

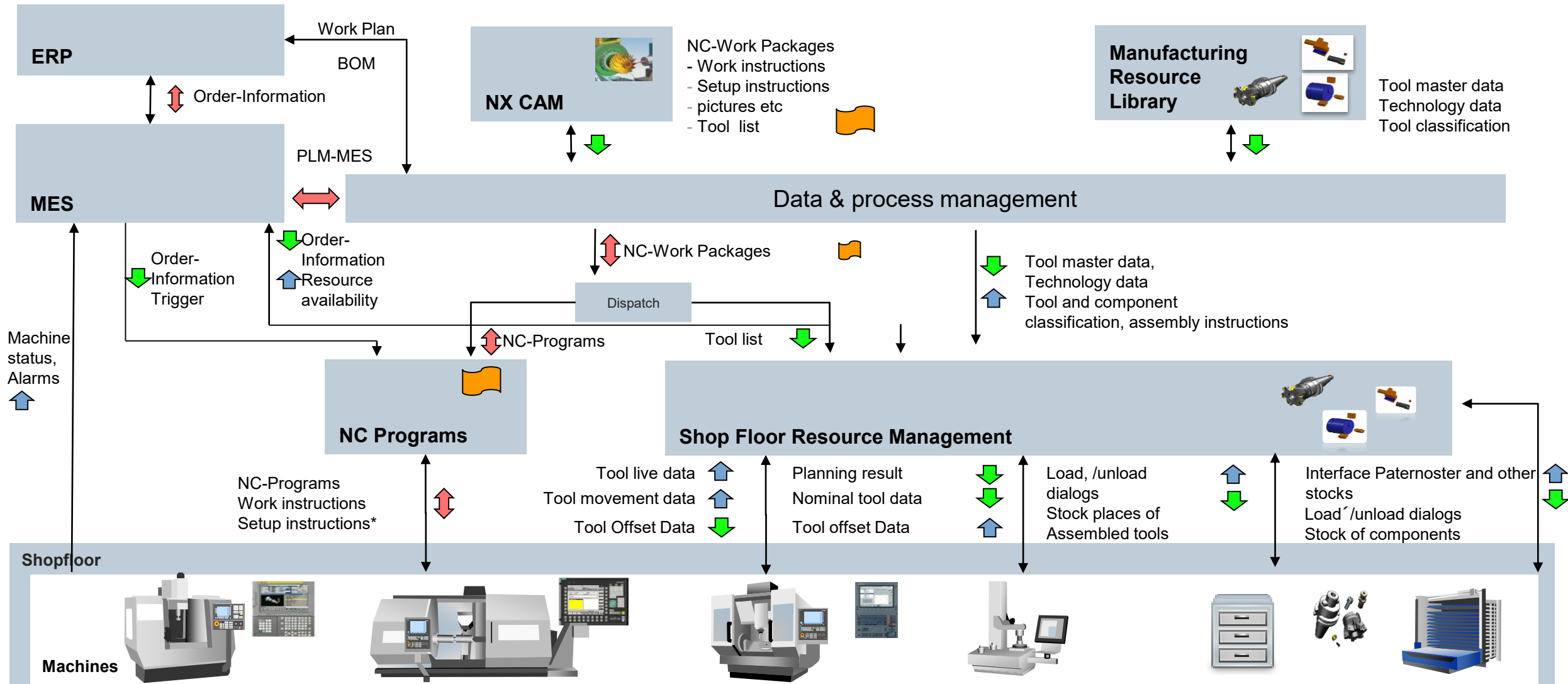
SIEMENS
Ingenuity for life

Realize
LIVE 
GREATER CHINA

Connect top & shop floor for Part Manufacturing with a digital thread

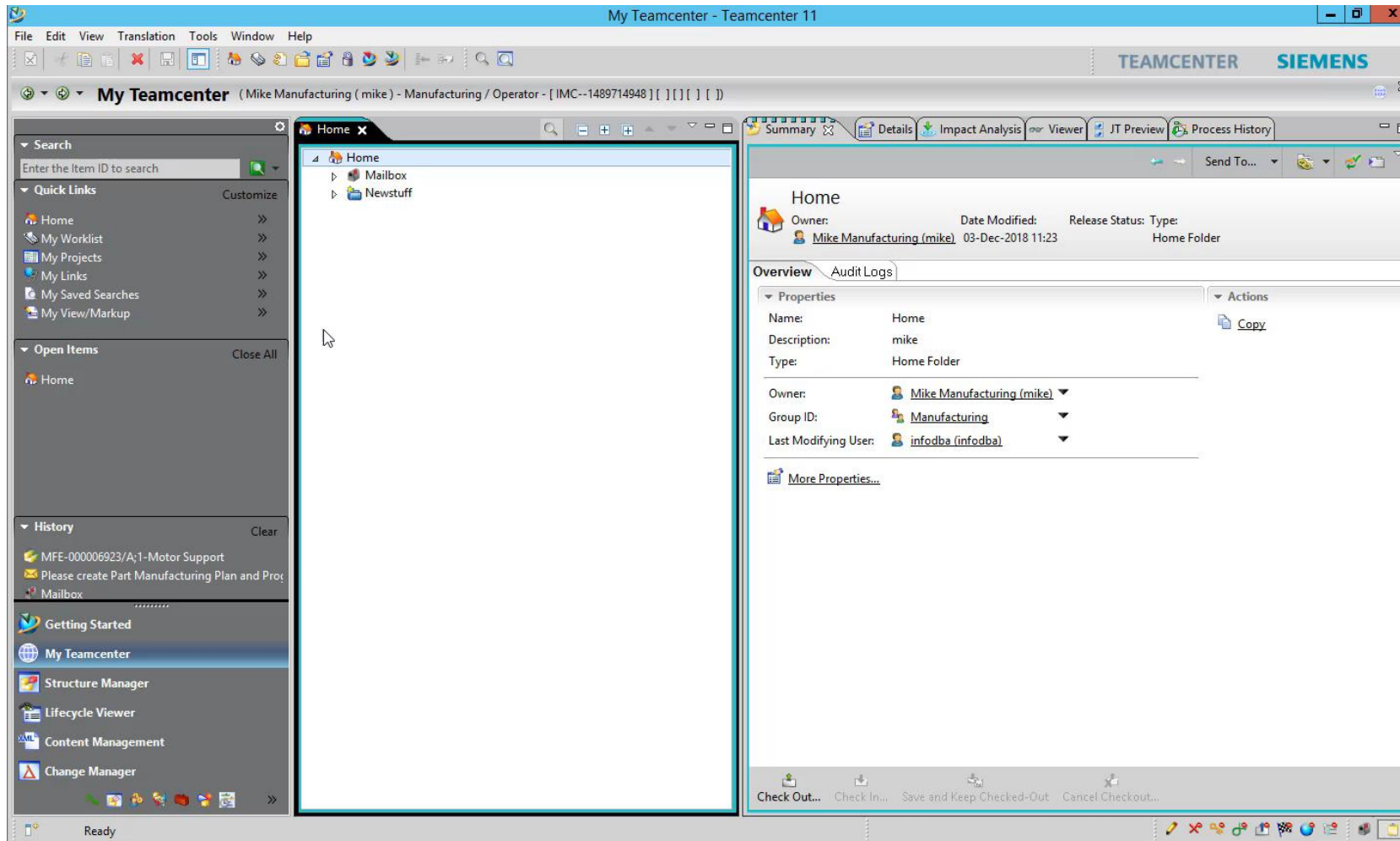
MBG 钟振宇

总体解决方案



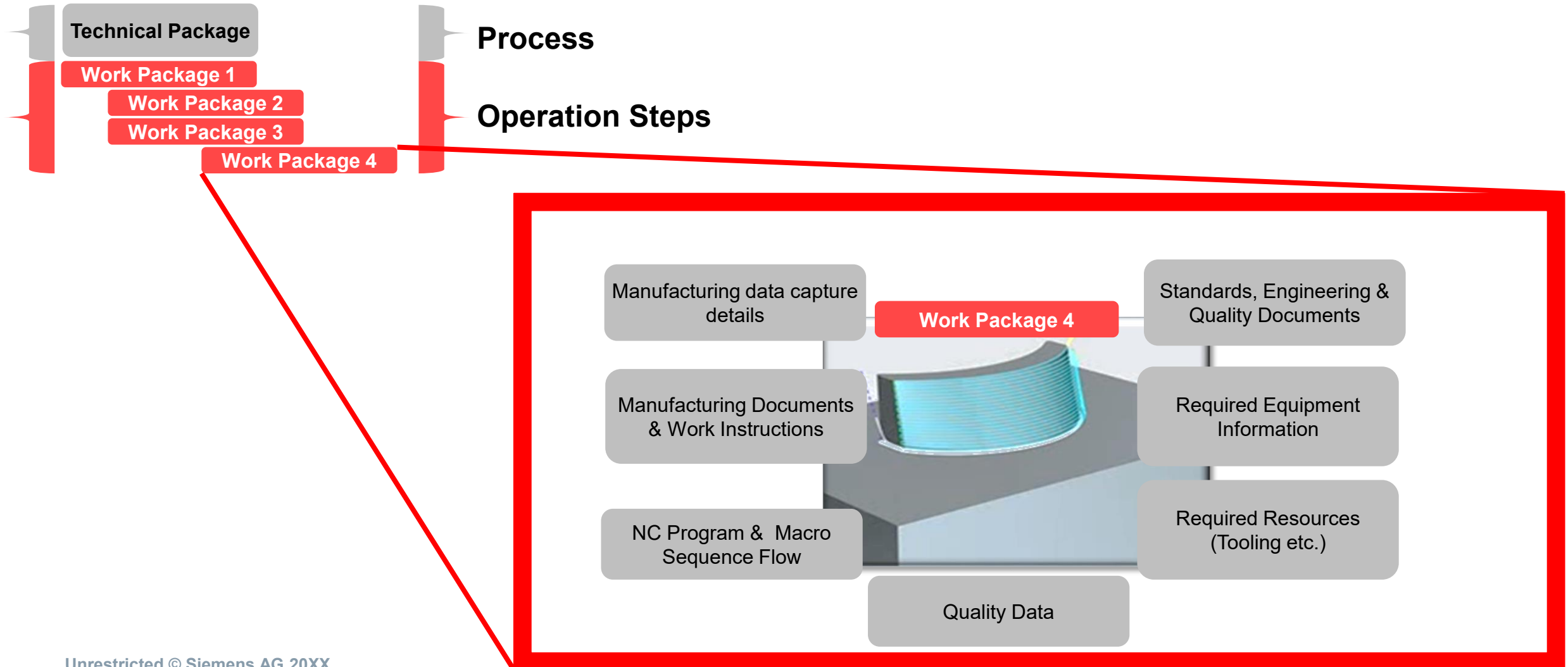
涉及到的相关产品

- 零件工艺——TCM
- 数控工艺——CAM
- 与车间硬件设备数据交互——SFC
- 刀具管理（刀具样本）——MRL
- 实物刀具管理——SFI
- 机床监控——MDA



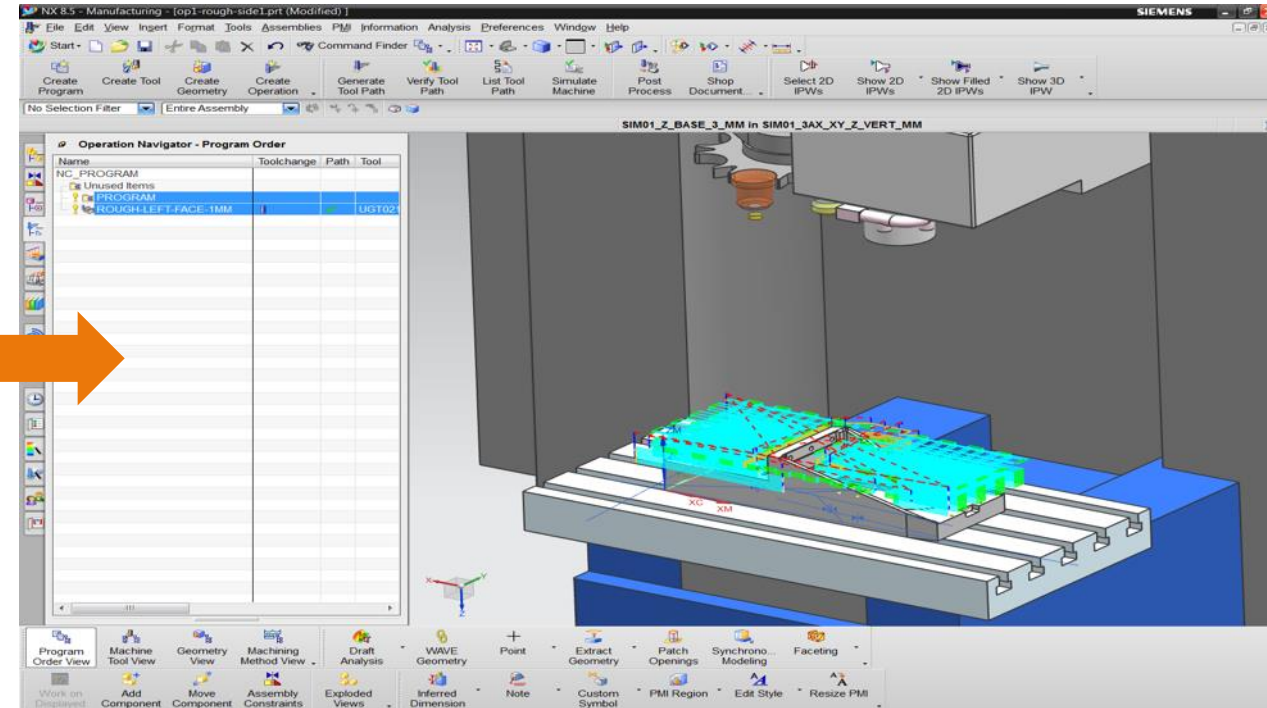
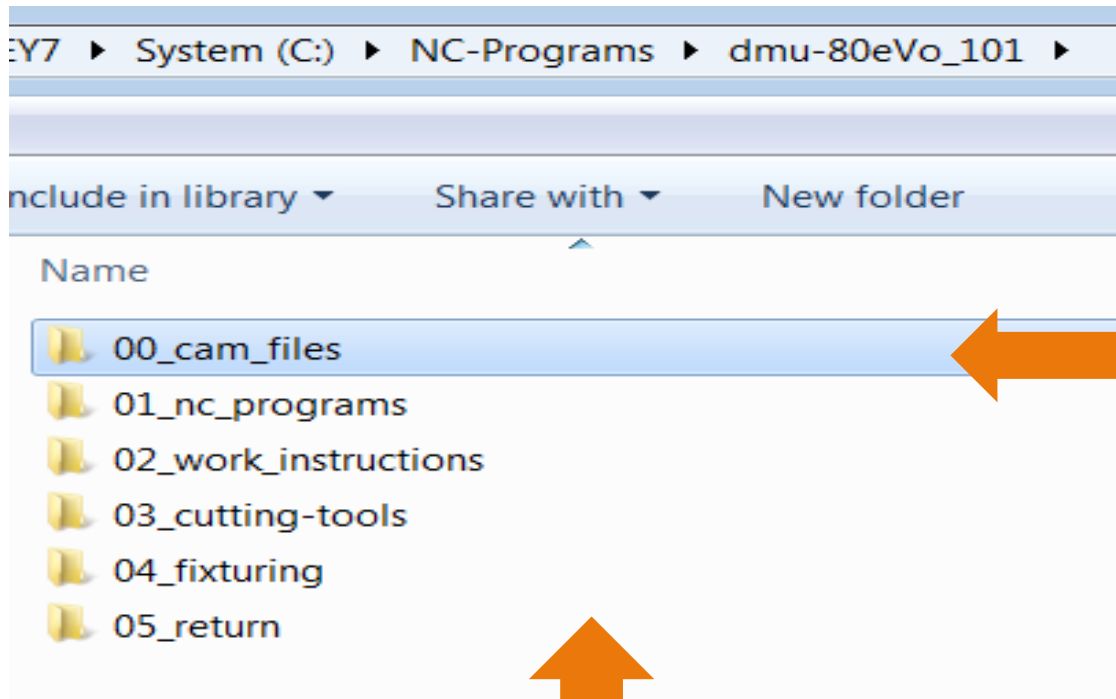
The screenshot displays the Siemens Teamcenter Part Planner interface. The main window shows a hierarchical BOM tree for a 'Motor Support Part Process'. The tree includes various manufacturing activities such as 'Material Procurement', 'Milling Drilling 1st Clamping', and 'Manual Inspection'. A table on the right provides detailed activity data.

Line	Description	Activity Description	Start (...)	Durati...	Start (Calc.) ...	Duratio
OPR-100063/A	Activity Root Object	Activity Root Object	100	600	100	16,098.5
1234	NX CAM program g...	NX CAM program g...	0	16,323.8	0	16,098.5
mill_5_axis	Output Dataset					
NXT_MILL_01_00002_A	FACING	FACING	0	922.82	0	922.82
NXT_MILL_01_00003_A	POCKETING	POCKETING	0	15,156...	922.82	15,156.5
EQP-100019_A	SLOT	SLOT	0	19.2	16,079.73	19.2
WorkInstructionsPdf	Output Dataset					



数据包

- PLM is used as a secure environment to manage the manufacturing files all in the context of a single work package, providing version controlled managed data directly to CAM or the Shop Floor.

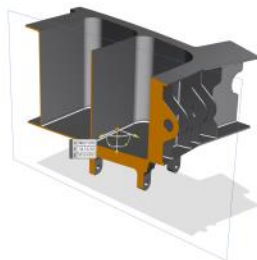


Shop Floor

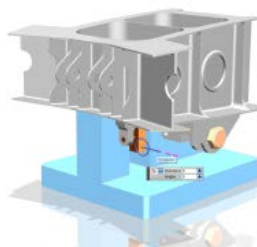
SFC——车间设备数据双向传输解决方案

SIEMENS
Ingenuity for life

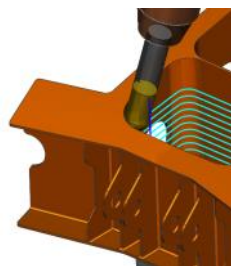
Part model preparation



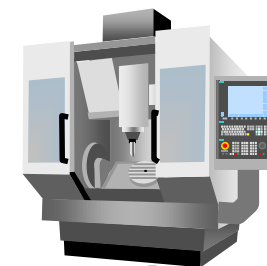
Tooling and fixture design



CAM



CNC



Machine Tool Operator

The Manufacturing Plan

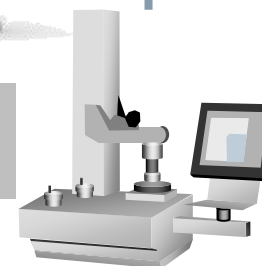
Shop Floor Connect for Teamcenter



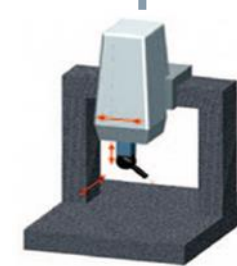
Process planning



Tool Setter



Tool management



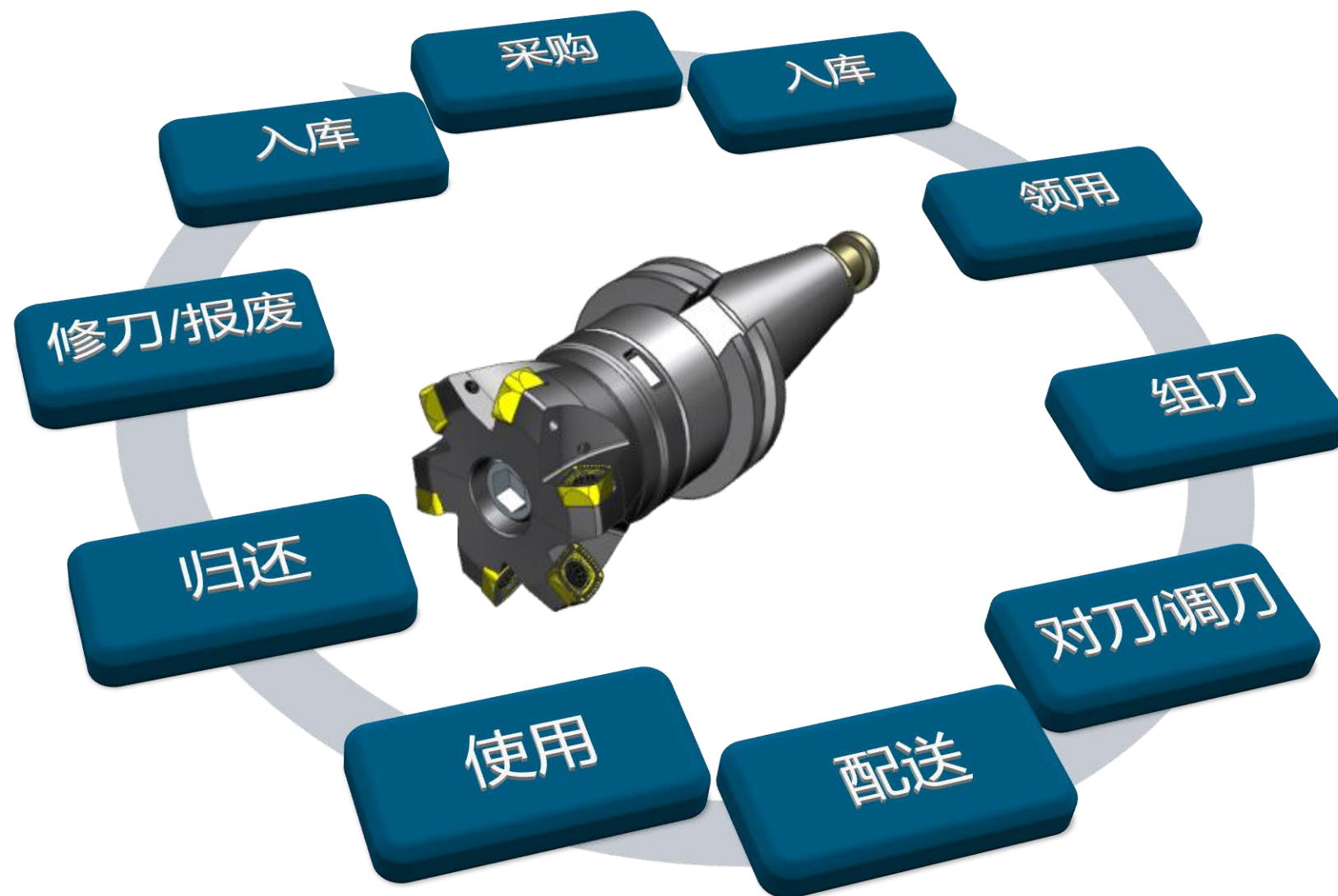
CMM Operator

CMM Machine

The screenshot displays the Siemens Teamcenter Part Planner interface. The main window shows a BOM tree on the left and a table of activities on the right. The BOM tree includes items like 'PRZ-100003/A;1-Motor Support Part Process' and 'OPR-100051/A;1-Material Procurement'. The activity table lists various operations such as 'FACING', 'POCKETING', and 'SLOT' with their respective durations and start times.

Line	Description	Activity Description	Start (...)	Durati...	Start (Calc.) ...	Duratio
OPR-100063/A	Activity Root Object	Activity Root Object	100	600	100	16,098.5
1234	NX CAM program g...	NX CAM program g...	0	16,323.8	0	16,098.5
mill_5_axis	Output Dataset					
NXT_MILL_01_00002_A	FACING	FACING	0	922.82	0	922.82
NXT_MILL_01_00003_A	POCKETING	POCKETING	0	15,156...	922.82	15,156.5
EQP-100019_A	SLOT	SLOT	0	19.2	16,079.73	19.2
WorkInstructionsPdf	Output Dataset					

刀具生命周期



数字化过程中刀具管理中面临的问题

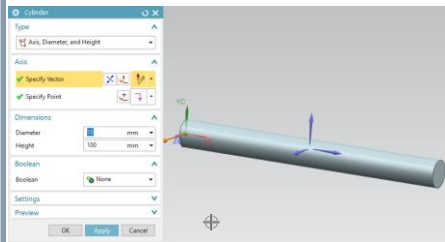
- 如何快速建立刀具三维数模
- 工艺准备过程中如何快速选刀/组刀
- 刀具结构尺寸如何传递
- 虚拟刀具与实物刀具如何对应
- 刀具识别
- 刀具寿命检测
- 库存和采购计划

建立刀具三维数模

1

...NX-CAD

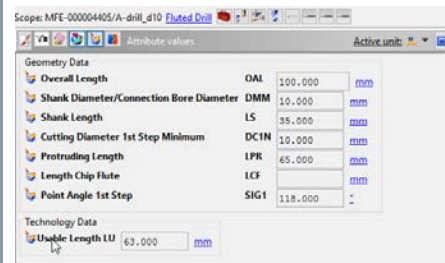
Start from scratch by using NX-CAD functionality



2

...Template Parts

Use more than 100 part family templates by filling out the needed attributes



3

...Tools United

TU is embedded inside of Teamcenter and has a special Siemens download button for transfer



4

...Tool Vendor Homepage 3D download

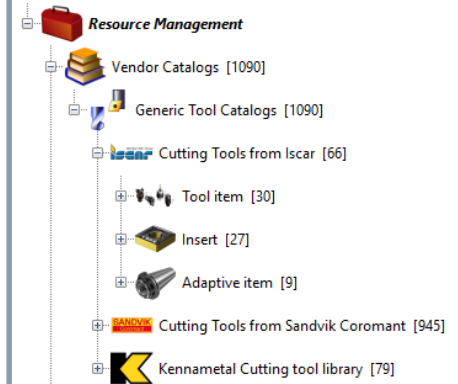
Most of the tool vendors provide 3D geometry download via stp...



5

...Imported Tool Vendor Catalogs

Components are mapped from Vendor Catalogs to the customer tool area by GTC



What is a GTC package?

Name	Type
class_hierarchy	File folder
step_3d_models	File folder
step_p21_products	File folder
assortment.txt	Text Document
catalog_info.txt	Text Document
class_hierarchy.plmxml	DirectModel Doc
step_p21_mapping.txt	Text Document



Catalog in GTC format

1) GTC Class Hierarchy

Tool vendor classes & attributes
Optional - Icons & Drawings

2) Assortment file – List of products and their classification

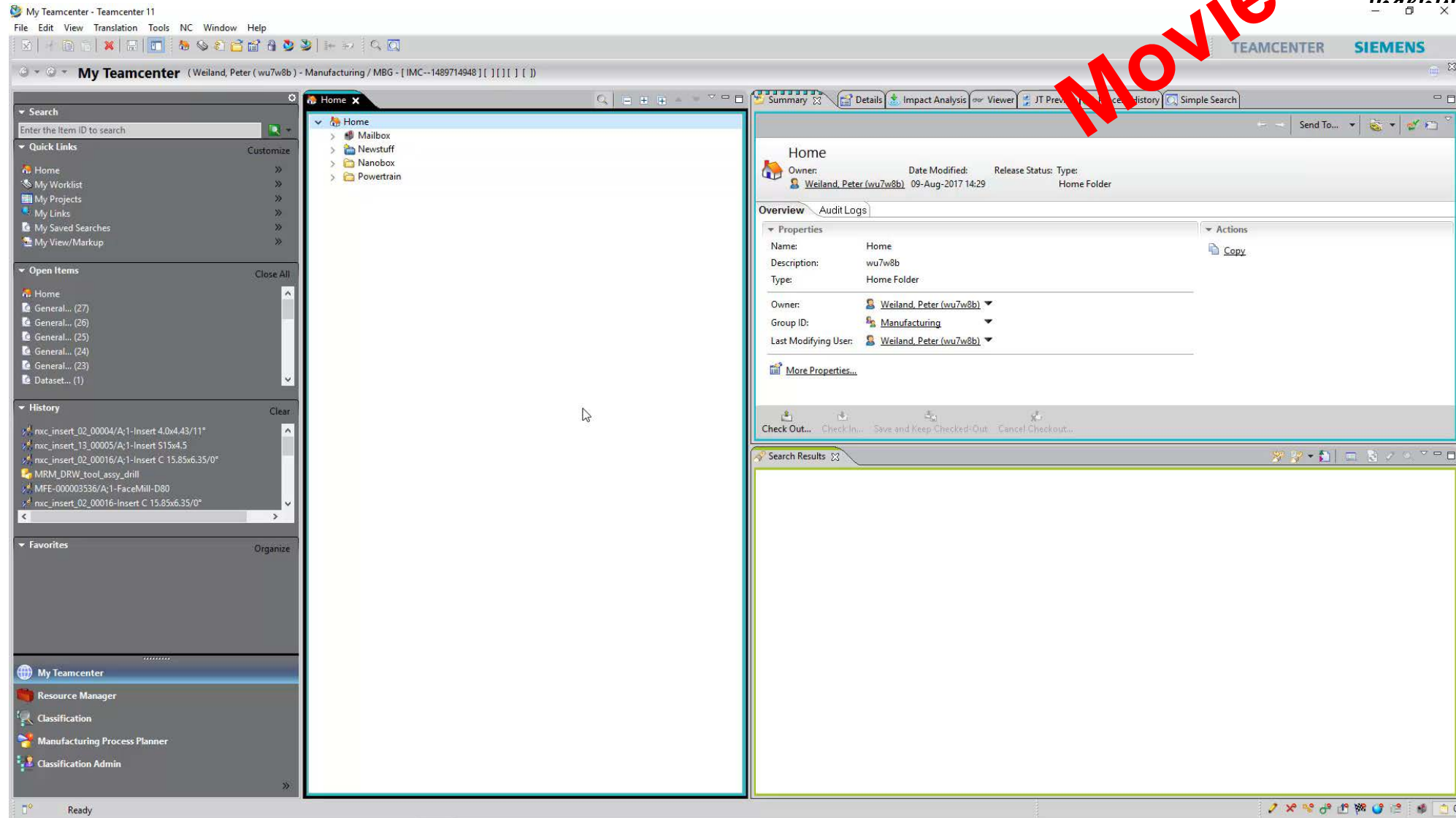
3) Product Data and Documents

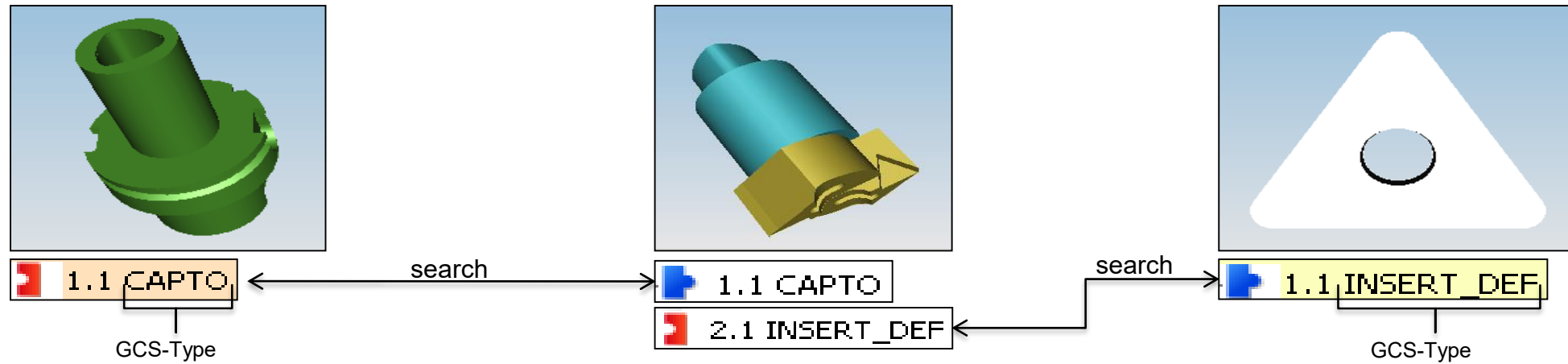
ISO 13399 Part 21

For each product there is an ISO 13399 p21 file providing the product attribute values
Optional - 3D models (STEP) and tool drawings



刀具厂商样本导入



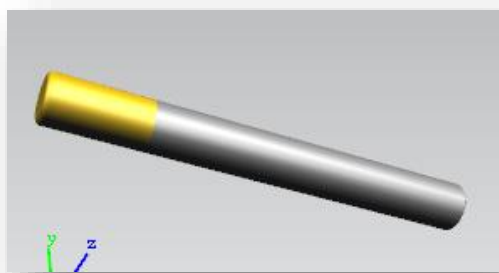


Connection Data	
Connection Size Code Machine Side	CZCMS
Connection Size Code Workpiece Side	CZCWS
Connection Code Type Machine Side	CCTMS
Connection Code Form Type Machine Side	CCFMS
Connection Code Type Workpiece Side	CCTWS
Connection Code Form Type Workpiece Side	CCFWS
Connection Code Workpiece Side	CCWS
Connection Code Machine Side	CCMS

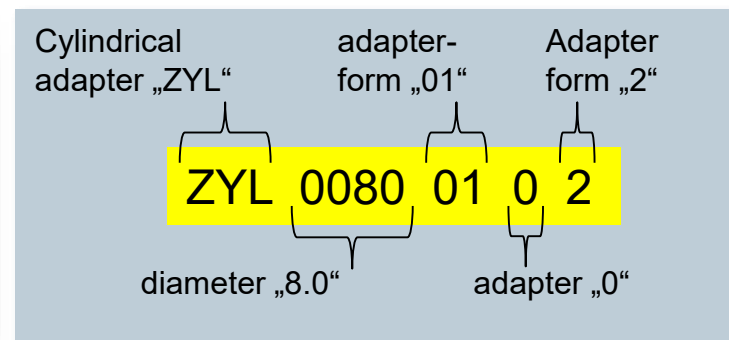
Interface Connection Attributes

连接号

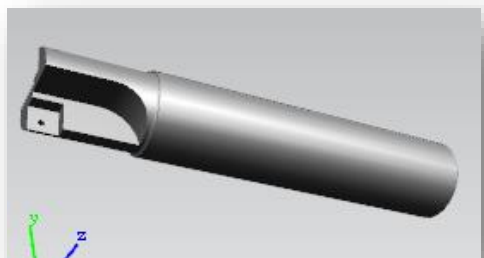
Example for solid body tools:



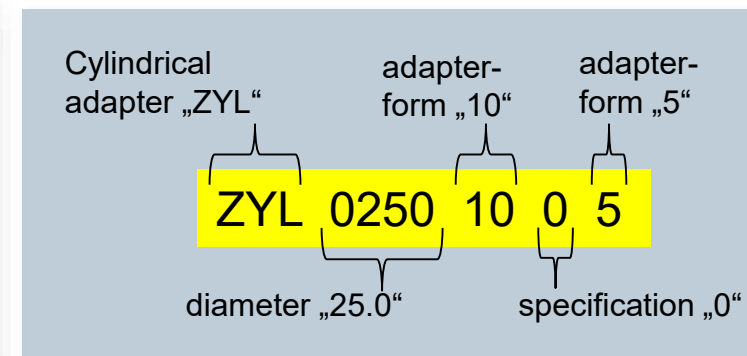
Connection Data	
Connection Size Code Machine Side	CZCMS 0080
Connection Code Type Machine Side	CCTMS ZYL Straight Shank Adapter
Connection Code Form Type Machine Side	CCFMS 01
Connection Thread Nominal Size Machine Side	THSZMS
Connection Code Machine Side	CCMS ZYL00800102
Machine Adapter	MA0



Example for insert carrier tools:

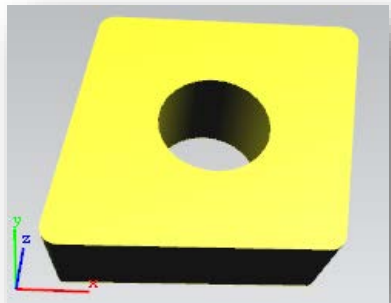


Connection Data	
Connection Size Code Machine Side	CZCMS 0250
Connection Code Type Machine Side	CCTMS ZYL Straight Shank Adapter
Connection Code Form Type Machine Side	CCFMS 10
Connection Thread Nominal Size Machine Side	THSZMS
Connection Code Machine Side	CCMS ZYL02501005
Machine Adapter	MA0
Insert Interface Code, Position A	IICA SD09T3073N
Insert Interface Code, Wiper Edge	IICWE

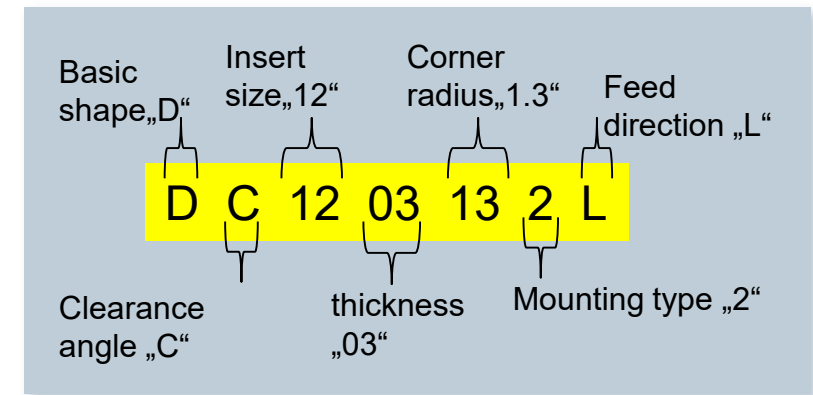


连接号

Example for inserts:

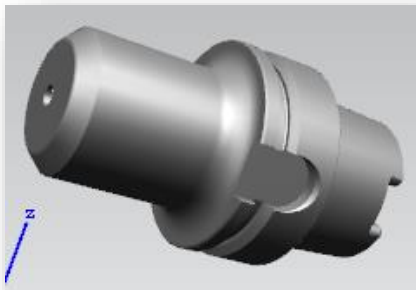


Connection Data
Insert Interface Code IIC DC1203132L

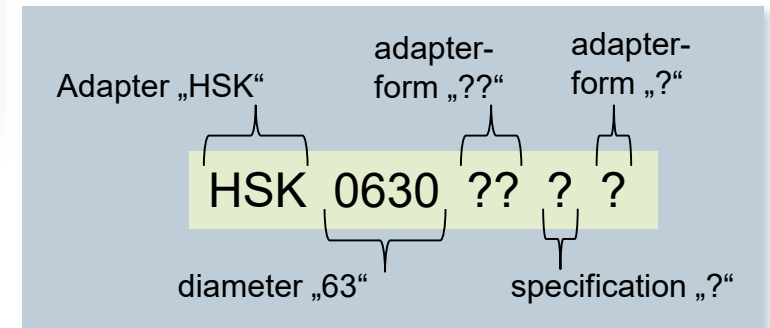
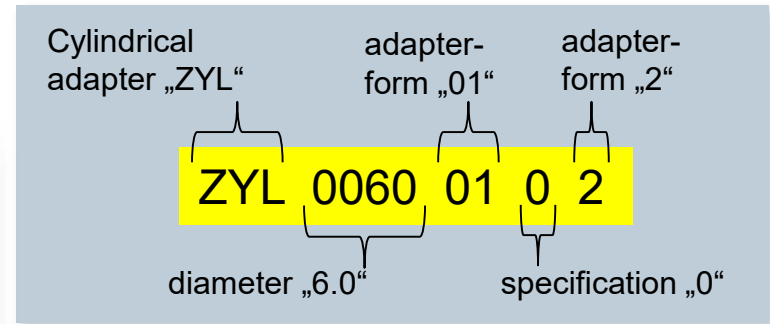


连接号

Example for holder for milling and drilling:



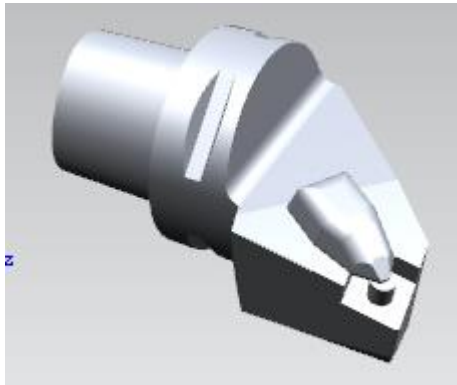
Connection Data		
Connection Size Code Machine Side	CZCMS	0630
Connection Size Code Workpiece Side	CZCWS	0060
Connection Code Type Machine Side	CCTMS	HSK Taper Lock
Connection Code Form Type Machine Side	CCFMS	
Connection Code Type Workpiece Side	CCTWS	ZYL Straight Shank Adapter
Connection Code Form Type Workpiece Side	CCFWS	
Machine Adapter	MA0	HSK63 Hollow Taper Shank HSK 63
Actuation Method	LAM	
Connection Code Workpiece Side	CCWS	ZYL00600102
Connection Code Machine Side	CCMS	HSK0630????



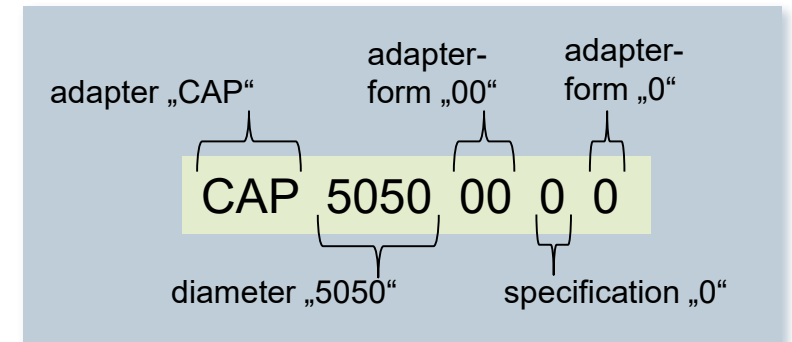
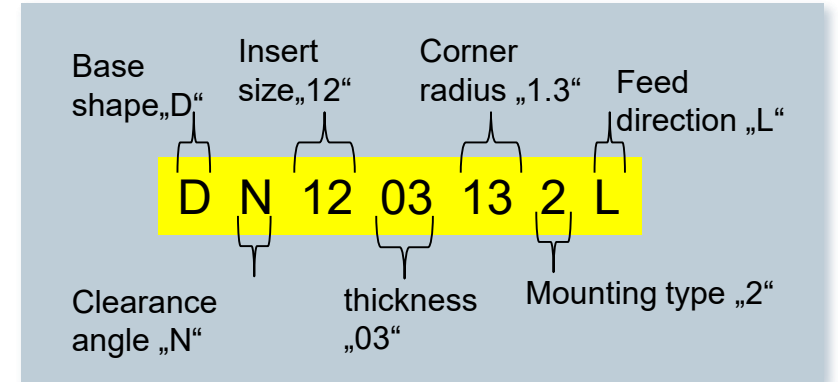
If multiple values possible
please use the wildcards „?“

连接号

Example for turning holder:

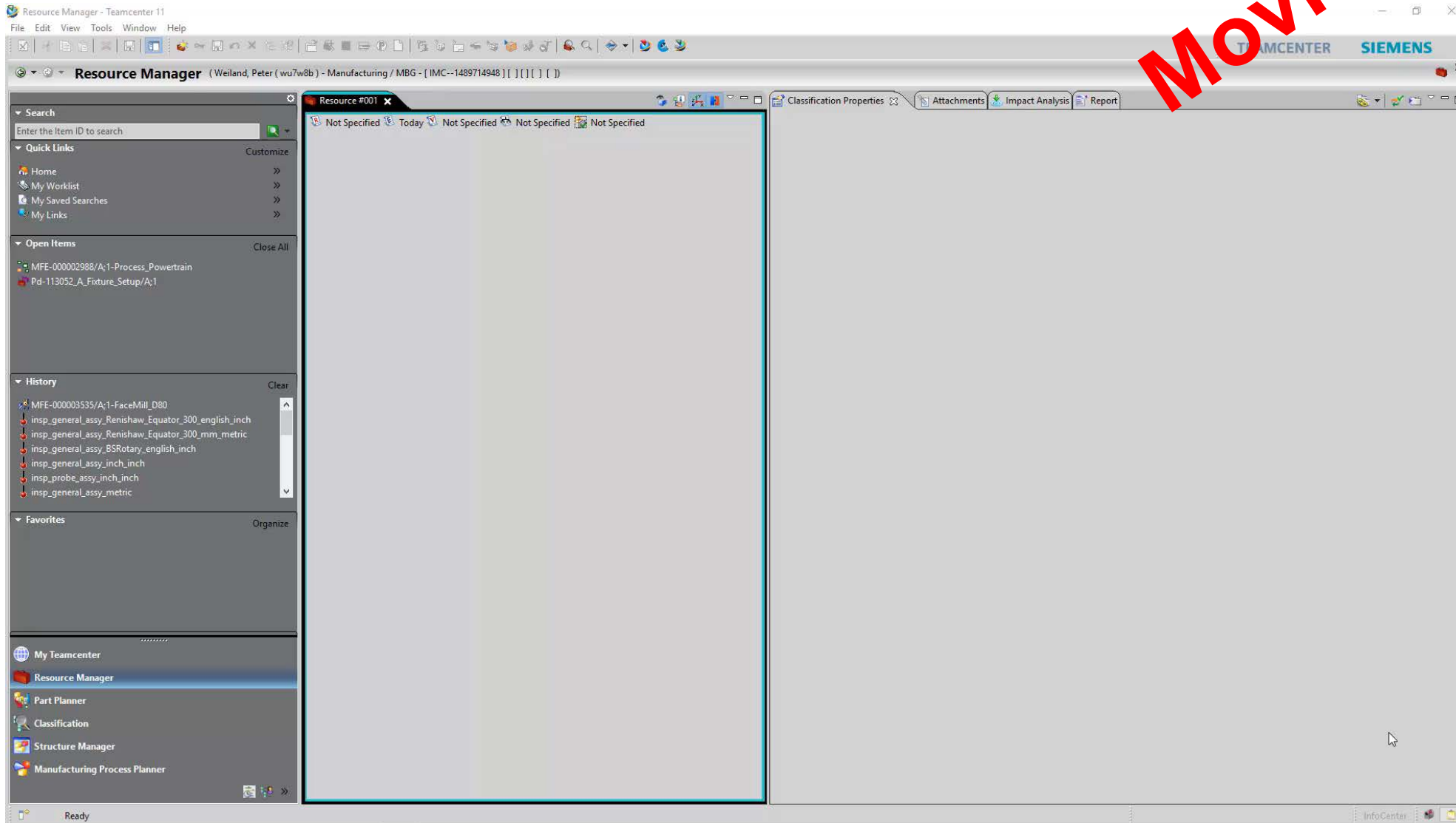


Connection Data	
Connection Size Code Machine Side	CZCMS <input type="text"/>
Connection Code Type Machine Side	CCTMS CCS Coromant Capto System
Connection Code Form Type Machine Side	CCFMS <input type="text"/>
Connection Code Machine Side	CCMS CAP50500000
Machine Adapter	MA0 C5 Capto PSK/CCS 5: 50mm
Insert Interface Code	IIC DN1203132L



Create Tool Assembly

Movie

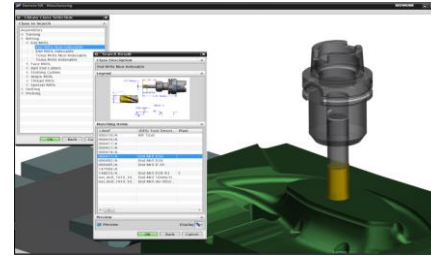


刀具管理员与数控编程人员

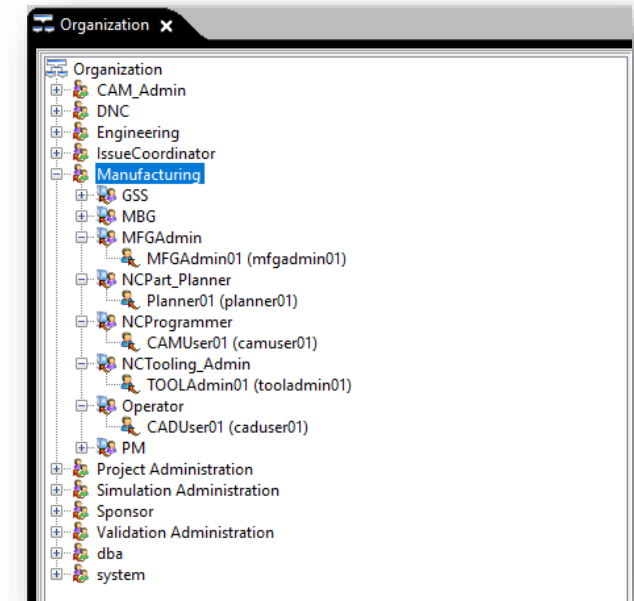
MRL Authoring User
creates the tools
and maintains the
library
(tooladmin01)



Teamcenter / MRL



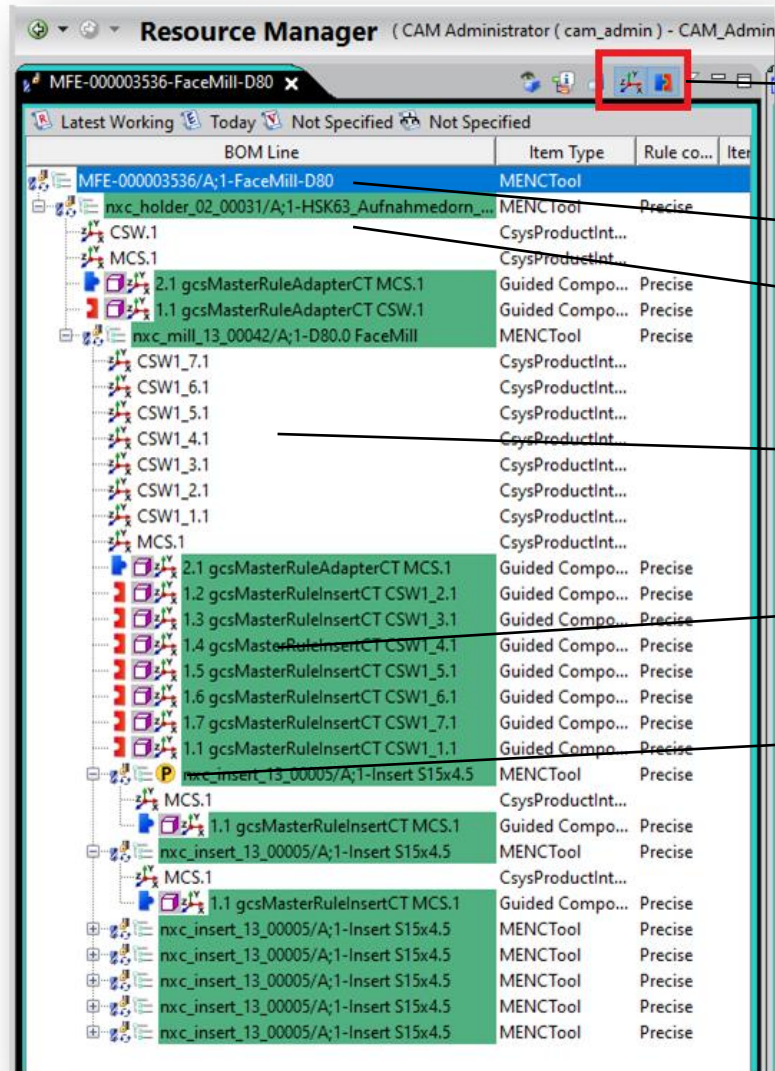
NC PROGRAMMER
creates tool paths using
tools created by the MRL
Authoring User
(camuser01)



The screenshot displays the Siemens Teamcenter Resource Manager interface. On the left, a navigation pane shows 'Resource Manager' selected. The main area is divided into three sections:

- Resource components and Connection Codes:** A BOM tree for 'MFE-00003536/A;1-FaceMill-D80' is shown. It lists various components like 'MENCTool', 'CsysProductInterface', and 'Guided Component...' with their respective 'Rule configured by' values.
- Tooling library attributes:** A 'Classification Properties' dialog box is open for 'Square Shoulder Mills Indexable'. It shows fields for 'Tool Description', 'Comments', 'Supplier', 'Plant', 'Machine Group', 'Status', 'Site Specific Data', 'Resource Location', and 'Resource Status'. Below these are 'Collision Data' fields (Max. Depth, Collision Distance KK, KE, KF) and 'NX Tool Type' (NX 01;01 NX Milling Tool 5 Parameter).
- Library instance image (3D model):** A 3D model of a face mill tool is shown, along with a technical drawing (schematic drawing) of the tool. The drawing includes dimensions and a barcode.

用户调用的刀具



Filter for Csys and CPs

Item Revision (Tool Assembly iteself)

Item Revision Component

Coordinate Systems

Guided Component Search elements
Connection Points

Propagation Point for attribute values

刀柄数据传播

Preferences By Search

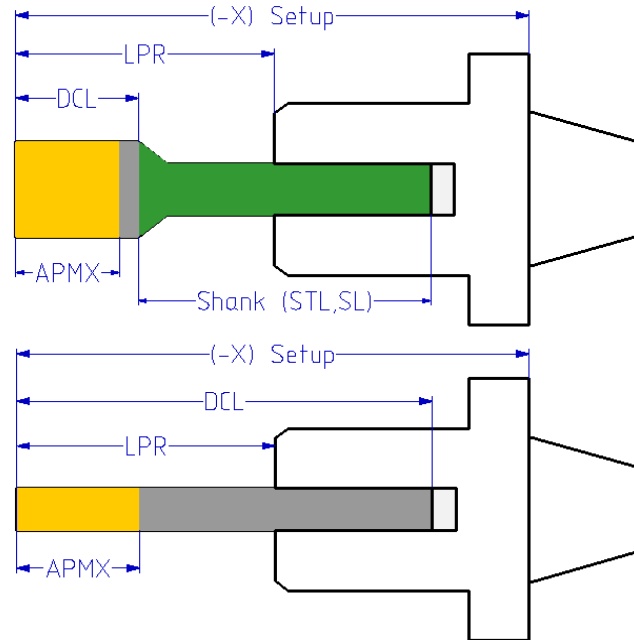
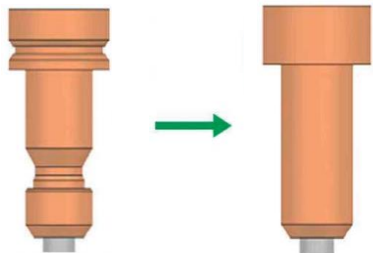
Name	Location	Value
MRMHolderData	Site	true

- The holder attributes are attributes from the tool assembly
- You can find it also in the tool dialog in NX under the holder tab. They were used for the tool path generation

important:

LPR and DCL **must** filled out. Because of automatically holder data identify

holder simplify with TC11.5



D4.0 R0.5 Bullmill/Hsk63

Tool Shank Holder More

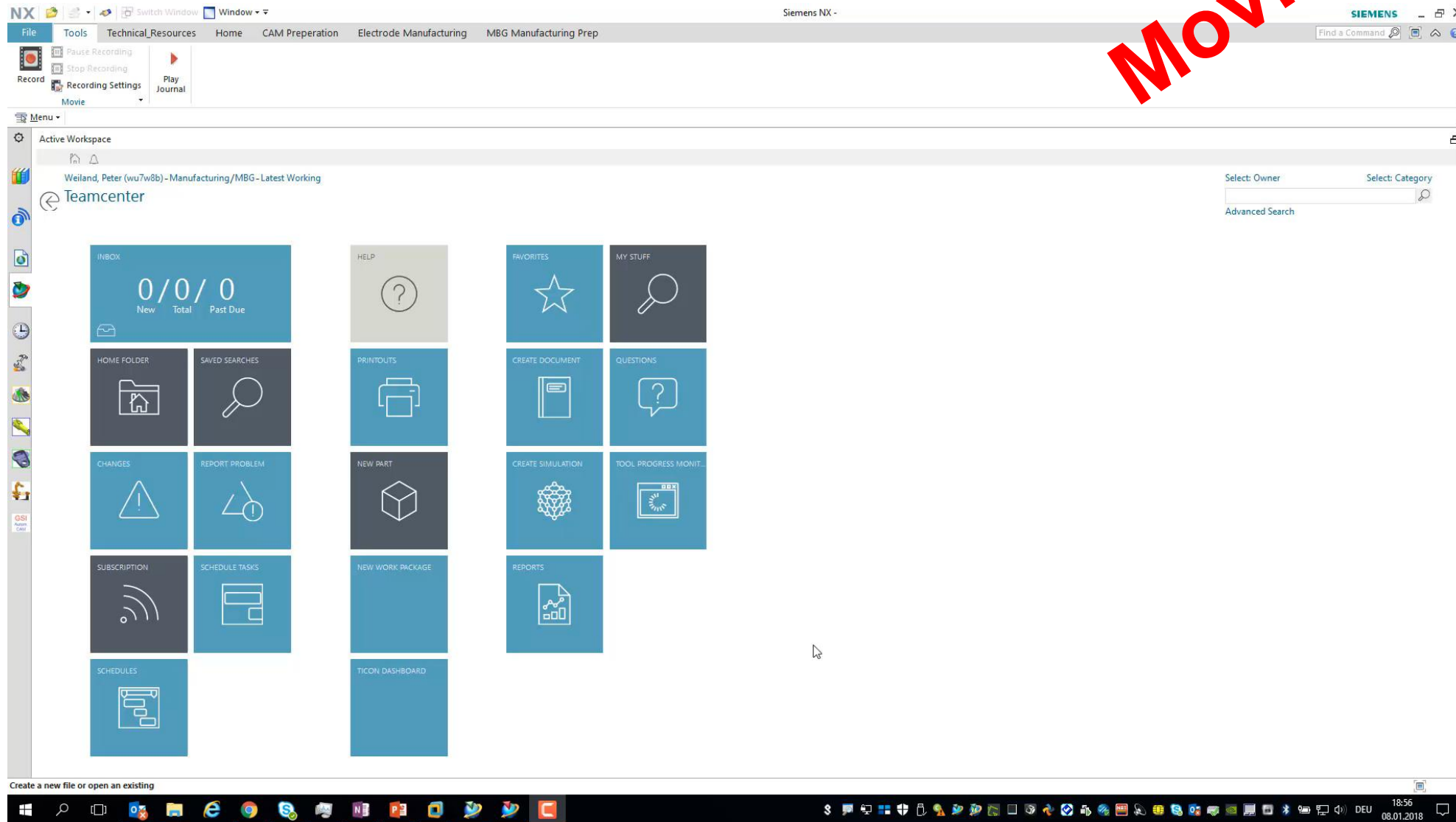
Legend

Holder Steps

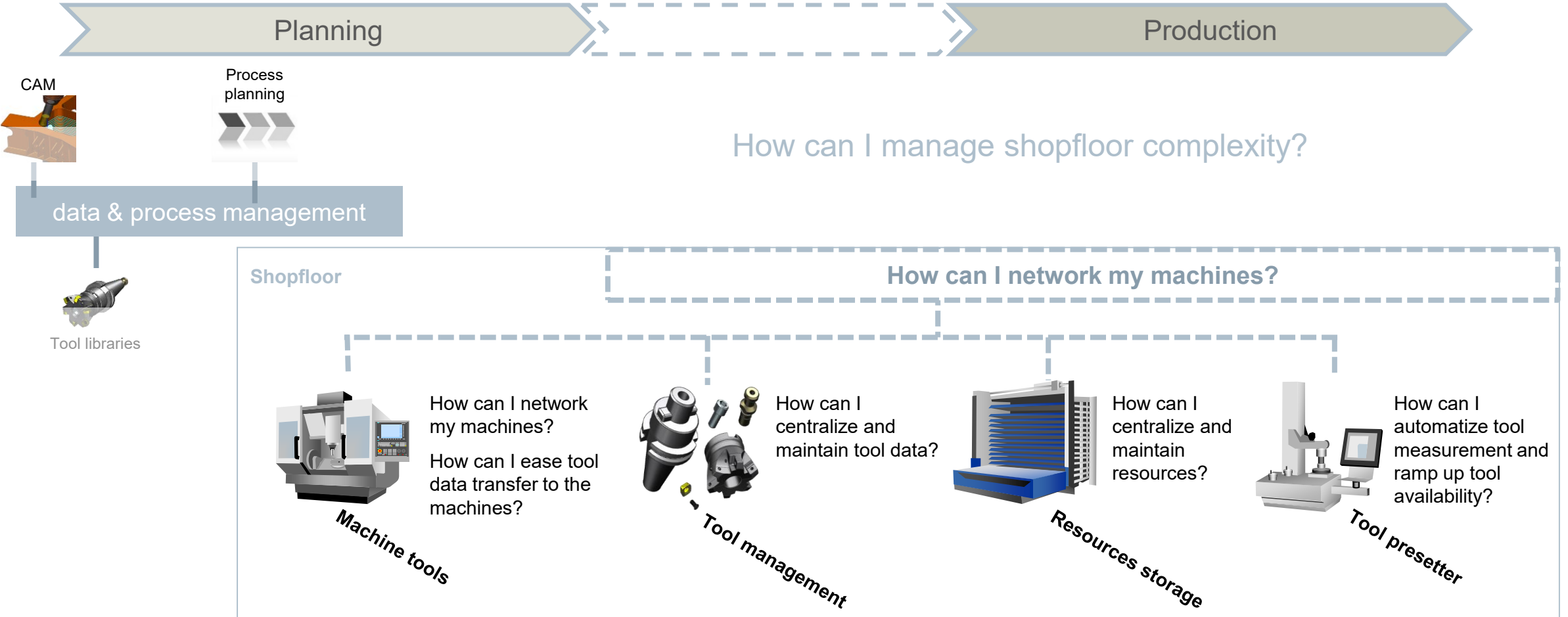
(LD) Lower Diameter	62.9400
(L) Length	66.5660
(UD) Upper Diameter	62.9400
(B) Taper Angle	0.0000
(R1) Corner Radius	0.0000

Step	Lower Diameter	Length
1	17.237000	0.366000
2	17.519000	0.124000
3	18.000000	2.510000
4	18.000000	0.134000
5	17.519000	0.231000
6	17.237000	0.270000
7	17.237000	0.231000
8	17.519000	0.124000

Movie

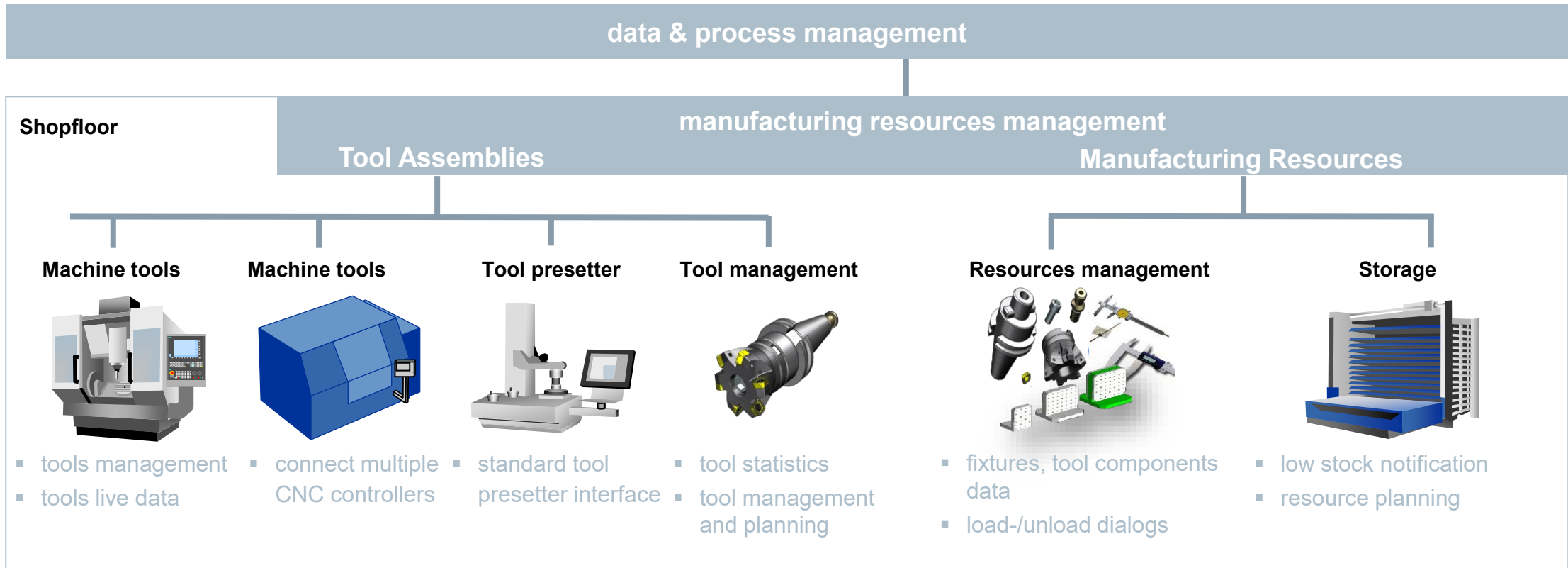


Managing individual tool assets at the shop floor

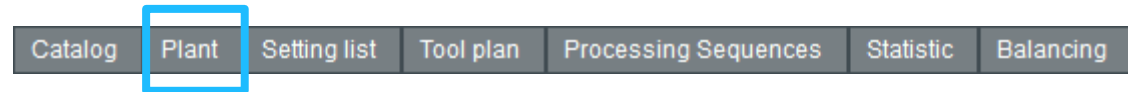


虚拟刀具与实物刀具的对应

The solution: connect virtual and real world by networking your resources



Online access to real tool data in machine tools, storages, and presetters



■ Machines

- Tool assemblies with constantly up-to-date data from the CNC (remaining live time, tool offset data,)

■ Stock location

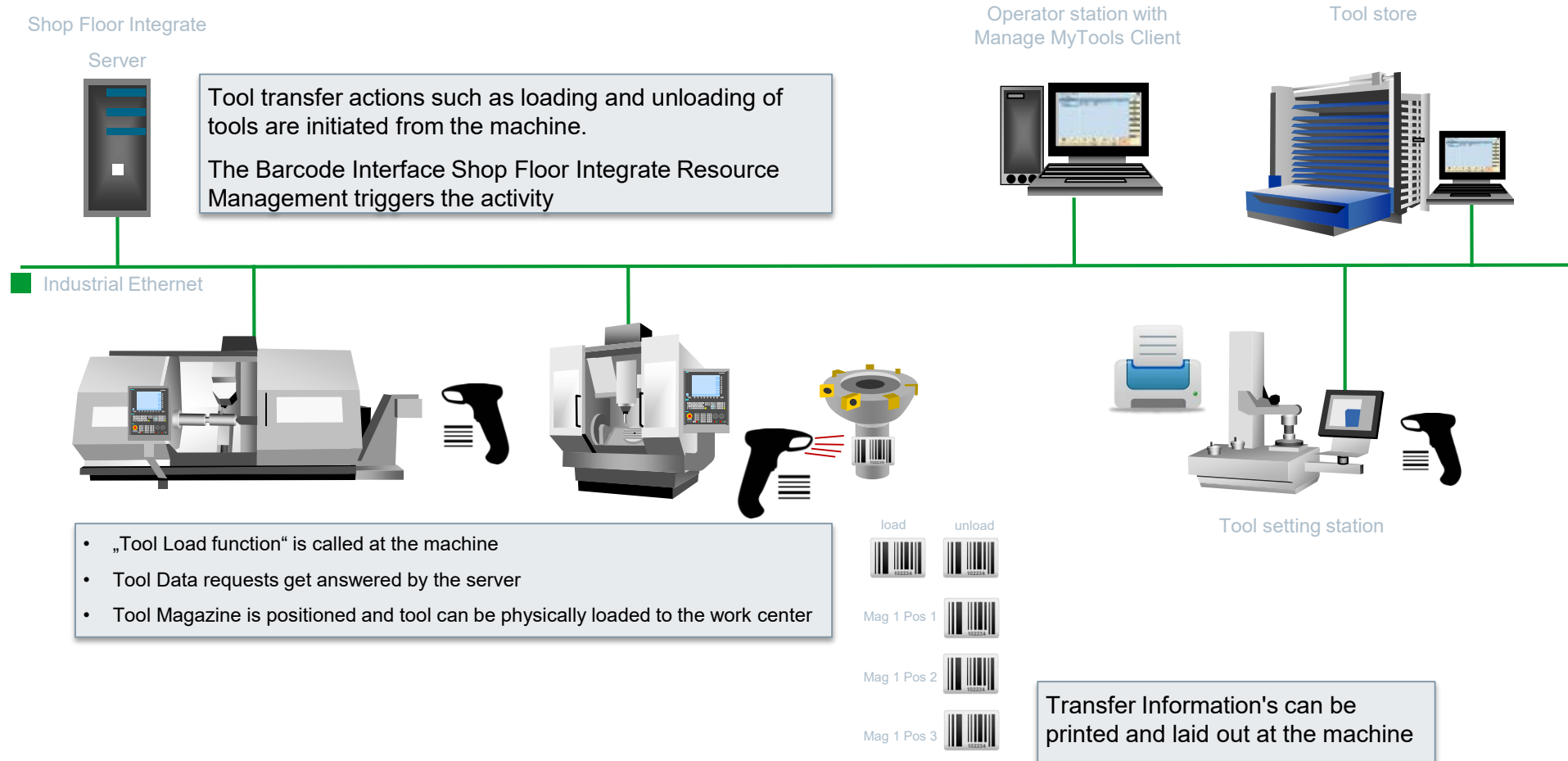
- Administration of tool assemblies and components
- Organization of storages
- Assignment of resource data to appropriate location

■ Technical data and drawings

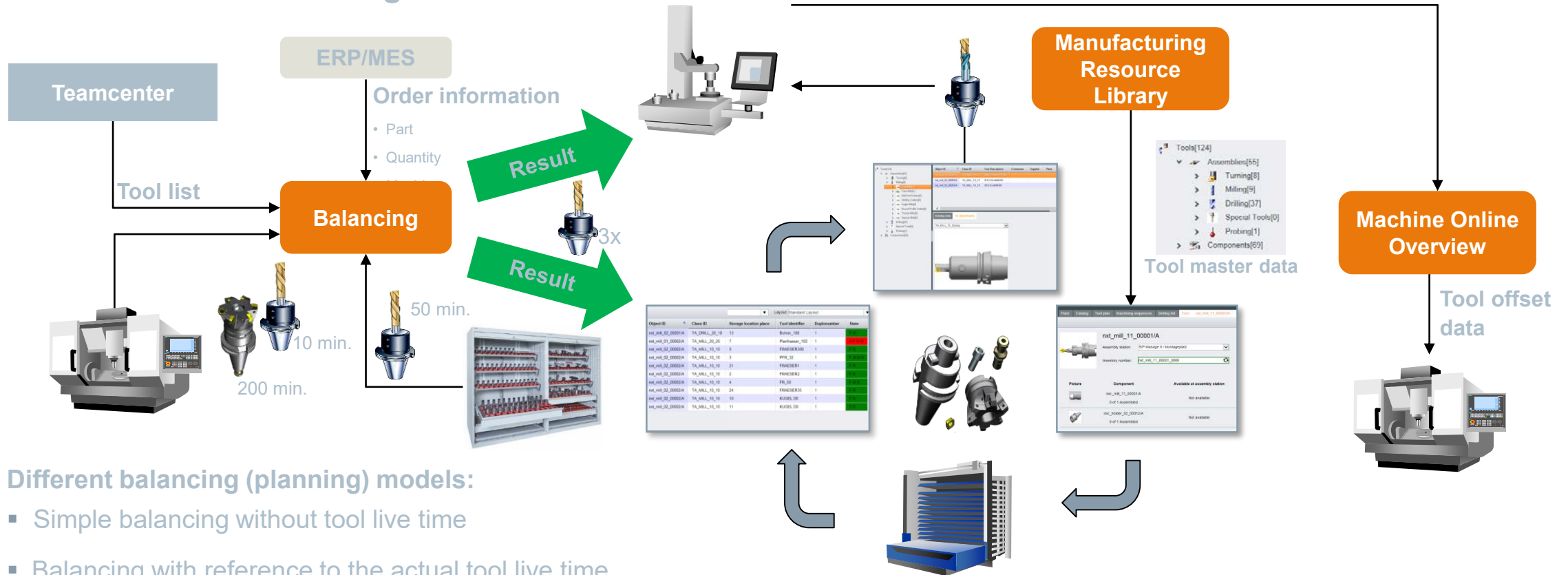
- Components data and assembly drawings

Object ID	Class ID	Number	Inventory number	Storage location component	Storage location place	Tool identifier	Duplonumber	State	Tool type
nxt_mill_02_00002/A	TA_MILL_10_10	1	000057-0002	SIP Manage It / 840Dsl_ak / MAGAZIN_30	9	FRAESER300	1	FR	120
nxt_mill_02_00002/A	TA_MILL_10_10	1	000102-0002	SIP Manage It / 840Dsl_ak / MAGAZIN_30	3	PFR_32	1	F M R	140
nxt_mill_02_00002/A	TA_MILL_10_10	1	nxt_mill_02_00002_0002	SIP Manage It / 840Dsl_ak / MAGAZIN_30	21	FRAESER1	1	FR	140
nxt_mill_02_00002/A	TA_MILL_10_10	1	nxt_mill_1010_100-0002	SIP Manage It / 840Dsl_ak / MAGAZIN_30	2	FRAESER2	1	FR	120
nxt_mill_02_00002/A	TA_MILL_10_10	1	nxt_mill_2010_100-0001	SIP Manage It / 840Dsl_ak / MAGAZIN_30	4	FR_50	1	F M R	140

Tool actual data	
Owner station	9
Owner magazine	1
Read magazine station no. from tool	9
Read magazine no. from tool	1
Read number of cutting edges from tool	1
Duplo number	1
Tool identifier	FRAESER300
Size to the left in half locations	1
Size to the right in half locations	1
Size up in half locations	1
Size down half locations	1
Magazine station type of tool	1
Tool status	1026
Type of tool monitoring	0
Type of tool search for replacement tools	0
Tool data	0
Tool-related user data	
User-defined tool parameter 1	0
User-defined tool parameter 2	0



Workflow - Tool Planning Process



Different balancing (planning) models:

- Simple balancing without tool live time
- Balancing with reference to the actual tool live time
- Load- / unload dialogs on the SINUMERIK 840D
- Strategy for single part and series production

Machines ready for next jobs, thanks to prior comparison of tool demand and available resources

- Calculation of required tool demand for the next production order based on current situation of machines and storages
 - Tool life time only with tool type request
 - Consideration of already existing tools with selection of potential storage areas
- Planning results:
 - Preset new tool
 - Load from a storage in the machine
 - Unload no longer required tools from the machine

Catalog Plant Setting list Tool plan Processing Sequences Statistic Balancing

Plant Catalog Tool plan Machining sequences **Setting list** +

SIP Manage It

ObjectID	Tool identifier	Target	Time of provision	Machining sequences	Number of tools	Tool plan
nxt_mill_01_00	840Dsl_ak	840Dsl_ak	2015-06-02T16:46:00	Motorblock_V12	1	Motorblock_V12
nxt_mill_01_00	840Dsl_ak	840Dsl_ak	2015-06-02T17:35:00	Motorblock_V12	1	Motorblock_V12
nxt_mill_11_00	r_10	840Dsl_ak	2015-06-02T16:59:00	Motorblock_V12	1	Motorblock_V12
nxt_mill_11_00	r_10	840Dsl_ak	2015-06-02T17:29:00	Motorblock_V12	1	Motorblock_V12
nxt_mill_11_00	r_10	840Dsl_ak	2015-06-02T19:12:00	Motorblock_V12	1	Motorblock_V12
nxt_mill_11_00	r_10	840Dsl_ak	2015-06-02T20:55:00	Motorblock_V12	1	Motorblock_V12

Plant Catalog **Tool plan** Machining sequences Setting list +

SIP Manage It

Tool plan	Version	In Use	Date	Target
Motorblock_V12	2	Yes	2015-06-01T11:56:47	840Dsl_ak
Motorblock_V8	2	Yes	2015-06-01T12:01:36	840Dsl_ak

Tool plan details

Tool plan* Motorblock_V12 Component 840Dsl_ak

NC program* MOTORBLOCK_V12.MPF Total duration* 109 min Channel No.* 1

Version 2 Changed on 2015-06-01T11:56:47 Changed by ADMIN

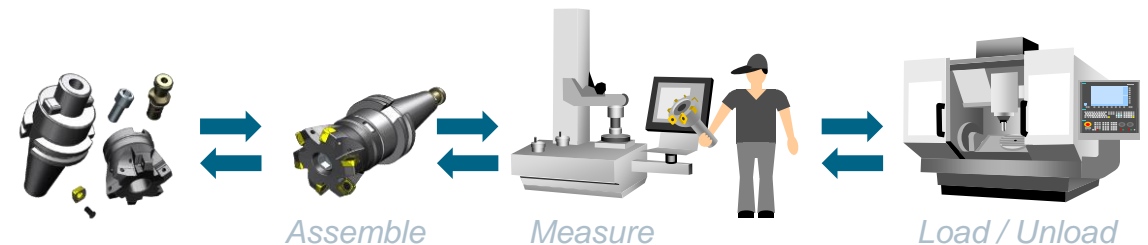
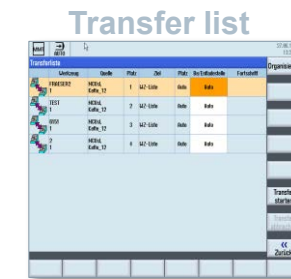
No.	Tool identifier*	ObjectID*	Monitoring*	Cut time*	Usage amount*	Cutting edge*
0	Planfraeser_100	nxt_mill_01_00002/A	Tool life	13	-	1
1	Kugelkopffraeser_10	nxt_mill_11_00001/A	Tool life	36	-	1
2	Fraeser_50	nxt_mill_01_00003/A	Tool life	25	-	1

+ Add new tool

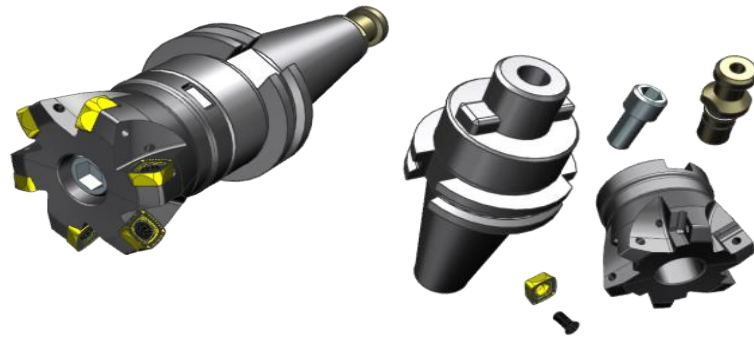
All tool lifecycle data are managed within an consistent workflow

Assembly / disassembly dialogs

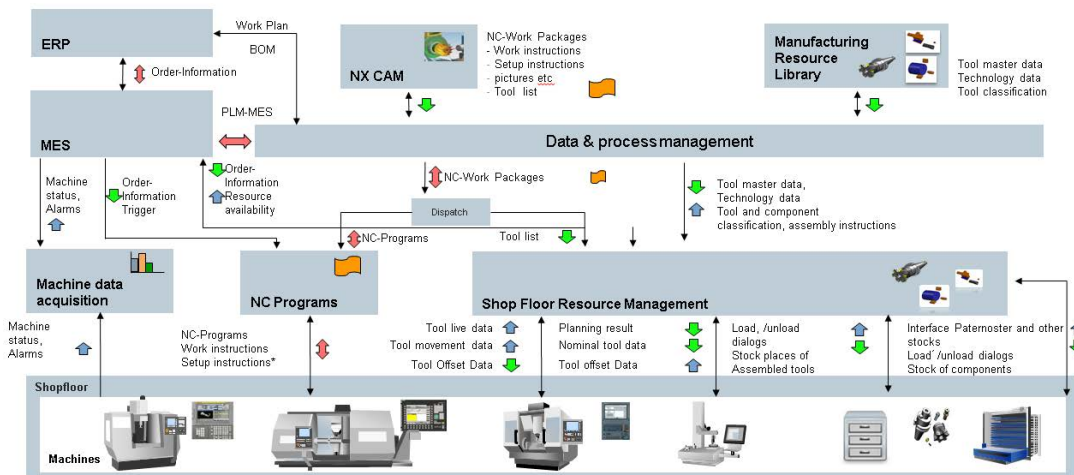
- Transfer to stores, master data from MRL (Manufacturing Resource Library)
- Show component stock location in assembly and disassembly dialogs with automatic update of tool inventory
- Interface to dynamic storage systems like Kardex or Haenel



Summary



- A standard off-the-shelf solution for our customers based on ISO
- A modern and up-to-date tool classification hierarchy
- An open platform for the integration of various tool vendor catalogs
- A seamless integration with NXCAM and all its features (3D models, guided component search...)
- An scalable solution from Resource Libraries to full Resource Management Solution
- Machine and Shop Floor Equipment connectivity
- Integrated in PLM Shop Floor value stream



localhost:8888/ localhost:8888/ActiveDNC/pages/search.xhtml?ds 192.168.56.22:8088/MCM/

User: DNC Admin (DNC Admin) - Manufacturing / MFI User: DNC Admin (DNC Admin) - Manufacturing / MFGAdmin Workplace: WPP

CAM000089/A-CAM Drone CAM000089/A-CAM Drone

Overview Content Blog MET Overview Content Blog METarget MEWorkArea

Properties

Element ID: CAM000089
Revision: A
Name: CAM Drone
Beschreibung: CAM000089
Typ: NC Machining Revision
Ist änderbar: True
Erstelldatum: 11-Sep-2018 09:00
Änderungsdatum: 29-Nov-2018 18:31
Freigabestatus:
Eigentümer: CAM Engineer (camuser01)
Letzte Änderung von: CAM Engineer (camuser01)

Properties

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Workplace
DMG Mori Mill Turn

Production
Production

Planned Downtime
Setup **Maintenan**

Unplanned Downtime
Technical Error

192.168.56.22:8088/PerfGrid/ 192.168.56. 192.168.56.22:8088/TimeLineChart/?wpl=DMG Mori

Hall Hermle C40 DMC80U

Mill Turn

Standby

OEE 32%

Production 00:29:14 Unplanned 00:56:55

Performance Grid

Week Month < Week 48 >

Workplace	Average	26.11.	27.11.	28.11.
Hermle C40 Mill Center	16%	0%	0%	98%
DMC80U Mill Turn 602	7%	0%	0%	39%
DMG Mori Mill Turn	22%	0%	0%	44%
HAAS VF6 14 Vertical Center	0%	0%	0%	0%

Workplace 0000 01 DMG Mori Mill Turn

Day Week Month < 04.

Production 31.87% Standby 6.87% Organizational Error 62.06%

Workplace 0000 01 DMG Mori Mill Turn

Day Week Month < 04.12. >

Production 31.57% Standby 6.97% Organizational Error 61.47%