

# OPUS Entwicklungs und Vertriebs GmbH

## Wilhelm-Raabe Strasse 4

### 73230 Kirchheim/Teck

*Clever bits working for you!*



CO & CEO Ralf Weissinger, Roland Aukschat

Since 1980

Customers 800, Workstations 3000

Employees 20

Development in Germany

Sales and Support for Southern Germany

Further Sales through System Centers (independent companies)

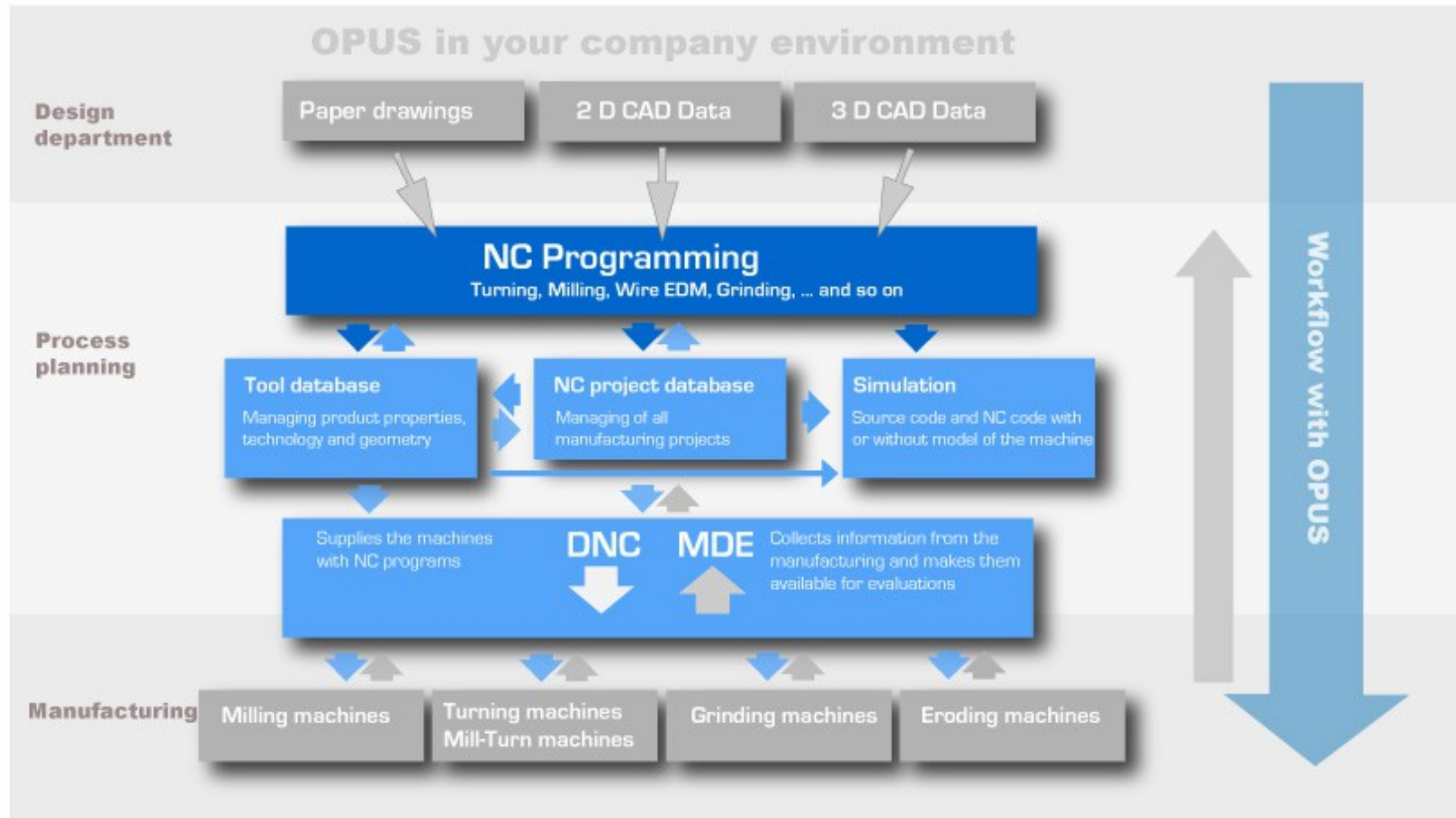
References

- BOSCH (Turning, Milling, Prototype to large amounts)
- LUK (Turning, Milling, Series)
- MAPAL (Turning, Milling, Eroding, Small Series)
- FLENDER (Turning, Milling, Small Series)
- VOITH Paper (Turning, Milling, Items=1)

# OPUS Professional CAM

## Workflow

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## History

- 1980 Contour calculation and tool radius compensation with programmable calculators.
- 1982 available to first PC  
Contour calculation tool radius compensation, program administration simulation
- 1984 Sirius Victor with 8080 Processor and 6 MHZ
- 1986 DNC im Hintergrund  
Wang PC with 80186 Processor  
IBM PC with 80286
- 1993 one of the first technical applications on Windows (2.11)



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# How do you find a fitting CAD/CAM System?

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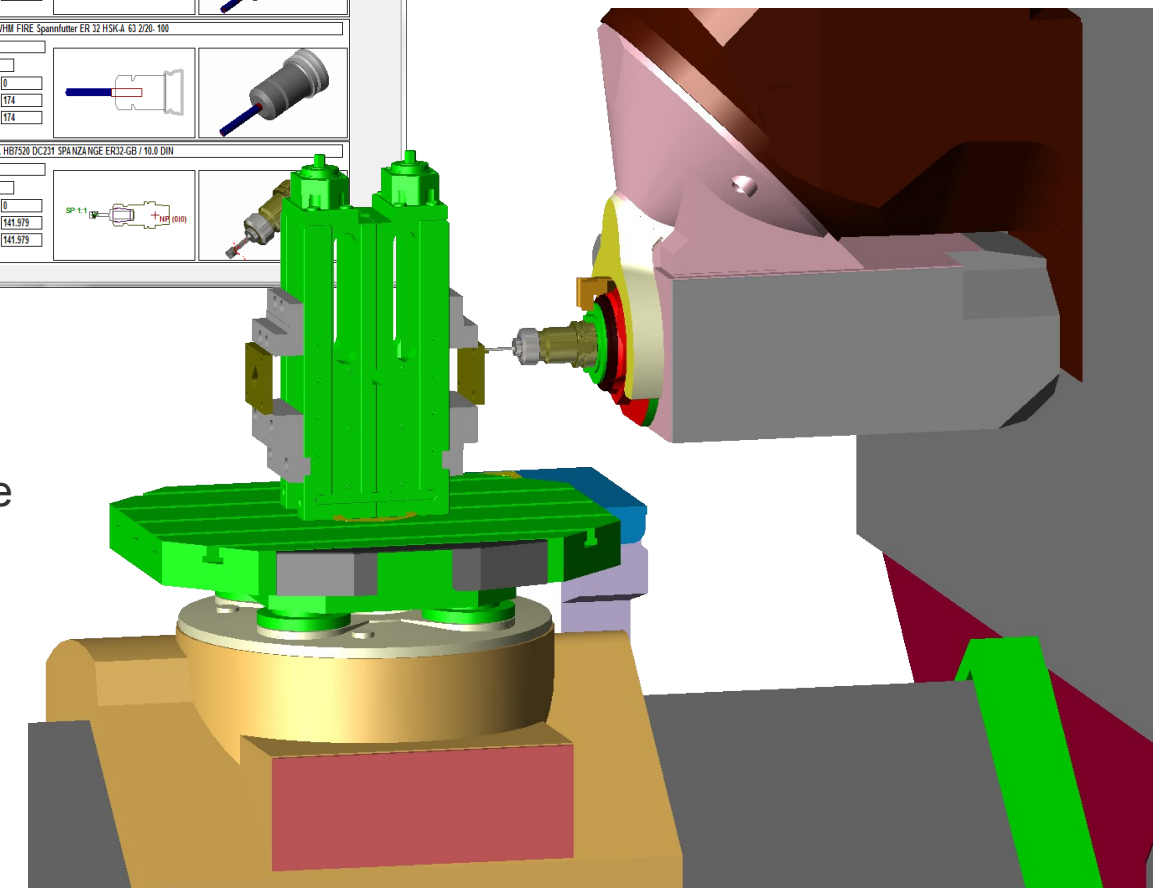
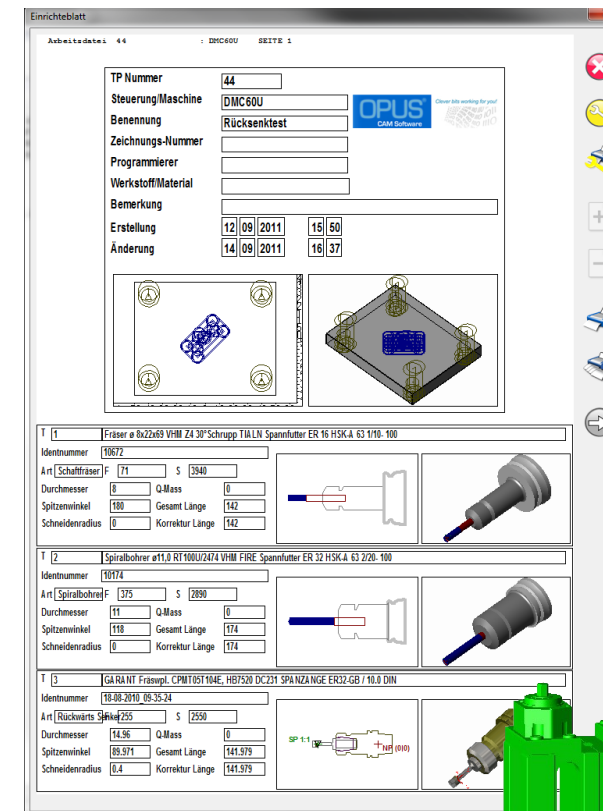


## How do you go about this?

- Define and analyze the requirements of the parts you produce, most accurate and precise as possible. In terms of arrangements and numbers.
- Each production has its own specific characteristics, depending on the Product Composition (Standard or Special Processing) and the average Lot size.

## Where to pay particular attention to?

- The data from your existing Design and CAD environment, as an input transducer (2D and 3D Data) should be comfortably fully integrated into the programming systems interface for a perfect CAM workflow.
- You should be able to intergrate as much old Data as possible, comfortably, via interface. Not all Systems are really "open" like this. With extensive data acquisition, you save a lot of programming time.
- A CAM system must master all common operations with powerful processing modules. From a simple turning procedure, to a modern N – Axis Turning/Milling procedure.
- The ability to adapt and modify the software must be given. Otherwise you run the risk having to adjust your production to the CAM system, that is not the point of a CAM system. The CAM system must be able to be adapted flexibly to your optimized production processes. Ideally, a system can be trimmed flexibly, to very specific requirements.



# How do you find a fitting CAD/CAM System?

## NC Program Management

- Here fast and easy access is important. The opportunity should also be given to find similar or even identical operations quickly, to then be able to take these over into the NC Machining Program.

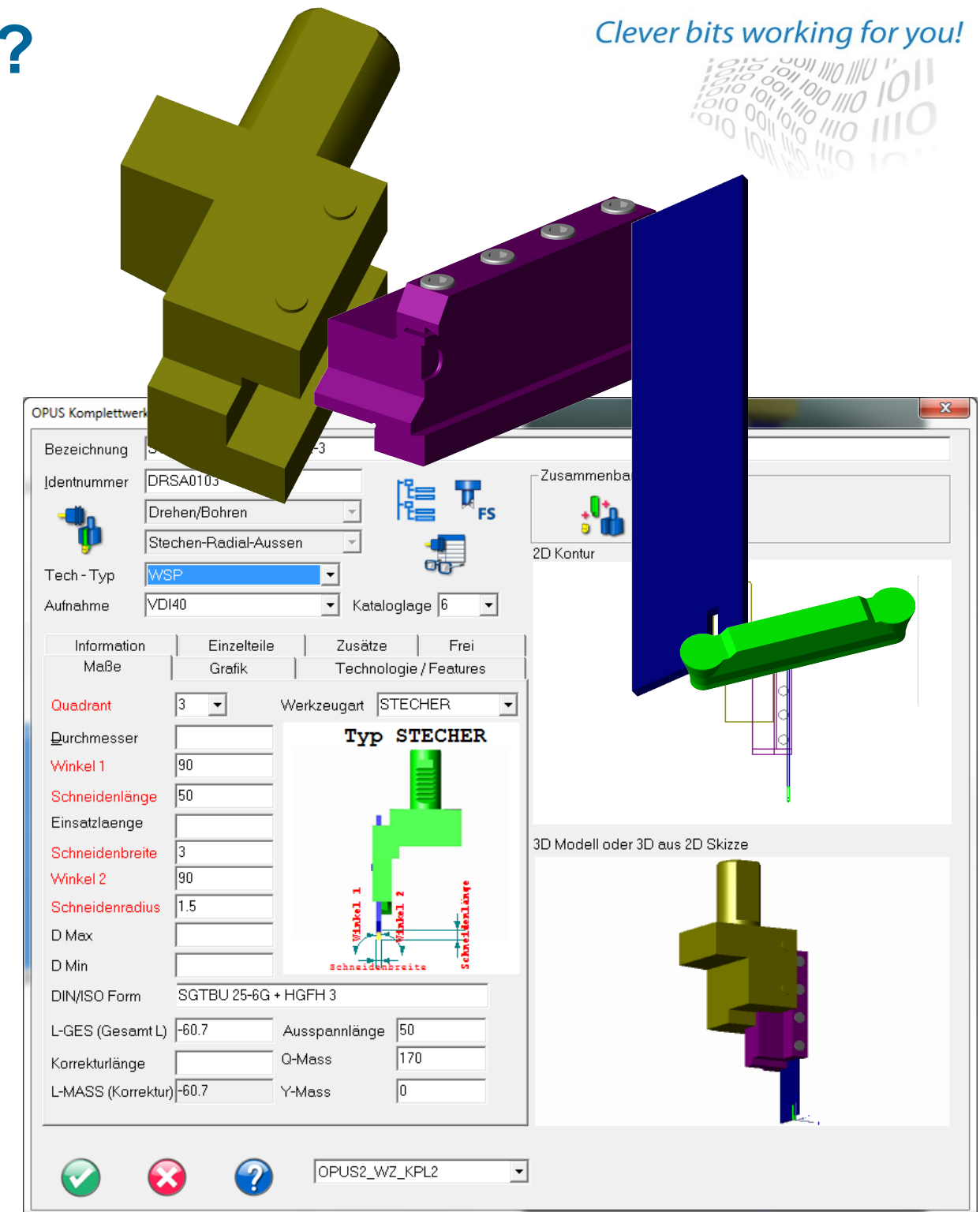
## Smart Tool Management will save you money

- An efficient management of your tools will tell you, what tools are being used where they are being used, or if they are free and can be used for processing. Thus, a very productive scheduling of the pending jobs is possible.
- Technology and Cutting Data must be completely stored in a Tool Database. You will save a lot of time Programming because the data is filled in automatically.
- Your expensive CNC machinery will set the tone.

## Interface to the Machine (Postprocessor)

- The output, to the manufacturing centers in the workshop, is crucial. If it comes to "communication problems", it is possible that there is no productivity increases.
- You must able to communicate with all CNC Machines in your production, with powerful Postprocessors, no exceptions.

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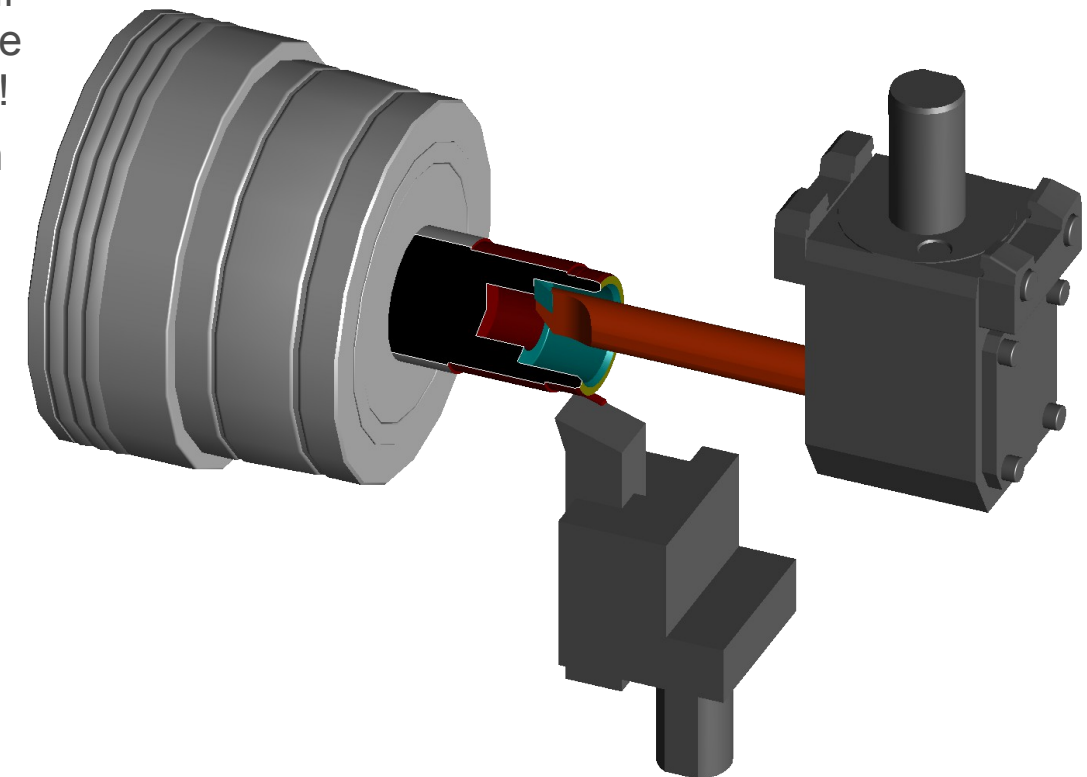
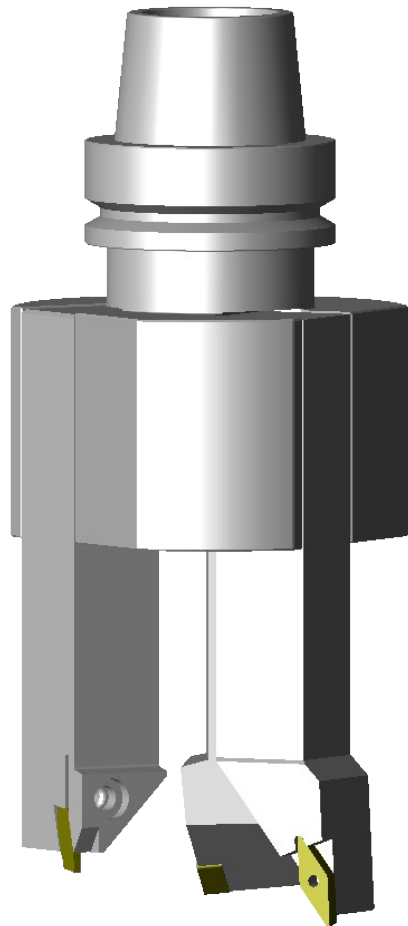
# How do you find a fitting CAD/CAM System?

## *Simulation Possibilities "in real life"*

- Simulate the process at your desk and then make changes to optimize it if needed. If you recognize an error at your desk, it will not cost you much, on the other hand, an error on the expensive CNC machines, might turn into a fiasco!
- A modern CAM System needs to master all steps if a Simulation. From an easy Simulation Source to a full NC-Simulation with a Machine Model. Costly error processing can be avoided to almost 100%.

## *Further Points*

- Continuity of the program across all modules of the CAM system.
- Usability! Easy to understand programming icons, continuous information about the next step, intuitive Program Surface, important information just a click away,.....
- The system has to be build up scalably. To take everything into operation at once isn't possible. A gradual introduction of the system must be implemented.



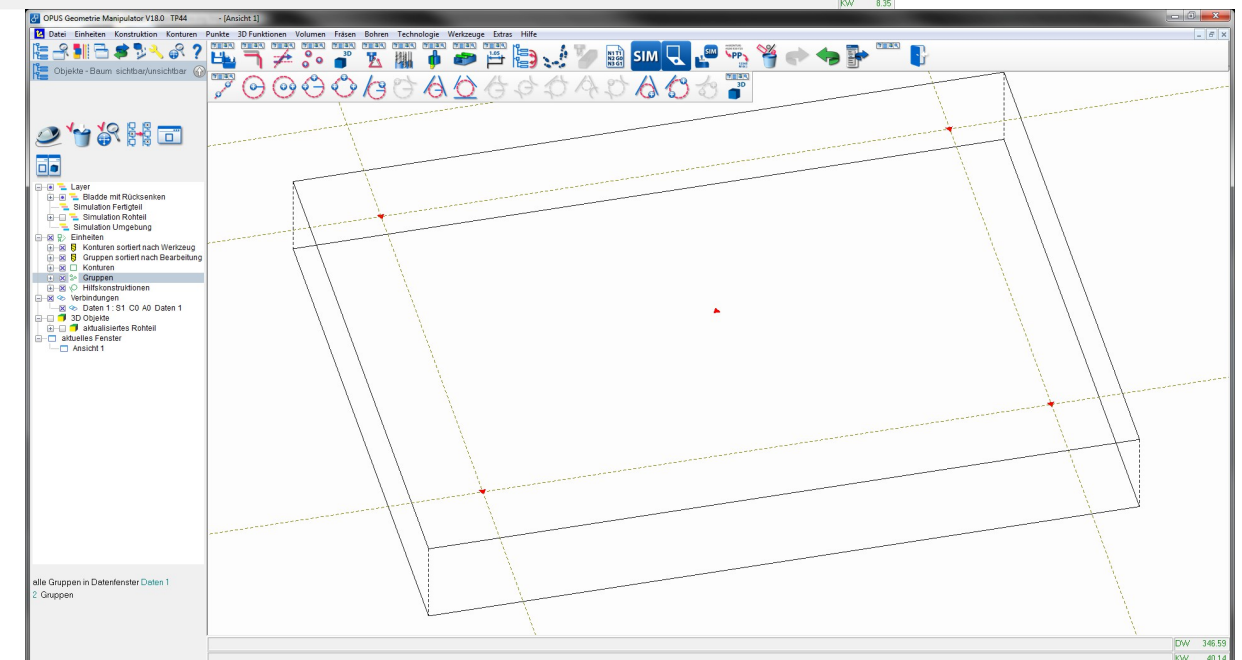
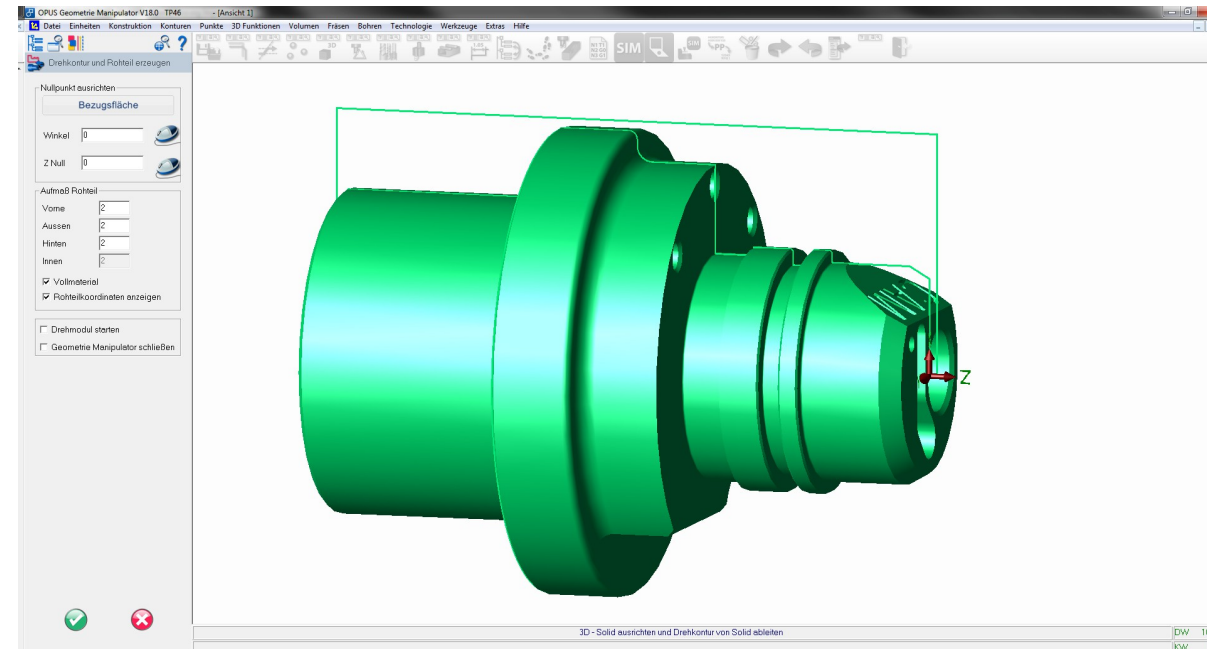
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# OPUS Workflow

- **CAD Import / Construction**
- Clamping Situation
- Process Definition
- Source Simulation
- Postprocessor
- Work papers (Electric or Paper)
- Simulation of the finished NC Program
- Sharing with Machine (DNC)
- Send the optimized program back
- Compare with Original

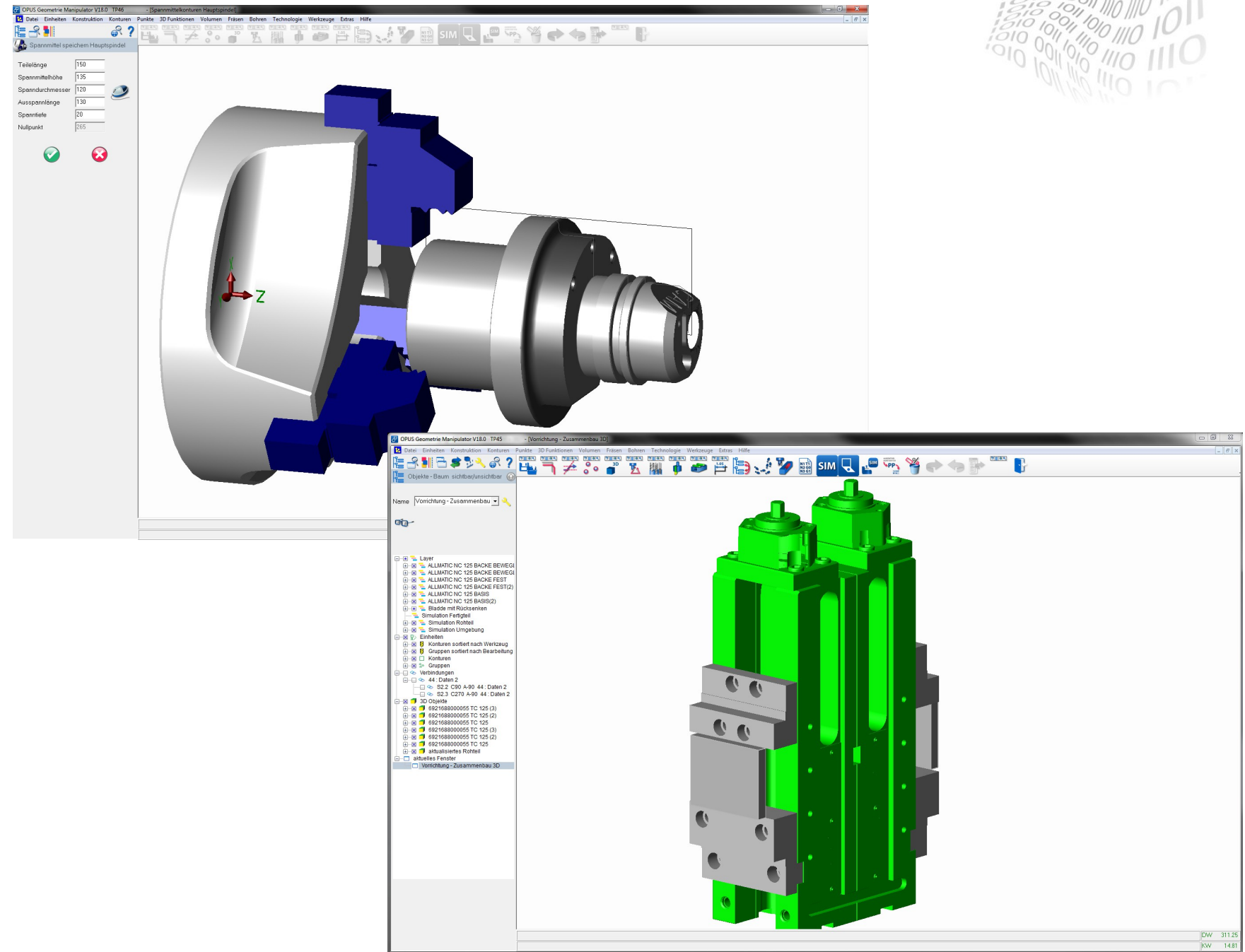
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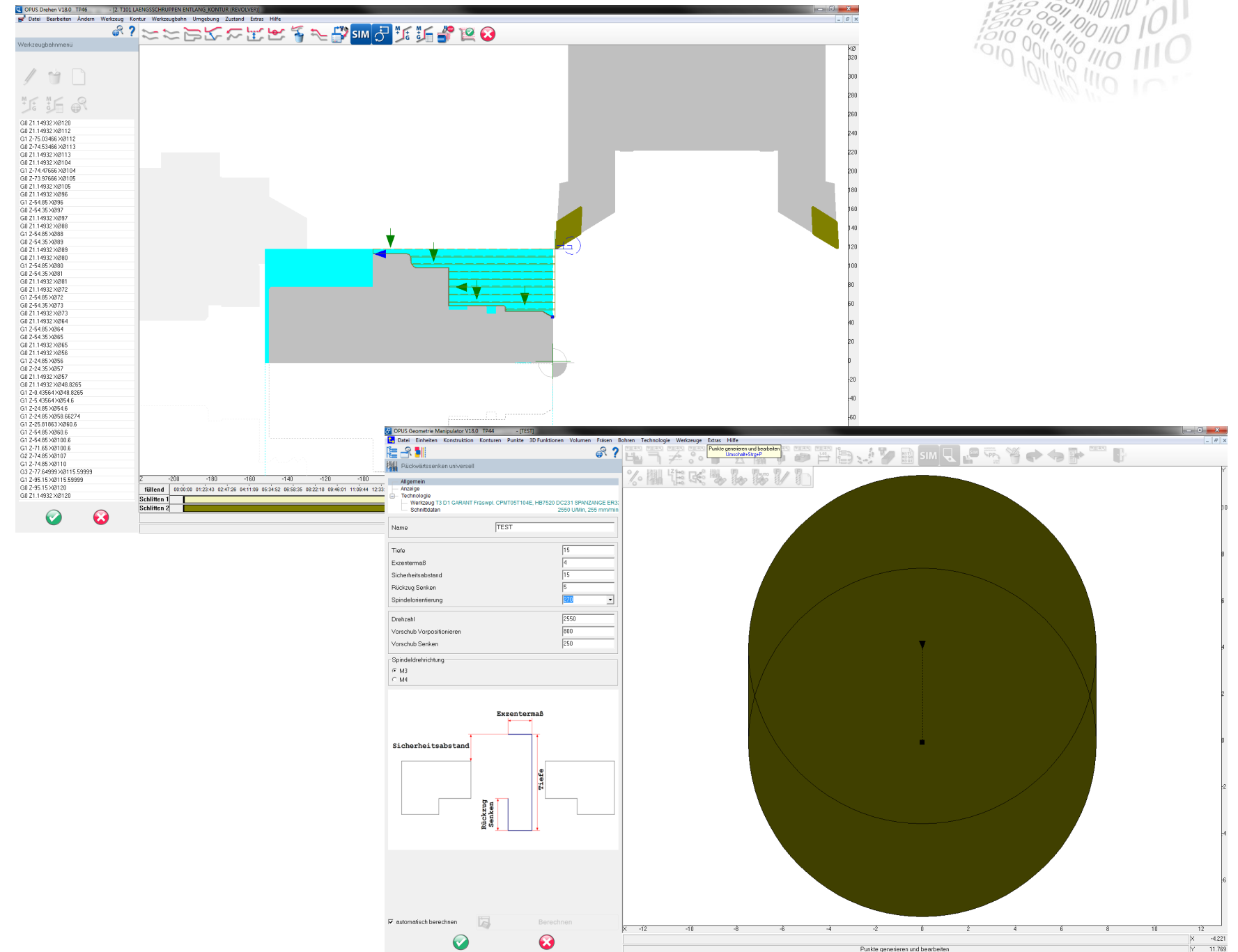




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- monitor machines
- (MDC machine data collection)

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The image shows two overlapping windows of the OPUS Editor software. The left window, titled 'OPUS Editor - [Arbeitsdatei 46] : GMX250', displays NC code for a part named 'GMX250'. The code includes conditional statements like 'IF {U200==0}', subprogram calls like 'UNTERPROGRAMM "1001"', and tool definitions for a 'HM-Schrupfraeser'. The right window, titled 'OPUS Editor - [Arbeitsdatei 45] : DMC60U', shows code for a part named 'DMC60U'. This code includes date information, tool definitions for a 'Spiralbohrer' and a 'Fräser', and detailed cycle definitions for drilling and milling operations with various parameters like depth, speed, and feed.



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Einrichteblatt

Arbeitsdatei: 44 : DMC60U SEITE 1

TP Nummer: 44  
 Steuerung/Maschine: DMC60U  
 Benennung: Rücksenktest  
 Zeichnungs-Nummer:   
 Programmierer:   
 Werkstoff/Material:   
 Bemerkung:   
 Erstellung: 12.09.2011 15:50  
 Änderung: 14.09.2011 16:37

T 1 Fräser ø 8x22x69 VHM Z4 30° Schrupp TIA LN Spannutter ER 16 HSK-A 63 1/10- 100  
 Identnummer: 10672  
 Art: Schaltfräser F 71 S 3940  
 Durchmesser: 8 Q-Mass: 0  
 Spitzenwinkel: 180 Gesamt Länge: 142  
 Schneidenradius: 0 Korrektur Länge: 142

T 2 Spiralbohrer ø11,0 RT100U/2474 VHM FIRE Spannutter ER 32 HSK-A 63 2/20- 100  
 Identnummer: 10174  
 Art: Spiralbohrer F 375 S 2890  
 Durchmesser: 11 Q-Mass: 0  
 Spitzenwinkel: 118 Gesamt Länge: 174  
 Schneidenradius: 0 Korrektur Länge: 174

T 3 GARANT Fräswpl. CPMT05T104E, HB7520 DC231 SPANZANGE ER32-GB / 10.0 DIN  
 Identnummer: 18-08-2010 09-35-24  
 Art: Rückwärts Spindel 255 S 2550  
 Durchmesser: 14.96 Q-Mass: 0  
 Spitzenwinkel: 89.971 Gesamt Länge: 141.979  
 Schneidenradius: 0.4 Korrektur Länge: 141.979

Einrichteblatt Programm-Nr.:0046

Maschine: GMX250  
 Programm: 0046  
 Erstellt von: Weissinger  
 Erstellt am: 14.09.2011

Werkstück: Workflow GMX  
 Zeichnung: TEST  
 Werkstoff: MG2  
 Bemerkung: Versuch 1

Spannmittelbeschreibung:

Werkzeugdatenblatt Programm-Nr.:0046

Identnummer: FFR\_02000\_3  
 Bezeichnung: HM-Schrupfräser D20 L38 Weldon D20 L80  
 T-Nummer: 1 Schlitzen: 1

Pos	Beschreibung	Hersteller u. Nummer	EDV-Nummer	Stk
1	Weldon D20 L80	GEWEFA - 93.05.031.016		1
2	HM-Schrupfräser D20 L38	Ruebfg. - 4228: 18.20.0	F02P10469	1
3				
4				
5				

Werkzeugdatenblatt Programm-Nr.:0046

Identnummer: DDA\_055080\_1  
 Bezeichnung: DNMG 150608-PM 4225 / EW=93 / Doppeldrehstahlhalter  
 T-Nummer: 1 Schlitzen: 2

Pos	Beschreibung	Hersteller u. Nummer	EDV-Nummer	Stk
1	Doppeldrehstahlhalter 25x25 Lx=130 VDI40	EWS - 15.4025.CTX		1
2	WP-Halter D-Platte Gr.15 EW=93	Sandvik - PDJNR 2525M 15	F02P010450	2
3	Wendplatte DNMG 150608-PM 4225	Sandvik - DNMG-150608-PM4225	F02P410.182	2
4				
5				

Quadrant: 1 Schneidenradius: 0.8  
 Q-Mass: 152.012 Durchmesser: 0  
 L-Mass: 75.001 Aussparlänge: 0  
 Y-Mass: 0 Kühlmittel: M254

Korrekturpickerl

Werkzeugdatenblatt Programm-Nr.:0046

Identnummer: D120\_1  
 Bezeichnung: er D1.2 R0,2 - S  
 T-Nummer: 1 Schlitzen: 1

Pos	Beschreibung	Hersteller u. Nummer	EDV-Nummer	Stk
1	er D1.2 R0,2 - S	GEWEFA - 93.05.008.004		1
2				
3				
4				
5				

Quadrant: 3 Schneidenradius: 0.8  
 Q-Mass: 152.012 Durchmesser: 0  
 L-Mass: -75.001 Aussparlänge: 0  
 Y-Mass: 0 Kühlmittel: M254

Korrekturpickerl

Werkzeugdatenblatt Programm-Nr.:0046

Identnummer: DDA\_055080\_1#2  
 Bezeichnung: DNMG 150608-PM 4225 / EW=93 / Doppeldrehstahlhalter  
 T-Nummer: 1 Schlitzen: 2

Pos	Beschreibung	Hersteller u. Nummer	EDV-Nummer	Stk
1	Doppeldrehstahlhalter 25x25 Lx=130 VDI40	EWS - 15.4025.CTX		1
2	WP-Halter D-Platte Gr.15 EW=93	Sandvik - PDJNR 2525M 15	F02P010450	2
3	Wendplatte DNMG 150608-PM 4225	Sandvik - DNMG-150608-PM4225	F02P410.182	2
4				
5				

Quadrant: 3 Schneidenradius: 0.8  
 Q-Mass: 152.012 Durchmesser: 0  
 L-Mass: -75.001 Aussparlänge: 0  
 Y-Mass: 0 Kühlmittel: M254

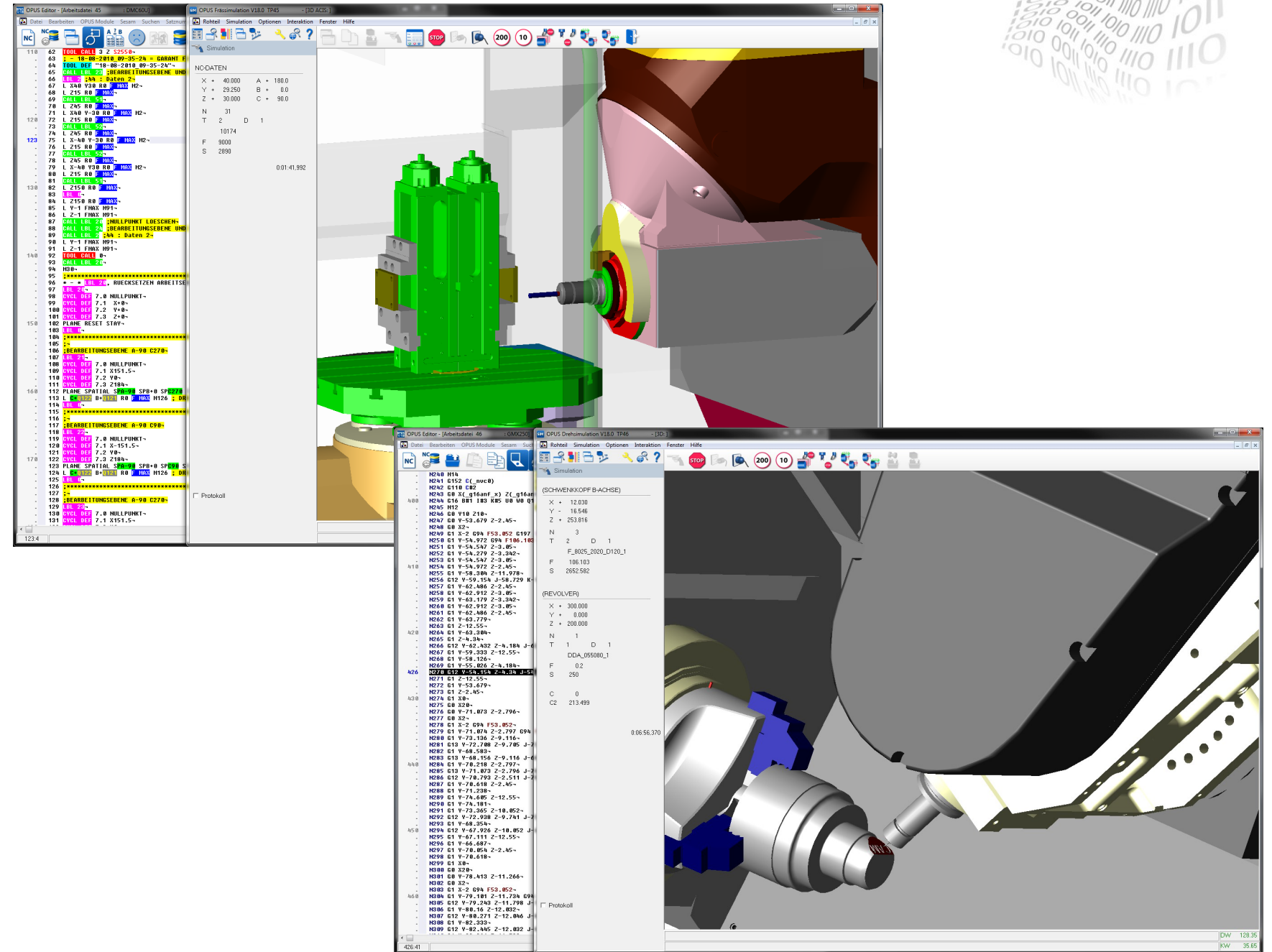
Korrekturpickerl



# OPUS Workflow

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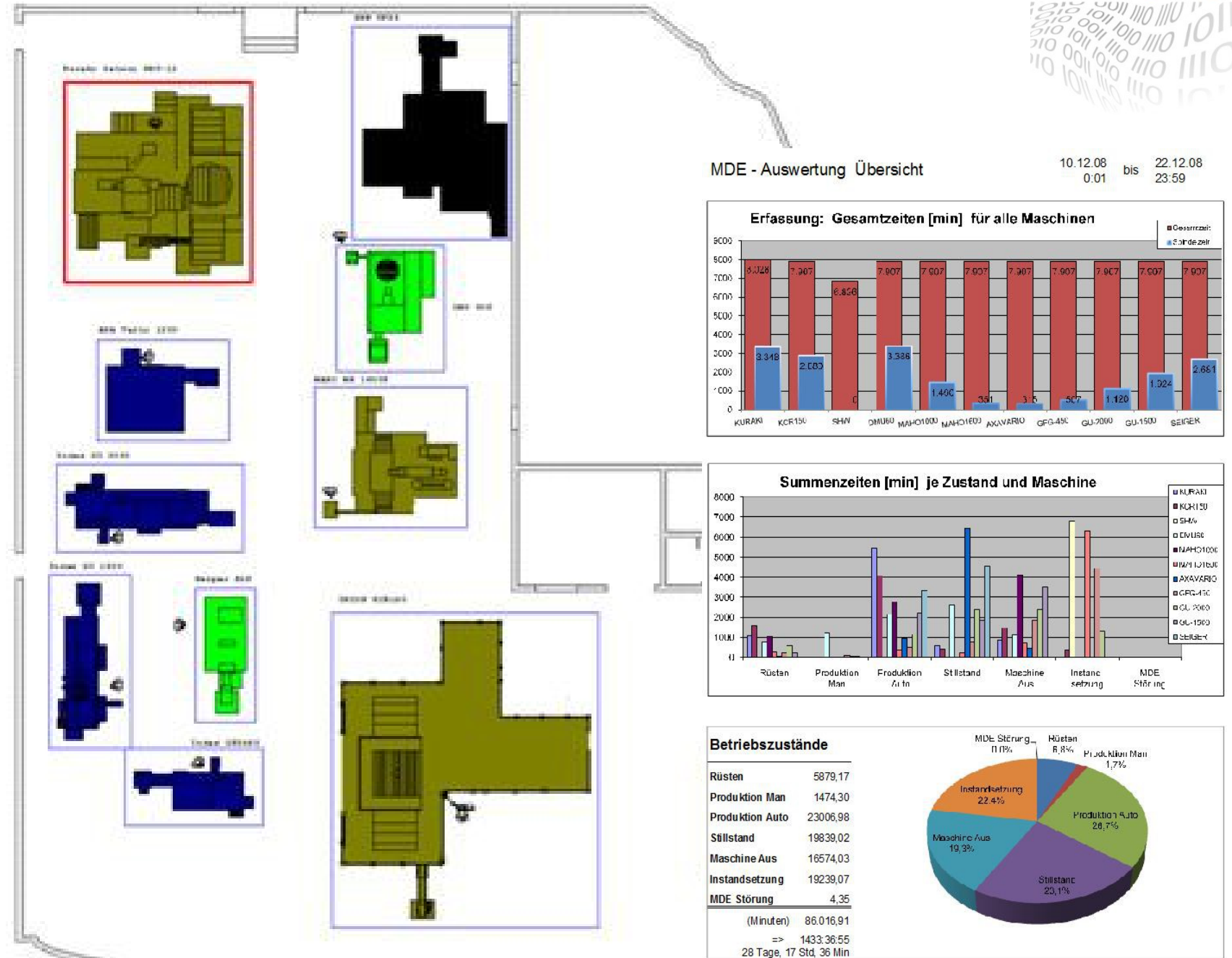
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*Claver hits working for you!*

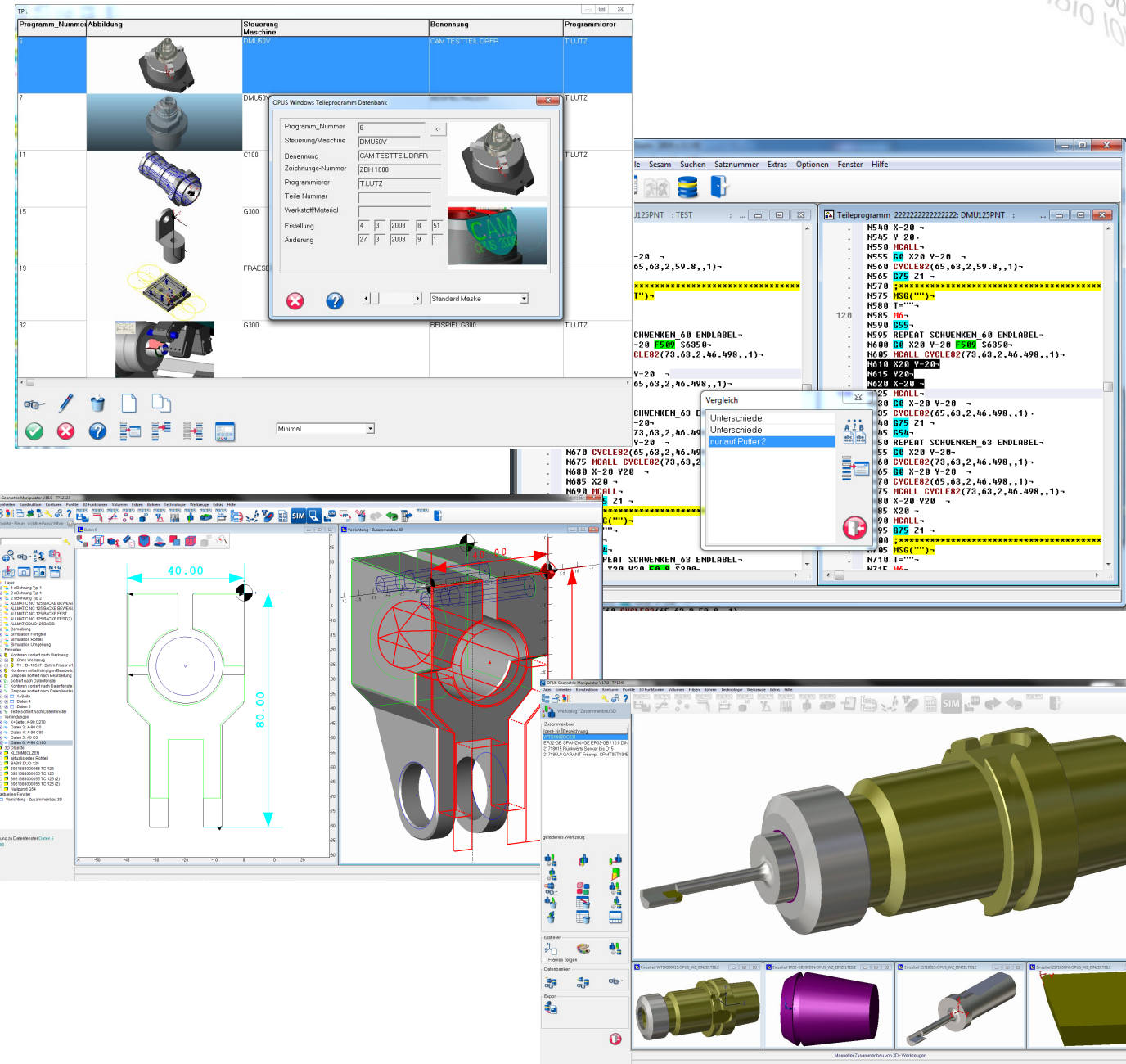


# OPUS Professional Basic

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- OP010 Basic Package
  - Project Management
  - SESAM
  - NC Editor
  - Version Management
  - Databases
  - 3D Viewer
- OP012 Geometry 2D/3D
  - 2D / 3D Construction
  - 2D / 3D Variants
  - CAD Import 2D / 3D
  - Processing of Part
  - Blank, Tool, Clamping
  - Drill analysis
  - Fotos and Bitmaps



# OP010 Basic Package

## Project Management

- All related data under one number
- Database
- NC Program
- Drawings
- Configurable Management Data
- Setup Sheets
- Any additional documents

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OPUS Professional

TP Nummer: 32

Steuerung/Maschine: DMC60U

Benennung: Spearmount

Zeichnungs-Nummer: Z78124345

Programmierer: Weissinger

Werkstoff/Material: MG5

Bemerkung: Test neuer Spannturm

Erstellung: 21 7 11 17 54

Änderung: 25 7 11 13 7

Werkstoff/ Material	Abbildung
MG2	
MG2	
MG1	

32 DMC60U Mehrfachspannung

FORMAT1





# OP010 Basic Package

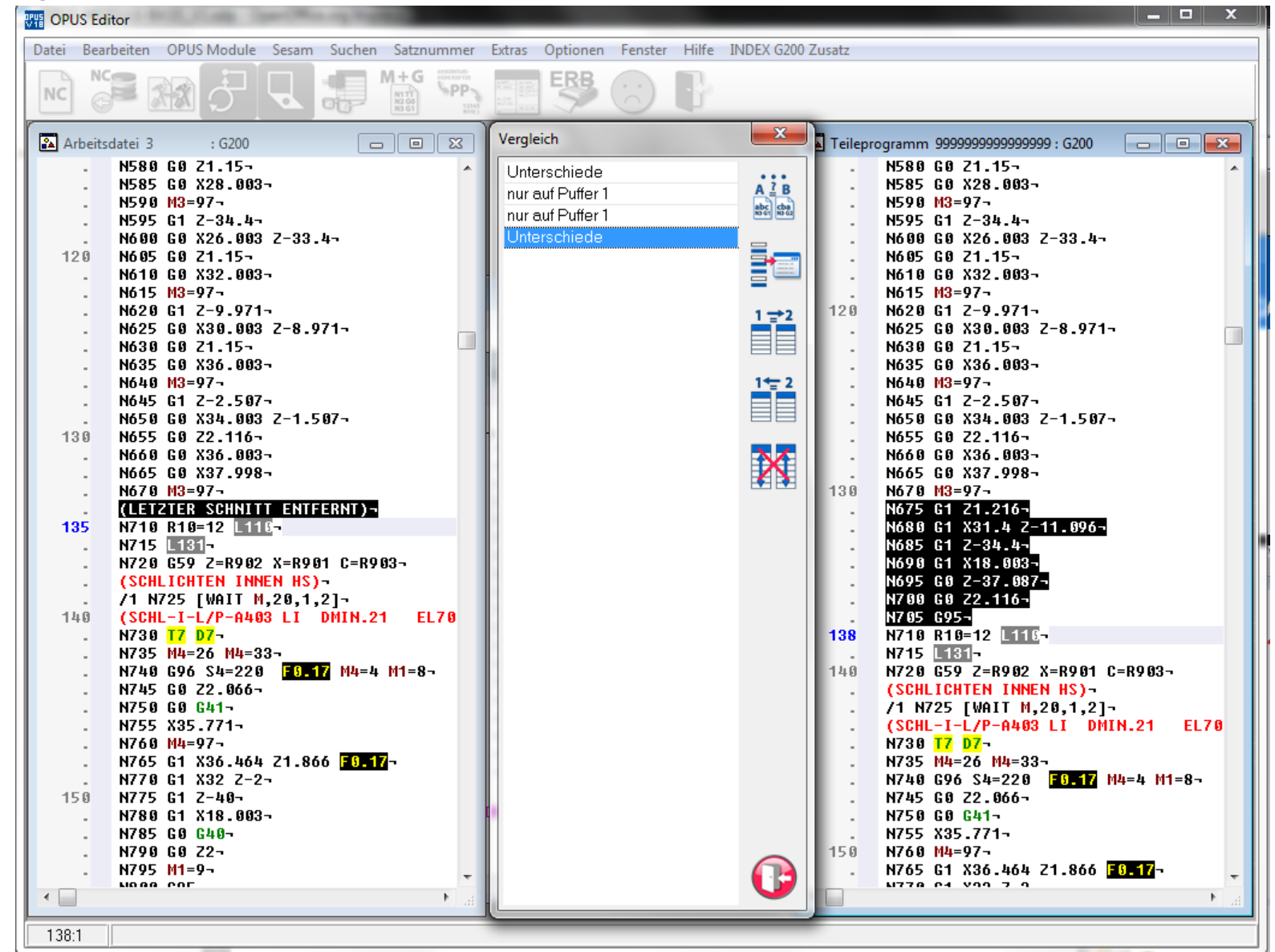
## Editor

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The Editor to write and change NC-Programs and or setup sheets.

- Several part Programs Parallel
- Compare Data
- Multiple Windows to one File
- Syntax Recognition / Display



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# OP010 Basic Package

## Version Management

- Automatic Version with every Change
- Number of Versions adjustable
- Contain DNC Actions

The screenshot shows the OPUS Editor interface with a G-code file open. A dialog box titled "Versionsverwaltung für TP 18" is overlaid on the editor, displaying a table of version changes.

Aktion	Datum	Uhrzeit	Von Station
Editor Puffer schließen	08.07.11	12:27	
Editor Puffer schließen	08.07.11	16:17	
Editor Puffer schließen	11.07.11	10:10	
Editor Puffer schließen	11.07.11	13:20	

The background G-code file contains the following text:

```

1  %MPF1006-
  (REV-1, TEST Drehen)-
  (DNC-0)-
  ( Datum 11.07.11 Zeit 10:10)-
  N100 L106-
  N105 G90 G95-
  N110 R10=6 R11=1 R12=550 L146 (Synchro. auf Achsposition)-
  /1 N1005 [WAIT M,5,1,2]-
  N115 G0 G53 X340 Z350 D0-
10  N120 G92 S4=-
  N125 G59 X=R901 Z=R902 C=R903-
  N130 G0 G53 X340 Z350 D0-
  N135 L136-
  N140 G59 Z=R906 X=R901 C=R902-
  (SCHLICHTEN)-
  /1 N145 [WAIT M,10,1,2]-
  (SCHR-A-L/P-A201 95GD LI)
  N150 T12 D5-
  N155 M3=26 M3=33-
20  N160 G96 S3=120 F0.2 M3=4-
  N165 G0 Z1.7-
  N170 G0 G41-
  N175 X81.6-
  N180 M3=97-
  N185 G1 Z0.1 F0.2-
  N190 G1 X-2.4-
  N195 G0 G40-
  N200 G0 X-0.4 Z1.331-
  (SCHLICHTEN)-
30  N205 G0 Z0.868-
  N210 G0 G42-
  N215 X77.76-
  N220 M3=97-
  N225 G1 X75.071 Z0 F0.2-
  N230 G1 X75.327 Z-0.198-
  N235 G1 X75.455 Z-26.383-
  N240 G1 X75.431 Z-30.359-
  N245 M5=9-
  N250 G95-
40  N255 G40-
  N260 R10=12 L116-
  (BOHREN KURZLOCH SACKLOCH)-
  (SHARK-CUT Ø20.0 LI AK10 R0.4 EL86 Q70 mittig abgenommen)-
    
```



# OP010 Basic Package

## Database

- Any Data  
(Pictures, Graphics, Memo Fields)
- Any Engine  
(Mysql, Firebird, Oracle..)
- Secure and Selective Archiving

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OPUS Teileprogramm + Zusatzdaten

Programm\_Nummer 5100 2142 1

Steuerung/Maschine HELLER

Benennung Mischblock 2K

Zeichnungs-Nummer 52161876

Programmierer Osen

Teile-Nummer 52161876

Werkstoff/Material 1.4305

Kommentar


Erstellung 7 12 2009 17 49

Änderung 17 12 2009 7 14

Laufzeit Zusatzdaten

1 Spannungen und Vorrichtungen | Spannpläne 3 bis 6

Spannpläne 1 und 2




Vorrichtungen

Nr 1. zeigen N L

Keine Vorrichtung definiert

Zeichnung



NC Zeigen

Akt. Zeigen

Akt. Eintrag

Nr 2. zeigen N L

Nr 3. zeigen N L

Nr 4. zeigen N L

Nr 5. zeigen N L

TPundZusatz

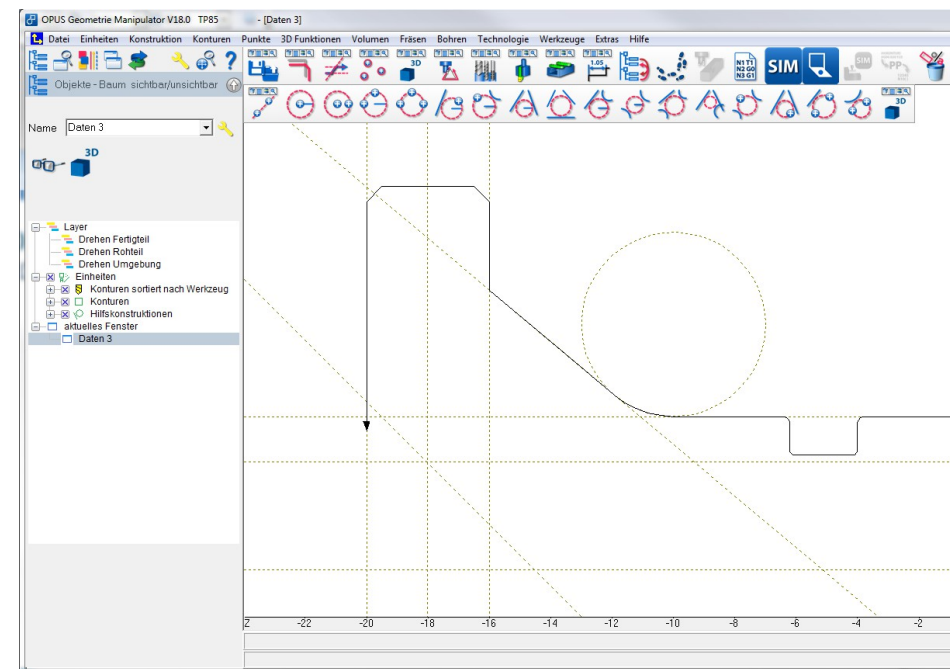
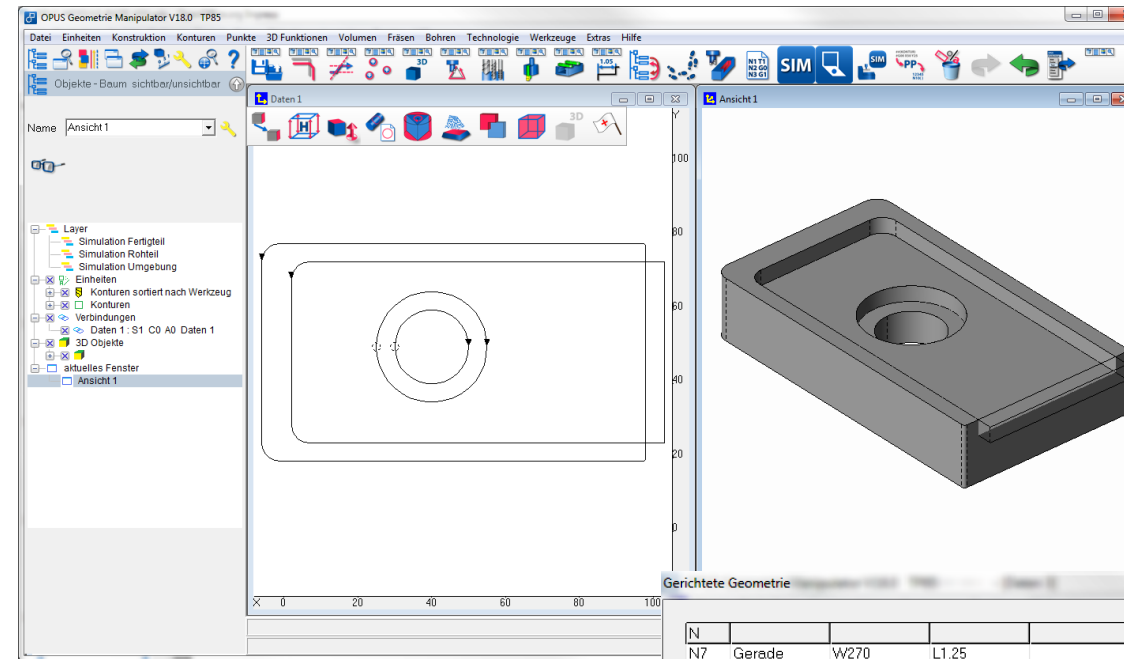


# OP012 Geometry 2D/3D

## 2D / 3D Construction

- Contour Manipulation
- Directional Geometry
- Help Construction
- Volume and Contour „bool“

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N	Objekt	Werte	Werte	Werte	Werte
N7	Gerade	W270	L1.25		
N8	Punkt	FASE W225	B0.1		
N9	Gerade	W180	L2.2		
N10	Punkt	FASE W135	B0.1		
N11	Gerade	W90			
N12	Punkt	RUNDUNG0.2			
N13	Gerade	W180			
N14	Punkt	Z-10	X15		
N15	Kreis N	R3			
N16	Punkt				
N17	Gerade	W140			
N18	Punkt				

N	Objekt	Werte	Werte	Werte	Werte
N2	Punkt	Z0	X5		
N3	Gerade	W90			
N4	Punkt	Z0	X14		
N4	Gerade	W135			
N4	Punkt	Z-0.5	X15		
N5	Gerade	W180			
N6	Punkt	Z-3.8	X15		
N6	Kreis P	R0.2	MZ-3.8	MX14.6	
N6	Punkt	Z-4	X14.6		
N7	Gerade	W270			
N8	Punkt	Z-4	X12.7		
N8	Gerade	W225			

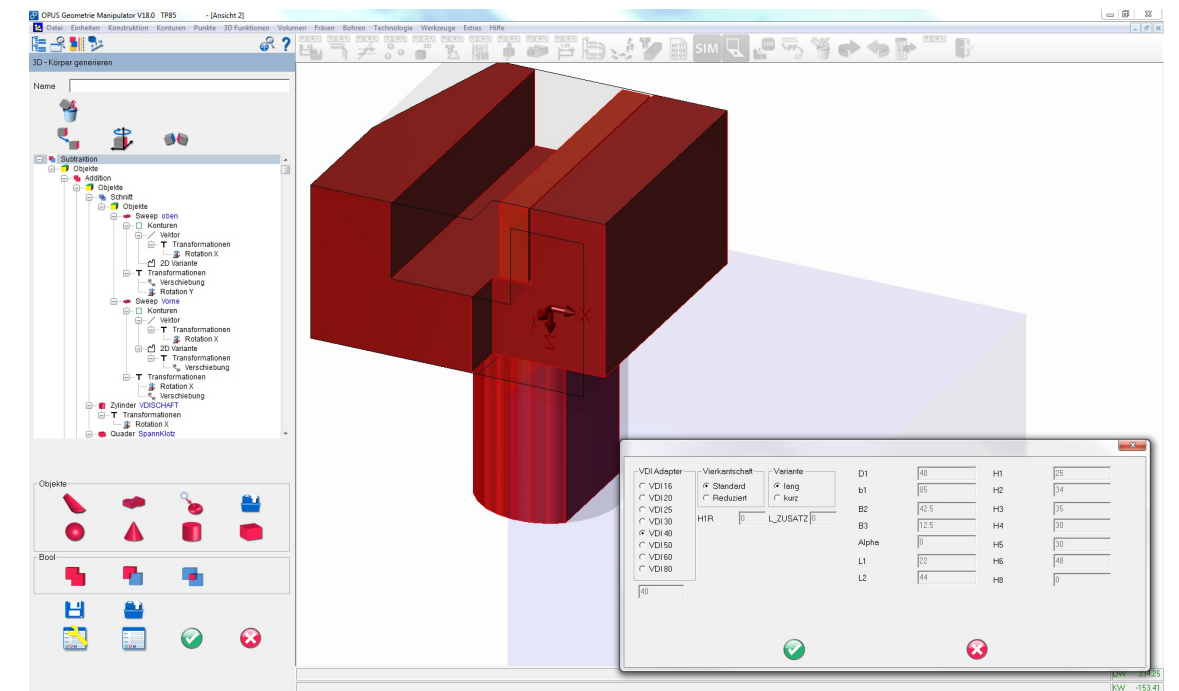
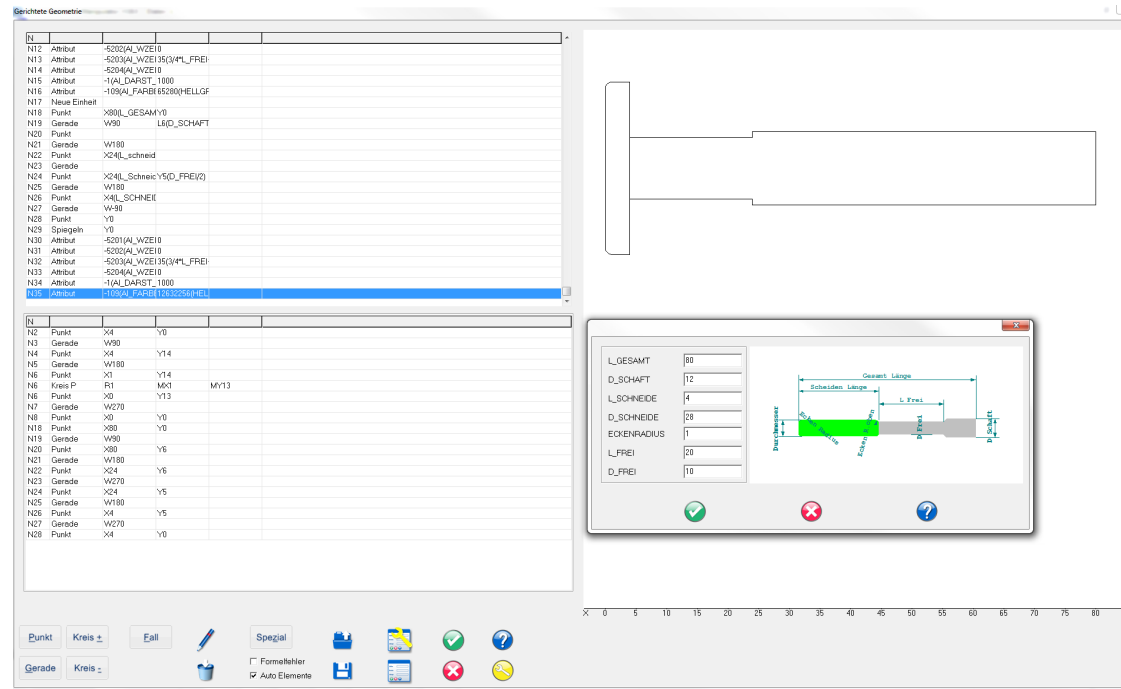


# OP012 Geometry 2D/3D

## 2D / 3D Variants

- Flexible Geometry
- Generate Entry Forms
- Merging 2D/3D

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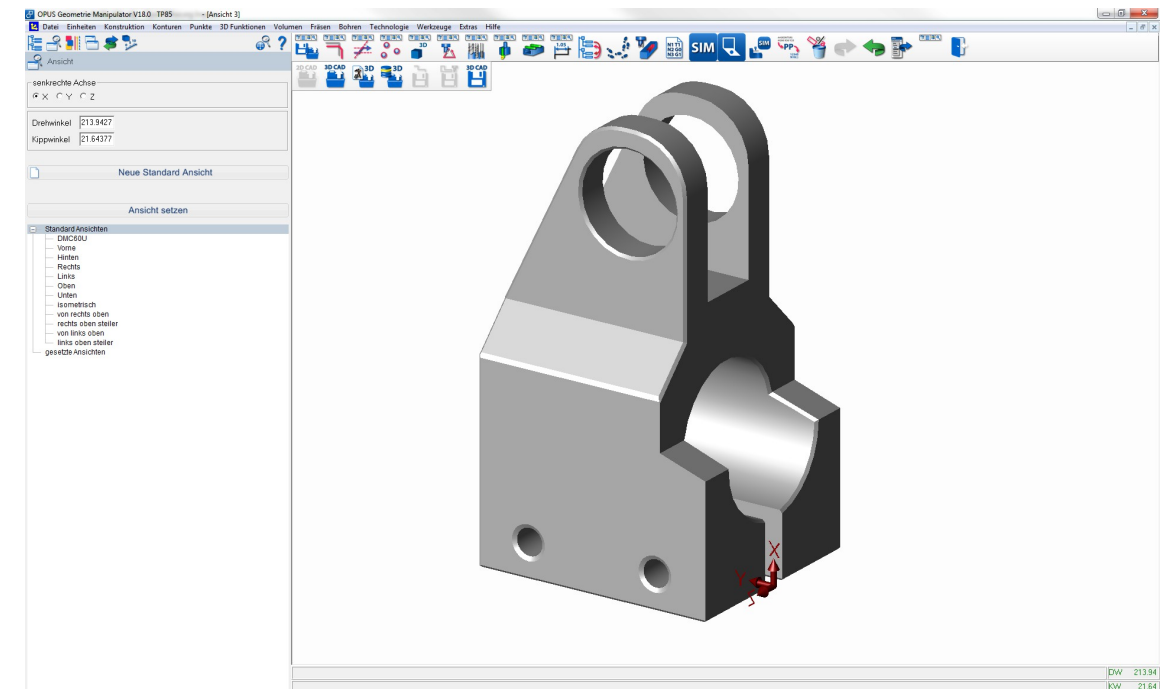


# OP012 Geometry 2D/3D

## CAD Import 2D / 3D

- Import of 3D Solids
- Direct work on/with the body
- Derive contours from 2D for processing
- Import of 2D Drawings
- Filter for Layers / Colors / Line Types
- Track Contour and Heal
- different 2D and 3D Formats

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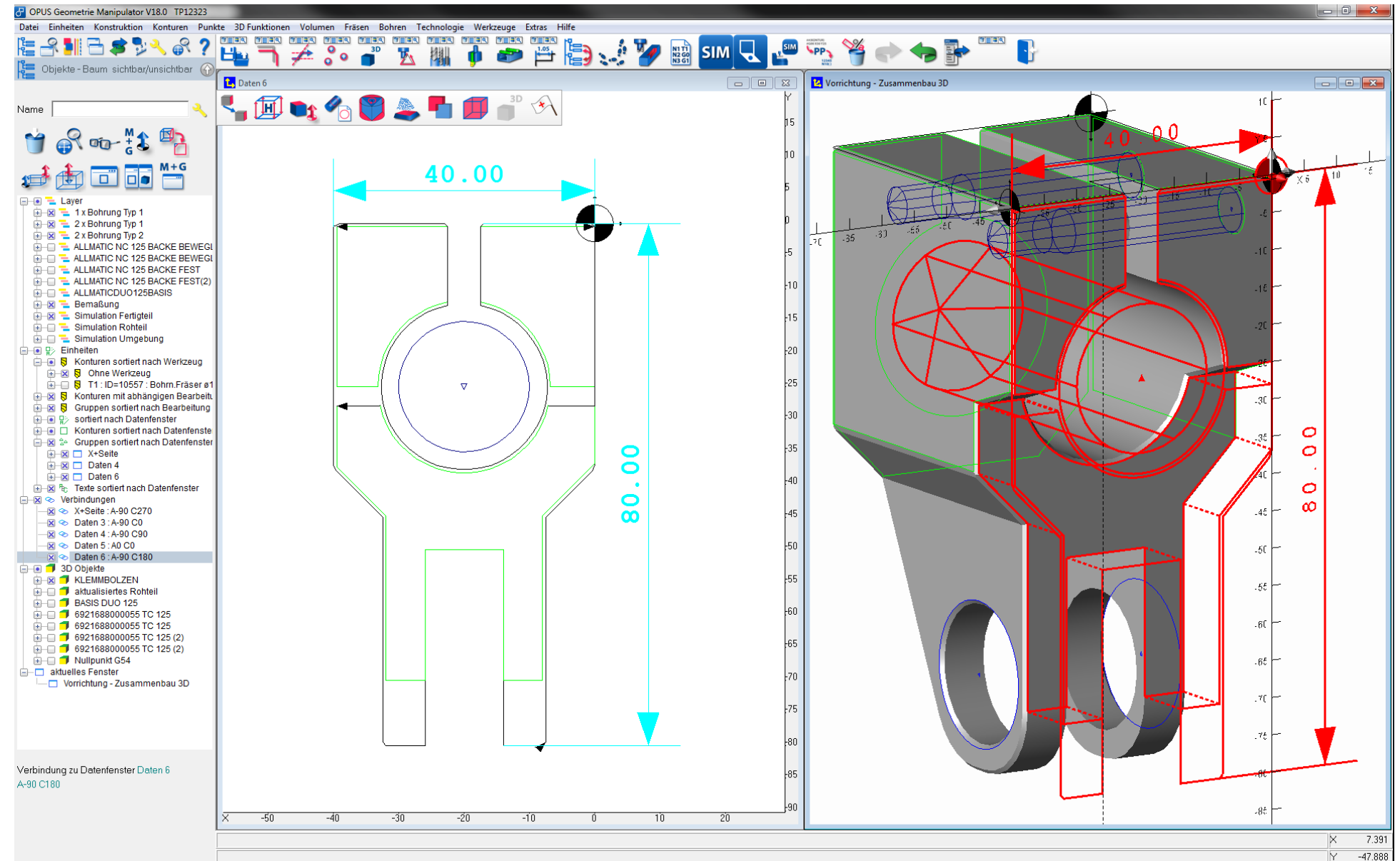


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# OPUS Professional

## OP012 Geometry 2D/3D

- 2D / 3D Construction
- 2D / 3D Variants
- CAD Import 2D / 3D
- Processing of Work Piece, Blank Part, Tool, Clamping
- Hole Analysis
- Pictures and Bitmaps



# OPUS Professional

## OP020 Tool Database

- Complete Tools
- Individual Parts, Parts List
- Cross Reference
- Technological Data
- Pre Setup
- Assembly
- Detailing on Demand
- Database for Tools, Clamping System, Measuring Tools...
- Extendable to ERMS

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Sprimag OPUS Komplettwerkzeuge

Identnummer: 1403\_28500 Maschine: BOLEY

Typ: Bohren Identnr (alt):

Tech-Typ: HSS Ma, Aufnahme: VDI20

Werkzeugart: BOHRER

Bezeichnung: NC-Anbohrer 90° Ø 10,0

Bezeichnung 2:

DB Vorlagen

Zusammenbau: manuell, automatisch

Stücklisten Baum

Stückliste bearbeiten

Verwendung

Durchmesser	10	Durchmesser (Text)		Quadrant	
Spitzenwinkel	90	L-Mass (L1) (Gesamtl.)	-64.5	Schneidenlänge	
Schneidenradius		Q-Mass (L2)		Ausspannlänge	43
Schneidenbreite		Y-Mass (L3)	60	Korrekturlänge	
Einstellwinkel		DIN/ISO Bezeichnung		Korrektur Maß	-64.5

OPUS\_WZ\_KPL\_ALLES

Manueller Zusammenbau von 3D-Werkzeugen

DW 58.39  
KW 3.84

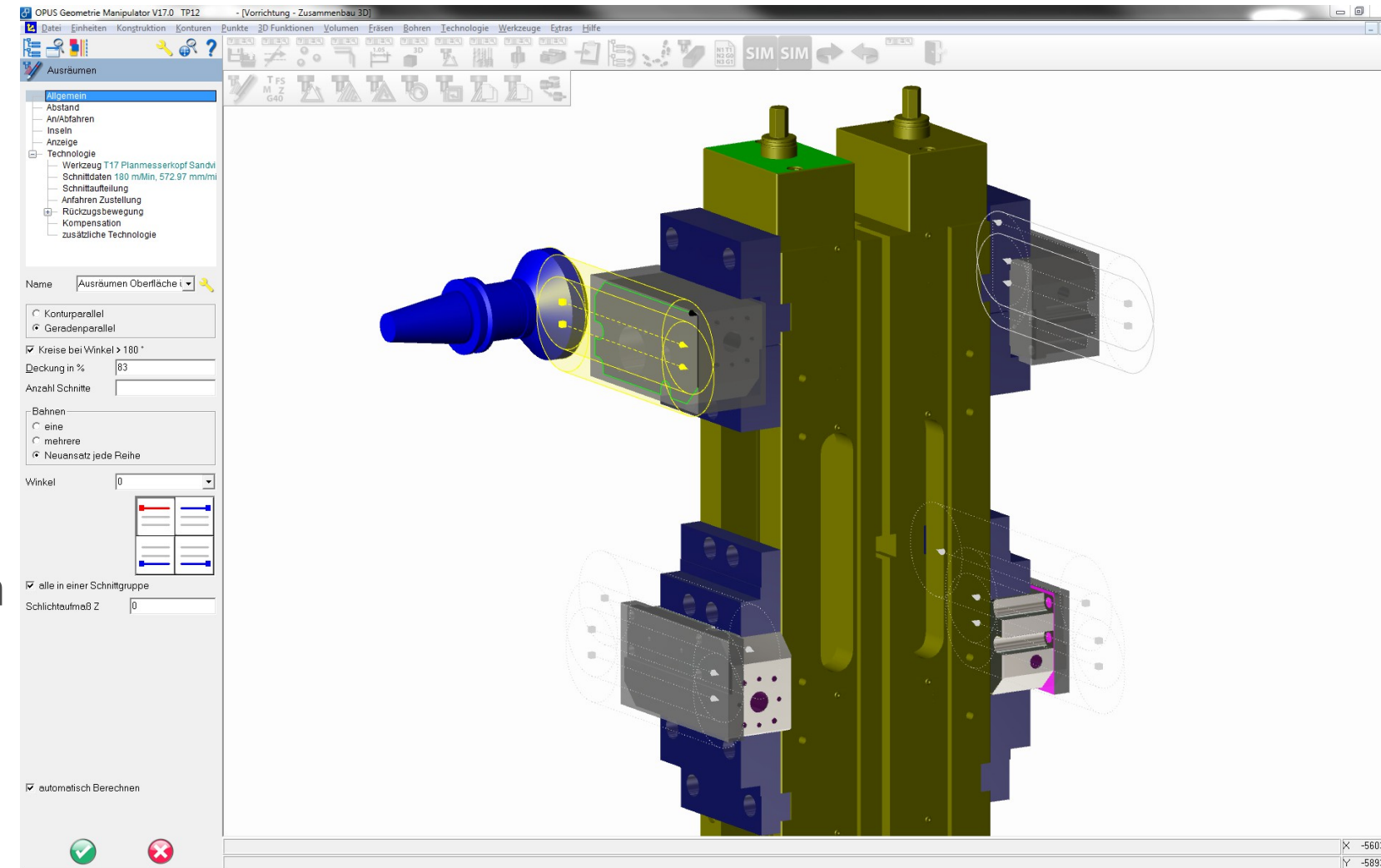


# OPUS Professional

## OP030 Milling

- Contours
- Pockets
- 3+2 Axis (Cubic Part)
- 3 Axis free forms
- Multi Clamping
- Drilling Recognition
- Mashine Cycles
- Processing Control and Material Reduction
- Tool Simulation/Part Clamping Situation
- Time Calculation

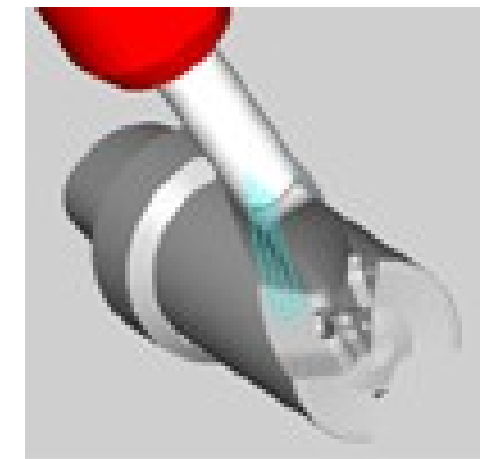
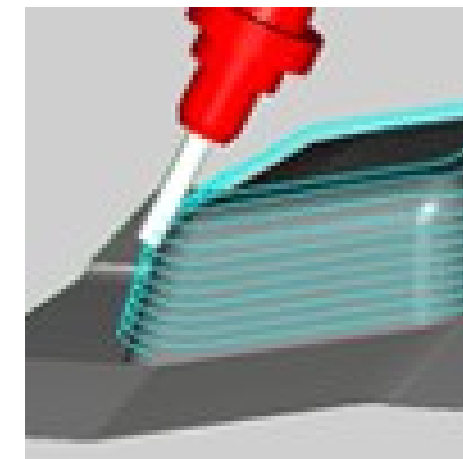
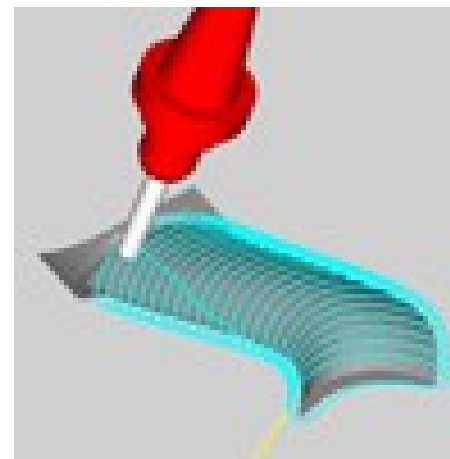
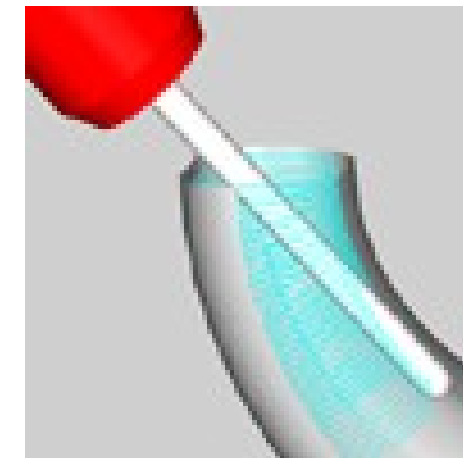
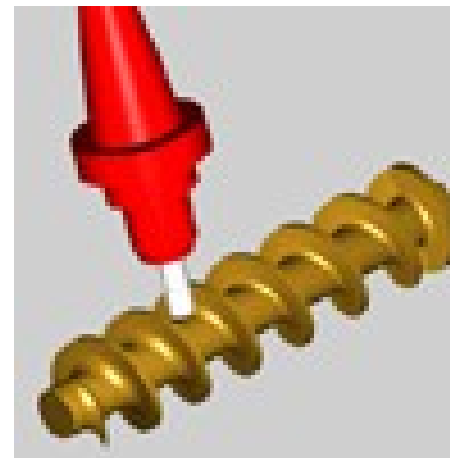
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# OPUS Professional

## OP032 Milling 5 Axis Simultaneous

- 5 Axis Swarf Cutting
- 5 Axis Contour Processing
- Flowline Strategy
- Diverse Finishing Operations for more Surfaces
- 3-5 Axis Conversion
- Efficient Roughing-Algorithm



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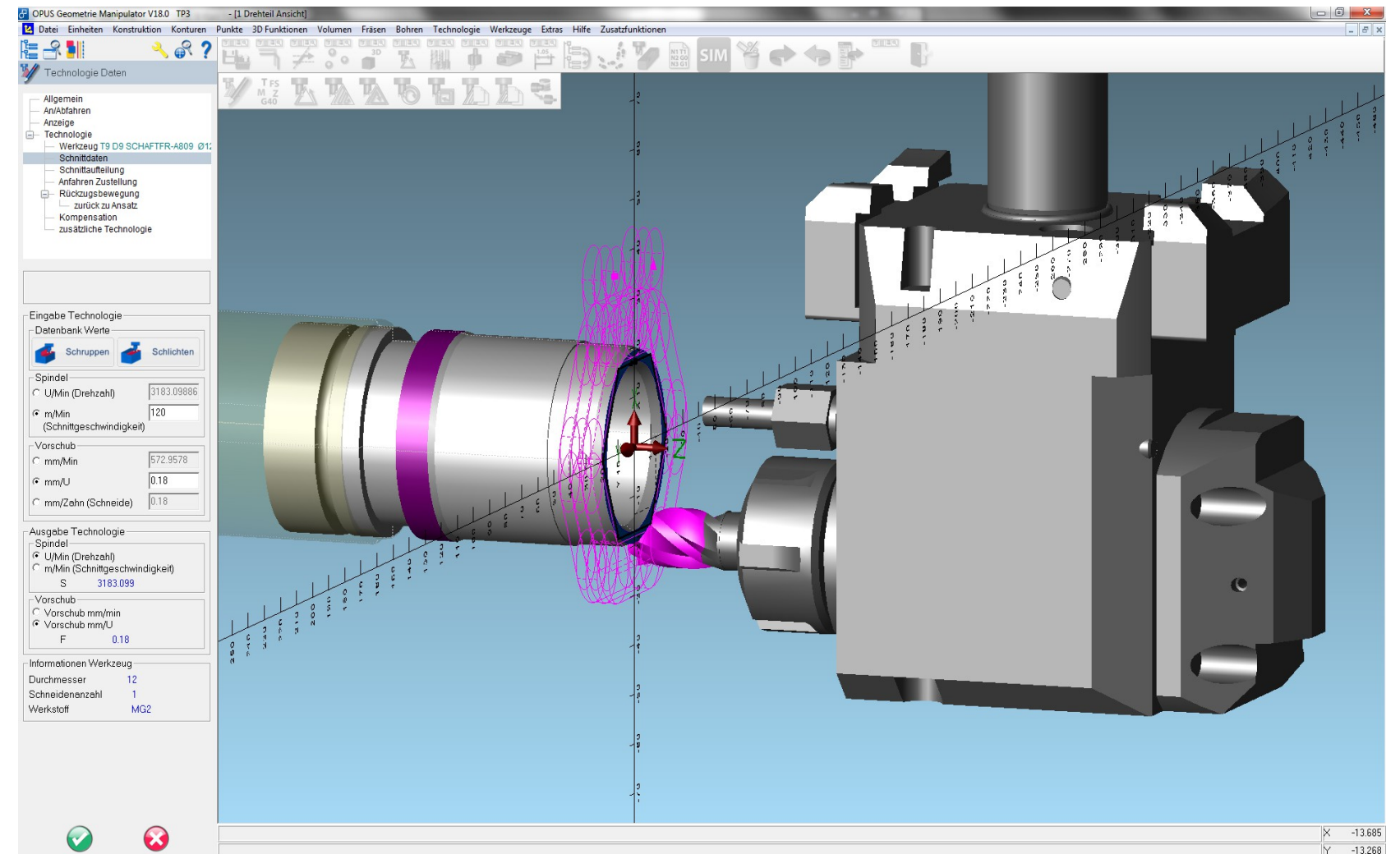


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# OPUS Professional

## OP035 Turning-Milling CYB

- Corresponds to Milling
- Only needed if Milling Module is not available
- On Shell, Face and Cutting Surfaces
- Programming and Construction for each Level Separate
- Shell Surface Programming on the corresponding 2D unwinding



# OPUS Professional

## OP040 multi-Tool/-Spindel/ -Axis

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- Synchronization of work process for multi-channel operation
- Processes
- NC Sets
- Listing
- Simulation

**Synchronisationsübersicht**

Schritten 1	Schritten 2	Schritten 3	SyncName
warten	warten	warten	SYNC1
warten	warten	warten	Sync6
warten	warten	warten	Sync5
warten	warten	warten	EndSync
warten	warten	warten	DummySync1
warten	warten	warten	DummySync2

**G-Code Listing:**

```

T1 D1 PLANSCHRUPPEN HSP (1.4sec SPINDEL 1)
Vorschub: G95 F0.2 mm/U
Drehzahl: G96 S1=190 m/min FUHRER
T1 D1 LAENGSCHRUPPEN ABHEBEN 45 GRAD (15.34sec SPINDEL 1)
Vorschub: G95 F0.2 mm/U
Drehzahl: G96 S1=190 m/min FUHRER
T3 D3 STECHEN EINSTECHEN (2.5sec SPINDEL 1)
Vorschub: G95 F0.2 mm/U
Drehzahl: G96 S1=190 m/min FUHRER
T1 D1 SCHLICHTEN PLAN (1.21sec SPINDEL 1)
Vorschub: G95 F0.2 mm/U
Drehzahl: G96 S1=190 m/min FUHRER
T1 D1 SCHLICHTEN LAENGS HS (9.97sec SPINDEL 1)
Vorschub: G95 F0.17 mm/U
Drehzahl: G96 S1=220 m/min FUHRER
6-Kant Fräsen (21sec SPINDEL 1)
T0 D Leerplatz anwählen ( SPINDEL 1)
Vorschub: G95 F0.2 mm/U
Drehzahl: G96 S1=190 m/min FUHRER
EndSync
T0 D Gegenspindel vorfahren und Werkstück spannen
Vorschub: G34 F0.2 mm/min
Drehzahl: G96 S1=190 m/min FUHRER
T0 D Werkstück vorziehen oder nachfassen ( SPINDEL 1)
Vorschub: G95 F0.2 mm/U
Drehzahl: G96 S1=190 m/min FUHRER
DummySync1
T3 D4 STECHEN ABSTECHEN (2.89sec SPINDEL 1)
Vorschub: G95 F0.2 mm/U
Drehzahl: G96 S1=190 m/min FUHRER
#G00 X340 Z-44.15 A180 U0 W-344.15 a-1033-3
#G00 X47 Z-44.15 A270 U-146.5 W0 a-1033-3
#G01 X5 Z-44.15 A270 U-21 W0 a-1101-0.4
#G04 F0.1
#G01 X-1 Z-44.15 A270 U-3 W0 a-1101-0.1
#G04 F0.1
#G00 X47 Z-44.15 A90 U24 W0 a-3021-1 t-3021+DummySync2
DummySync2
#G00 X340 Z-44.15 A90 U146.5 W0 a-1043-4
    
```

# OPUS Professional CAM Options

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- OP042 Features / Process Database
- OP060 Kinematics Module (Machines/Clamping Systems/Tools)
- OP850 Material Removal and OP851 Collision RealNC
- OP860 Material Removal and OP861 Collision Modulworks
- Control back Simulations

# OPUS CAM Options

## OP042 Features

- Import of CAD
- Processing with the same Parameters as in CAD
- Configurable Analysis via Database
- Automatic Conversion to the Processes

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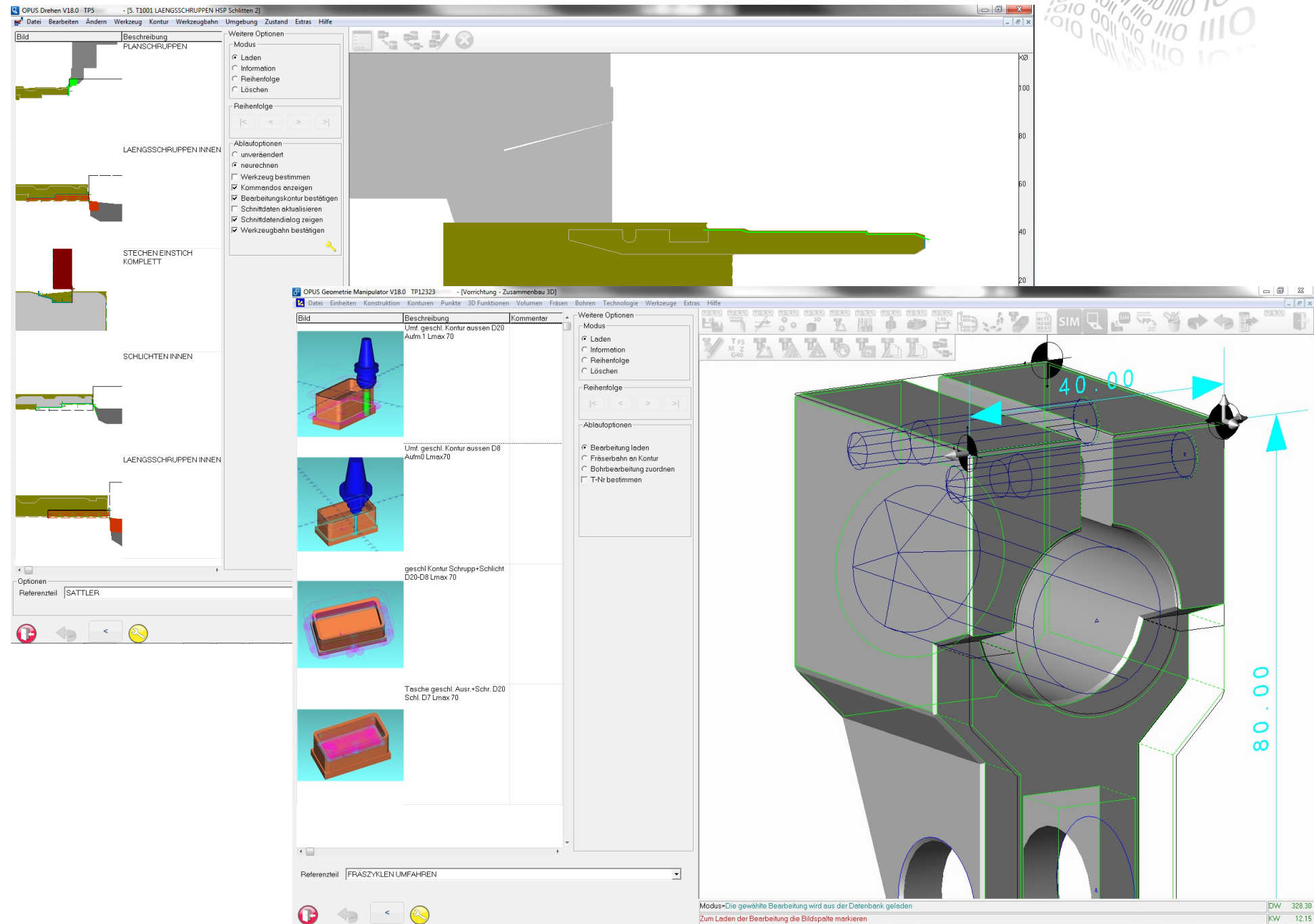
# OPUS CAM Options

## OP042 Process-Database

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- Create Process Templates
- Single Processes
- Process Steps
- Complete Processing for single Features
- Organized as Part Family or Part Type
- with Tool and mit Technology
- Flexible or unchanged
- for Turning, Milling, Drilling





## OPUS CAM Options

*OP860 Material Removal and  
OP861 Collision Modulworks*

- Nail Model
- Very Fast
- Speed adjustable via Accuracy
- Optimal for Free Form Surfaces  
3 or 5 Axis

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