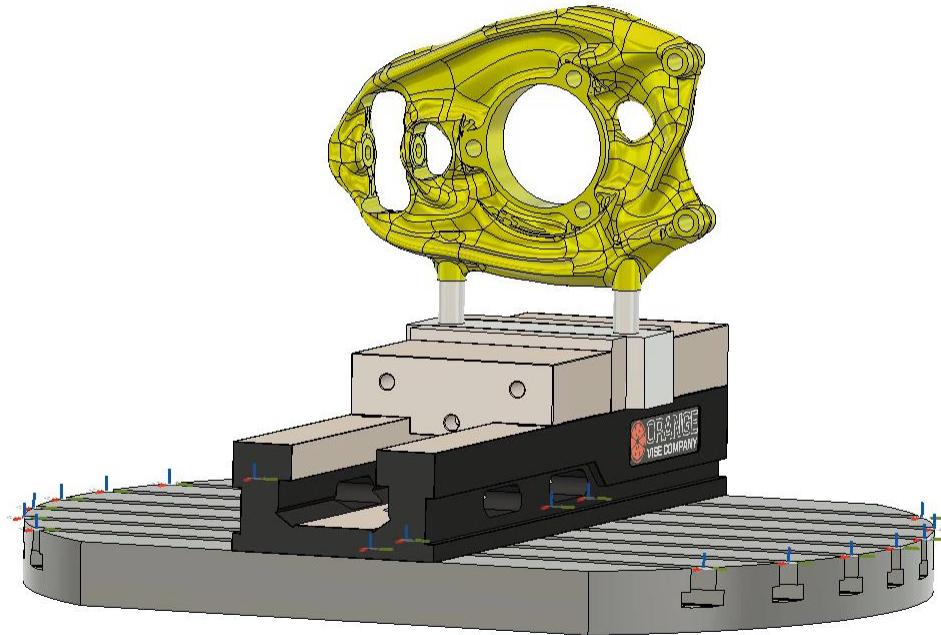




BROWSER

Assembly for Machining 2 v2

- Units: mm
- Named Views
- Analysis
- Models
- Setups
- Setup2
 - [T1 (0:14:34)] Adaptive5 (8...)
 - [T1 (0:20:02)] Adaptive5 (2...)
 - [T1 (0:00:34)] Bore3 (6mm l...
 - [T1 (0:00:09)] 2D Contour2 ...



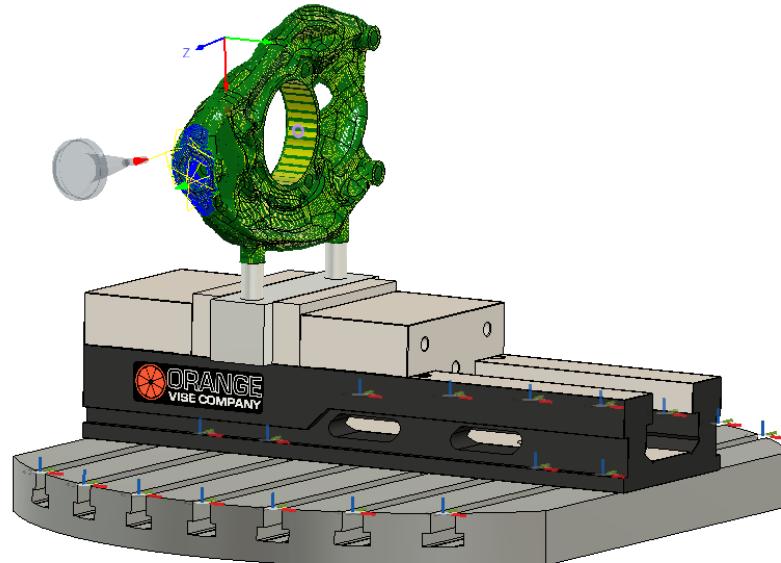
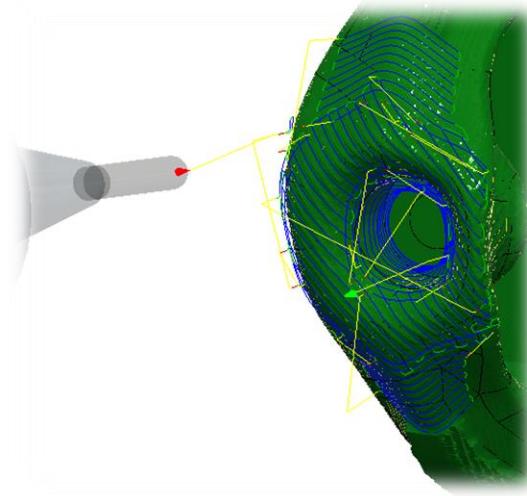


**Werkzeugwege
editieren**

Werkzeugwege editieren

Manuelles Editieren, Stutzen oder Löschen der Werkzeugwege

- Werkzeugwege an speziellen Geometrien aussetzen
- Verfahrwege ohne Materialabtrag stutzen



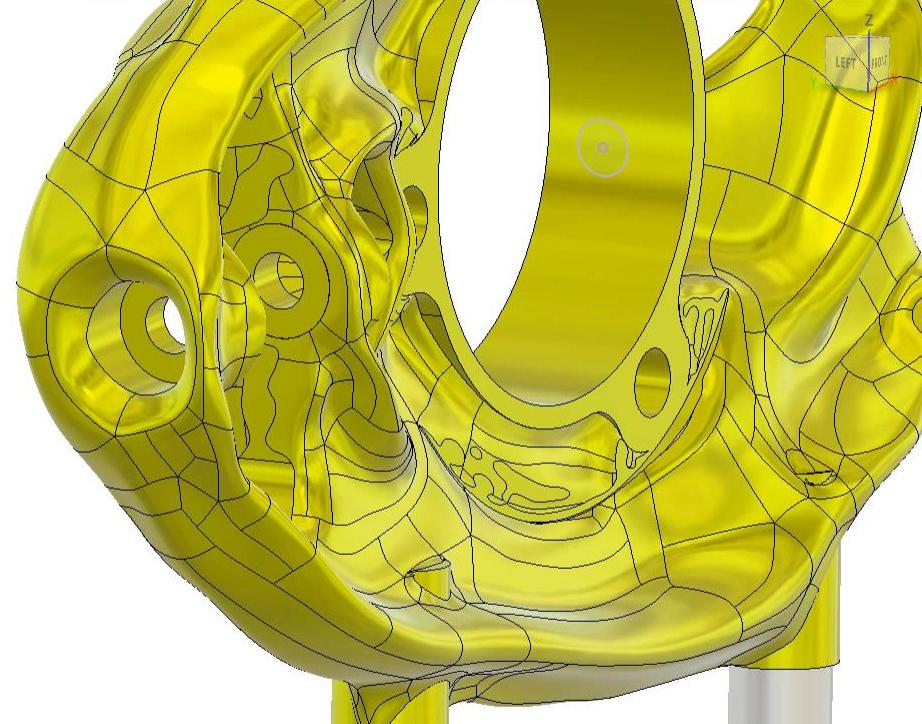
Autodesk Fusion 360 Assembly for Machining 2 v3* Assembly for Machining v9

MILLING TURNING ADDITIVE INSPECTION FABRICATION UTILITIES

MANUFACTURE SETUP 2D 3D DRILLING MULTI-AXIS DED MODIFY ACTIONS MANAGE INSPECT SELECT

BROWSER Assembly for Machining 2 v3

- Units: mm
- Named Views
- Analysis
- Models
- Setups
- Setup2
 - [T1 (0:14:34)] Adaptive5 (6...)
 - [T1 (0:20:02)] Adaptive5 (2...)
 - [T1 (0:00:34)] Bore3 (6mm ...)
 - [T1 (0:00:09)] 2D Contour2 ...
 - [T2 (0:24:07)] Steep and Sh...
 - [T2 (0:19:51)] Steep and Sh...
 - [T2 (0:01:28)] Steep and Sh...



COMMENTS

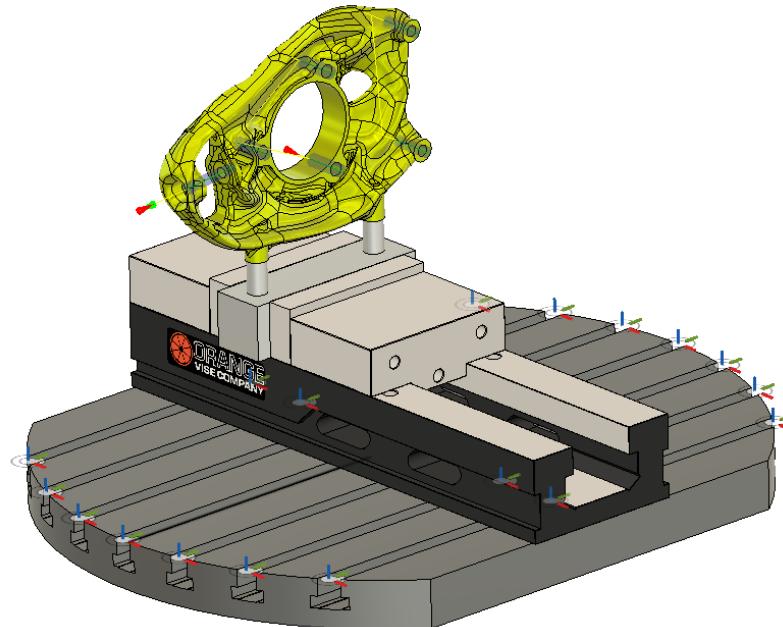
15:18 27.04.2021

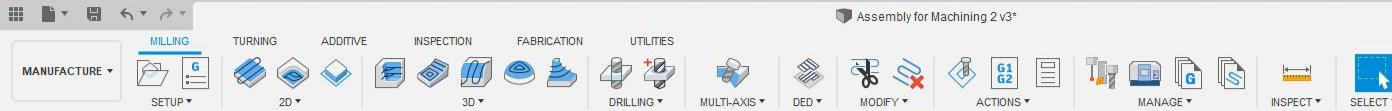
Bohrungserkennung

Bohrungserkennung

Automatisierte Prozesse zum Erstellen eines Bohrzyklus

- Automatische Erkennung von Bohrungen im Bauteil
- Automatische Erstellung der notwendigen Zyklen
- Manuelle Anpassung jederzeit möglich



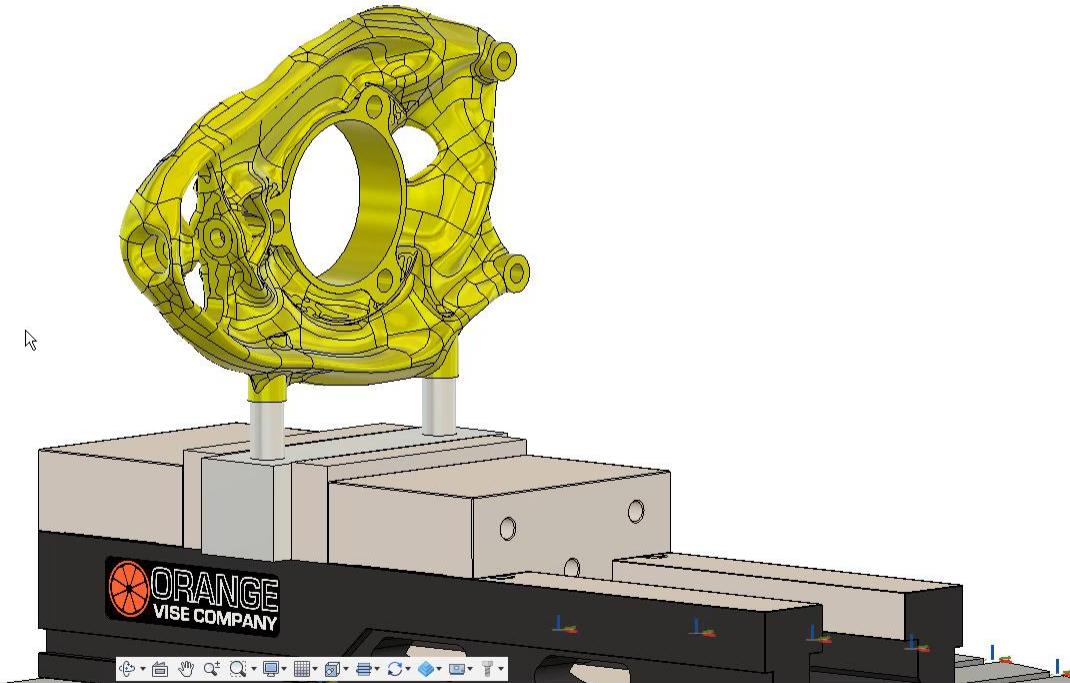


BROWSER

Assembly for Machining 2 v3

- Units: mm
- Named Views
- Analysis
- Models
- Setups

- Setup2
 - [T1 (0:14:33)] Adaptive5 (6...)
 - [T1 (0:20:01)] Adaptive5 (2...)
 - [T1 (0:00:34)] Bore3 (6mm l...)
 - [T1 (0:00:09)] 2D Contour2 ...
 - [T2 (0:24:06)] Steep and Sh...
 - [T2 (0:19:51)] Steep and Sh...
 - [T2 (0:01:28)] Steep a ...



COMMENTS

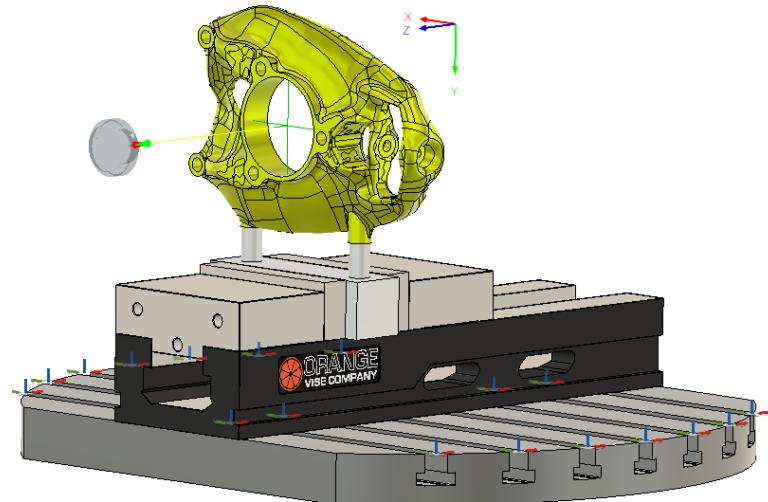


Werkstück vermessen

Werkstück ver messen

Toleranzabgleich und Werkzeuganpassung

- Prüfung auf Einhaltung der Toleranzen
- Verschleißanalyse und Kompensation
- Prüfen von Geometrien und Oberflächen direkt auf der Maschine möglich



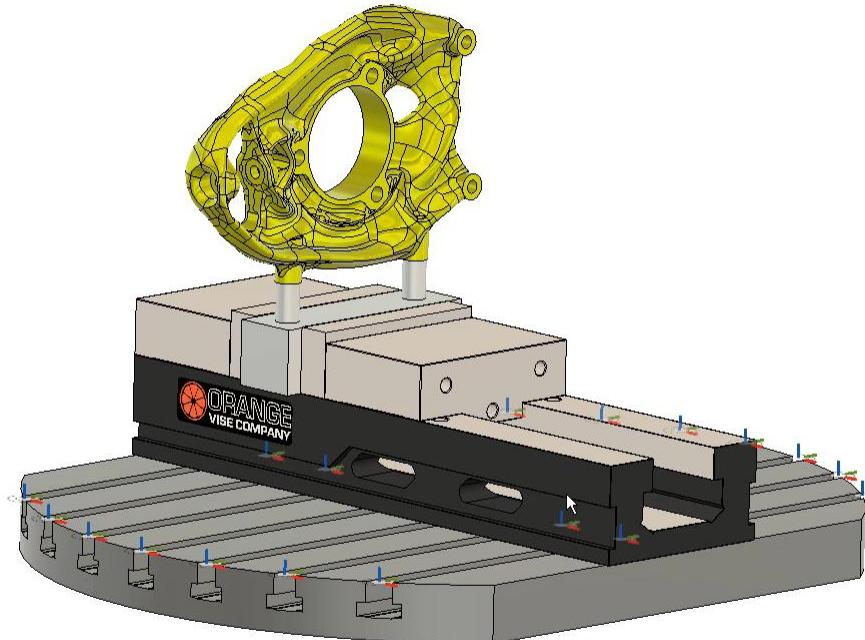
BROWSER

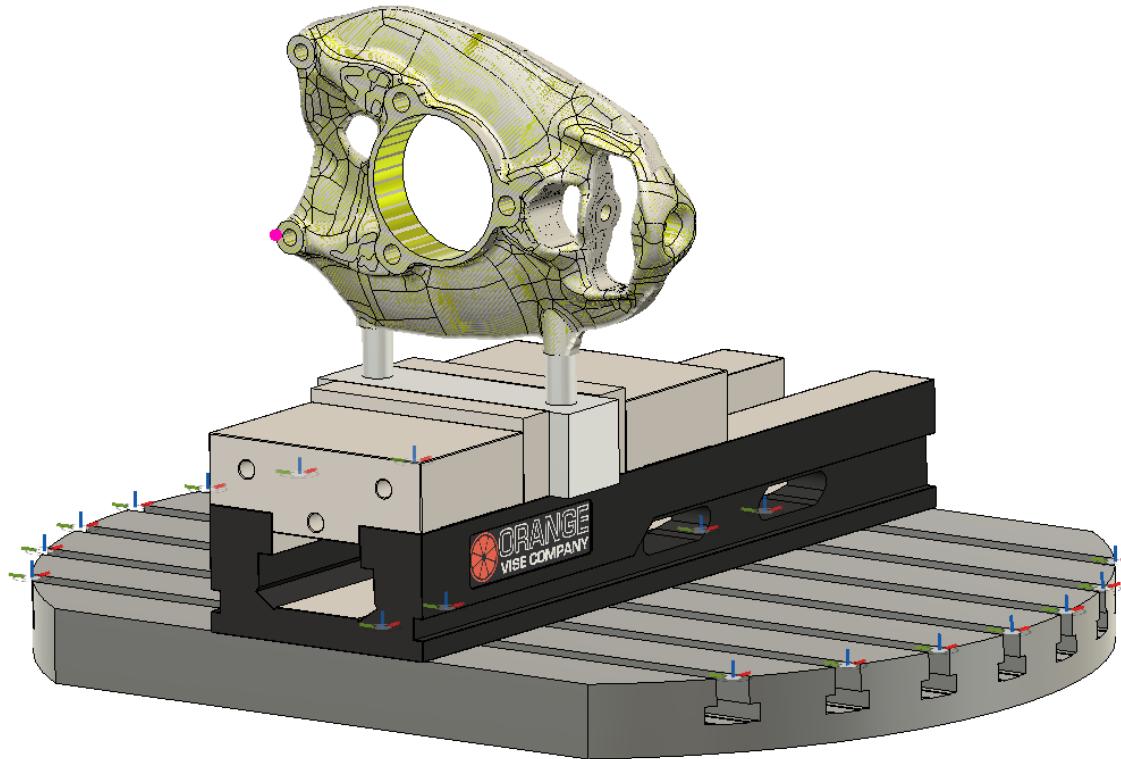
- Assembly for Machining 2 v3

- ▶  Units: mm
 - ▶  Named Views
 - ▶  Analysis
 - ▶  Models
 - ▶  Setups

- ▷  [T1 (0:14:33)] Adaptive5 (6i...
▷  [T1 (0:20:01)] Adaptive5 (2...
▷  [T1 (0:00:34)] Bore3 (6mm I...
▷  [T1 (0:00:09)] 2D Contour 2...
▷  [T2 (0:24:06)] Steep and St...
▷  [T2 (0:19:51)] Steep and St...
▷  [T2 (0:01:28)] Steep a...

- ▷  Hole Recognition6
 - ▷  [Rapid out] [T7: 00:01...]
 - ▷  [Chip breaking] [T8: 0:01...]
 - ▷  [Rapid out] [T6: 00:00...]
 - ▷  [Rapid out] [T6: 00:01...]
 - ▷  [Chip breaking] [T8: 0:01...]
 - ▷  [Rapid out] [T8: 00:01...]





Finally Done!

Zielgruppe

Zielgruppe

Wer profitiert von der Machining Extension?

- **Anwender A** möchte automatisierte CAM Prozesse nutzen
- **Anwender B** benötigt einzelne Funktionen unserer HighEnd CAM Lösungen
- **Anwender C** möchte eine lückenlose CAD/CAM Lösung verwenden

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