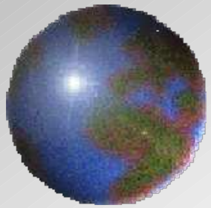


Dynavista

CAA V5 based

V10.2 / V11.2

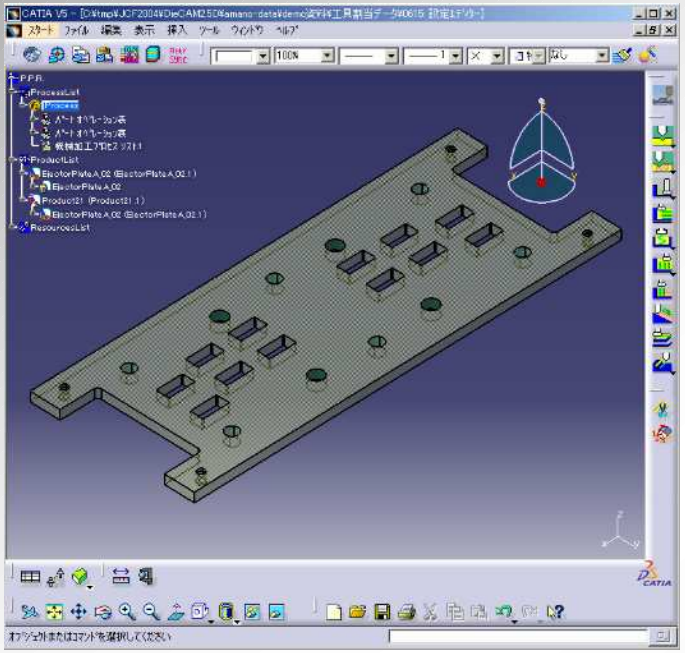
Die CAM 2.5D

October, 2011

UNIADEX, Ltd.

Die CAM 2.5D

Die CAM 2.5D/CAM 2.5D automates and optimizes machining for die structures.


CATIA V5
PPR
ProcessList
Process
ProductList
ResourcesList
CATIA

- Interference-free tool paths are calculated by taking tool changes and attachment changes into accout.

- Various machining operations especially for die structure machining.

- Automatic recognition of machining area and automatic selection of machining process and tool by the attribute association with DieStructure Design or MoldDesign.

- Machining sequence optimization taking efficiency and quality into account.

V5R18

V5R19

V5R20

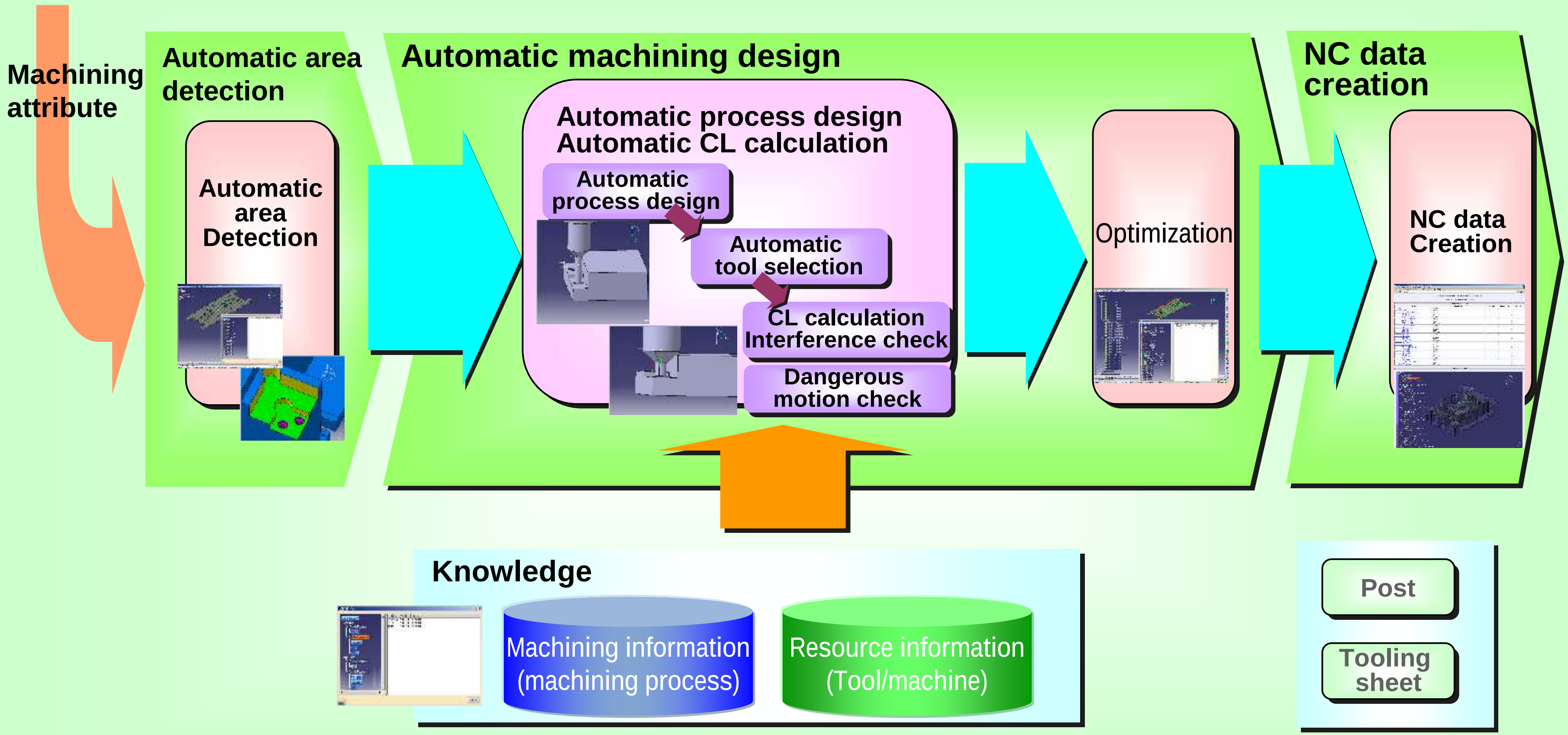
CAA V5 BASED

V5 prerequisites: MD2

Dynavista

Die CAM 2.5D command

DieStructure Design/Mold Design



Machining attribute

Automatic area detection

Automatic area Detection

Automatic machining design

Automatic process design
Automatic CL calculation

Automatic process design

Automatic tool selection

CL calculation
Interference check

Dangerous motion check

Optimization

NC data creation

NC data Creation

Knowledge

Machining information (machining process)

Resource information (Tool/machine)

Post

Tooling sheet

DynΛvistΛ / DieCAM 2.5D

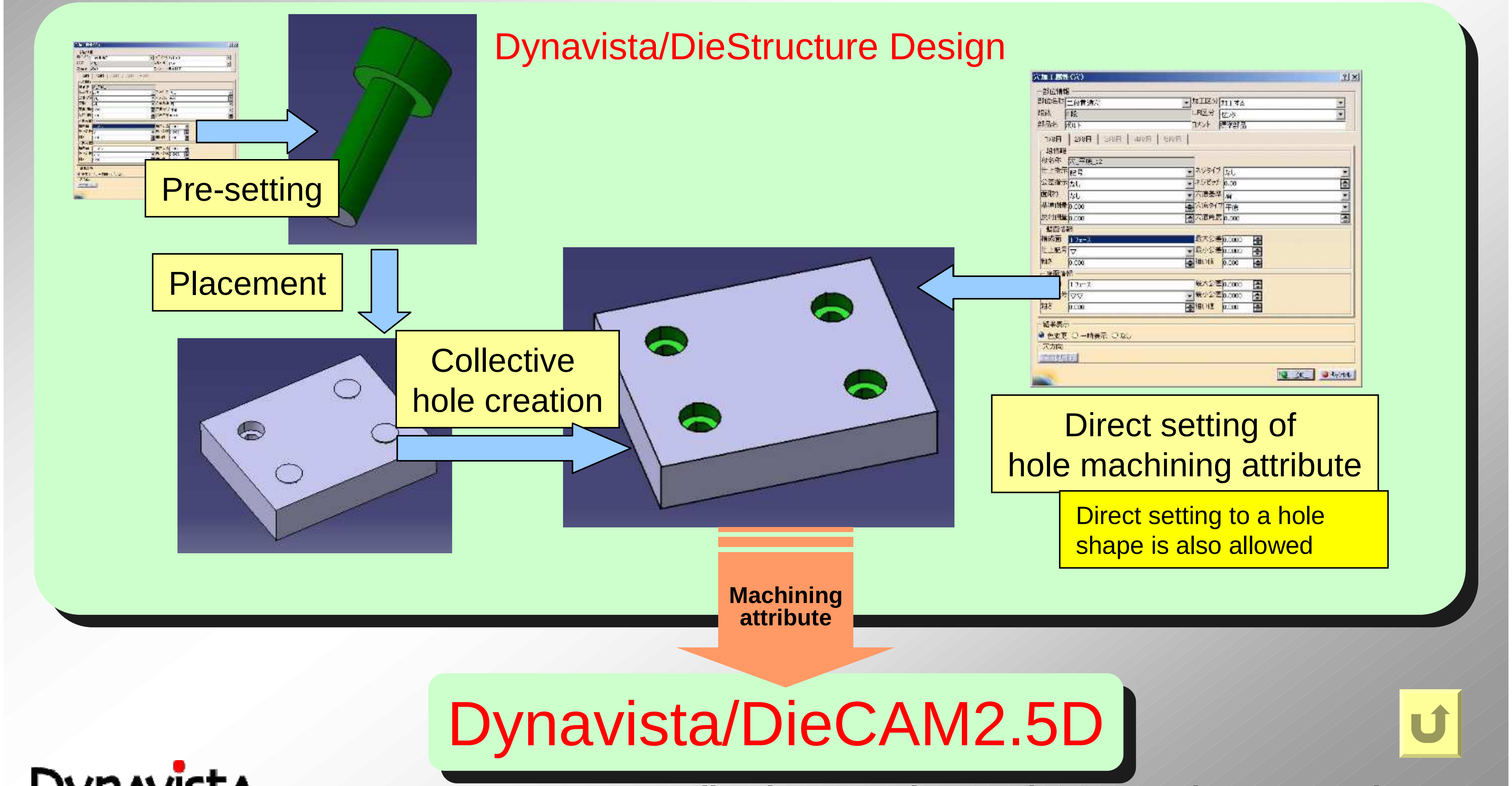
CATIA V5

DynΛvistΛ

Machining attribute

- Machining attribute is copied to a hole shape by adding the attribute to a cut solid and by executing Collective hole generation command.

Consideration of association with 2.5D CAM. Items can be customized such as addition of items and non display of an item.



Dynavista/DieStructure Design

Pre-setting

Placement

Collective hole creation

Direct setting of hole machining attribute

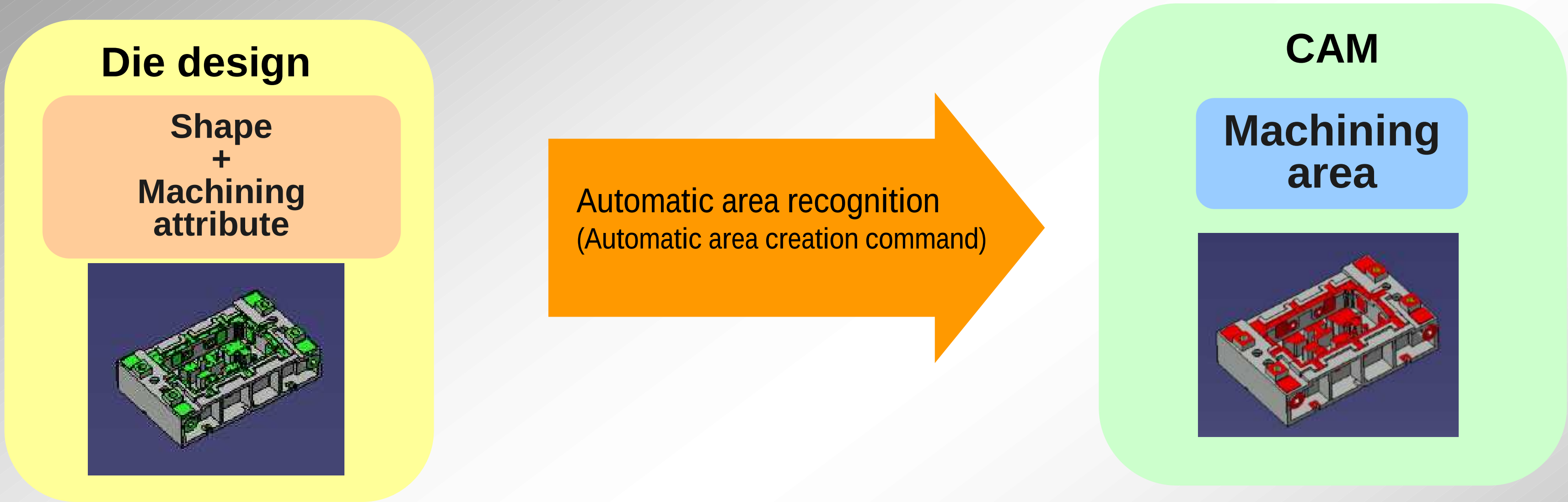
Direct setting to a hole shape is also allowed

Machining attribute

Dynavista/DieCAM2.5D

Automatic area recognition

- Machining attribute is copied to a hole shape by adding the attribute to a cut solid and by executing Collective hole generation command.



Die design

Shape
+
Machining attribute

Automatic area recognition
(Automatic area creation command)

CAM

Machining area

Topological continuous surfaces with same "Area name" will be recognized as one "Machining area" by referring machining attributes.

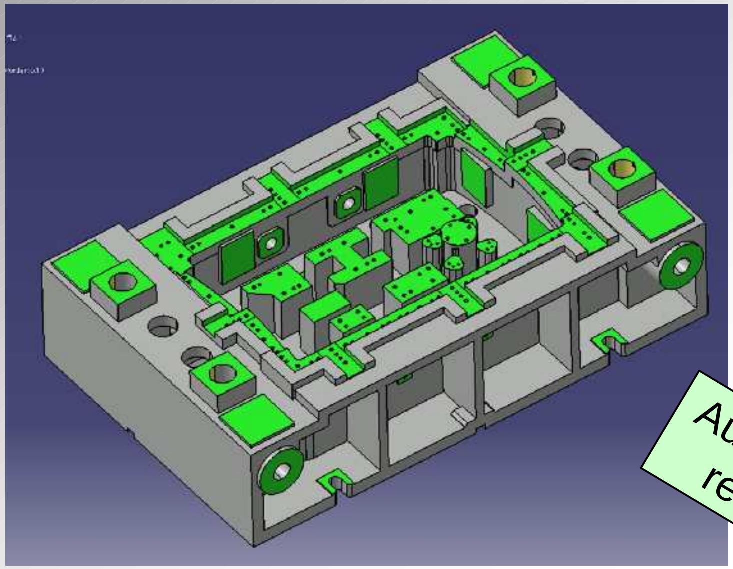
Followings are possible by defining machining areas.

(1) Assignment of optimum machining process to the recognized areas.

(2) Automatic definition of area parameters such as machining stock varied for each machining area.

Automatic machining design (automatic process assignment, automatic CL calculation) is possible by capturing machining targets without omission.

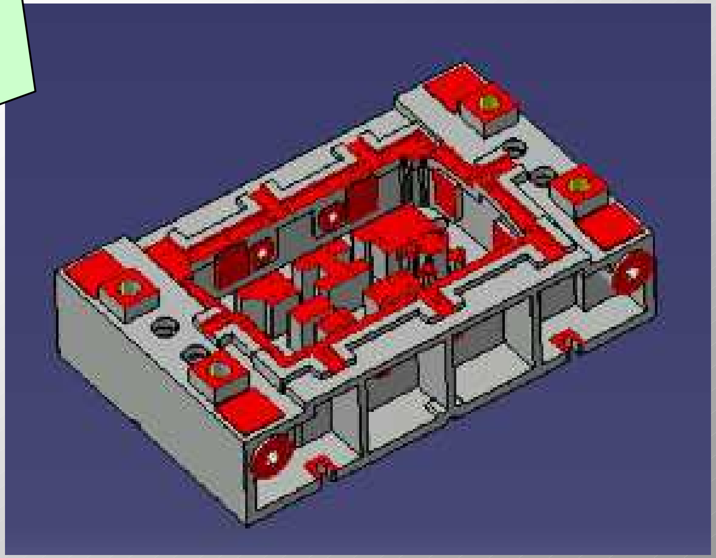
Result of automatic area recognition



Green:
surfaces where machining attributes
are attached by a design group

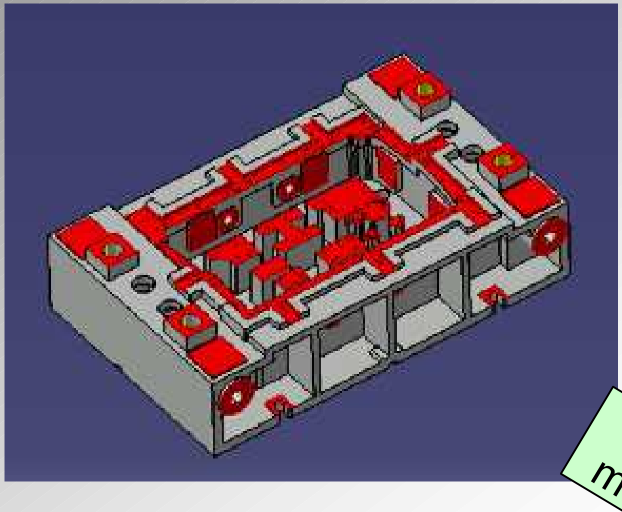
Automatic area recognition

Red:
Machining areas automatically
recognized by the system



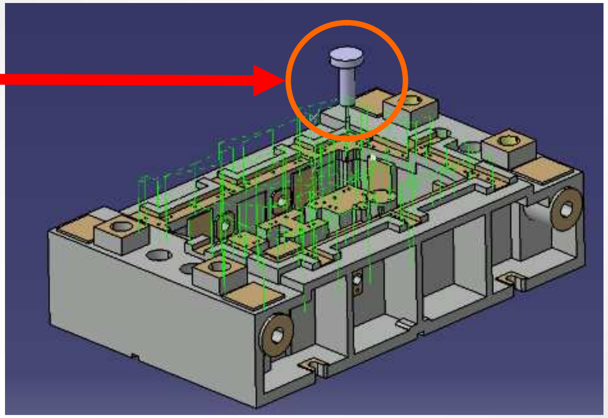
Actual measurement
OS : Windows XP
CPU : Pentium4 2.3GHz
Memory : 2GB
Version : V4.6(R14SP2)
Elapsed time : 45 sec
73 pockets, 158 holes

Result of automatic machining design

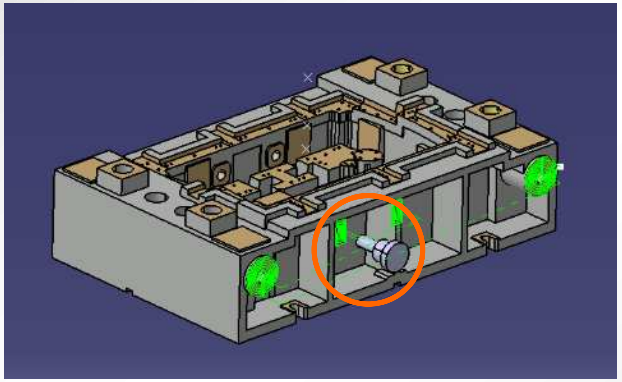


Automatic machining design

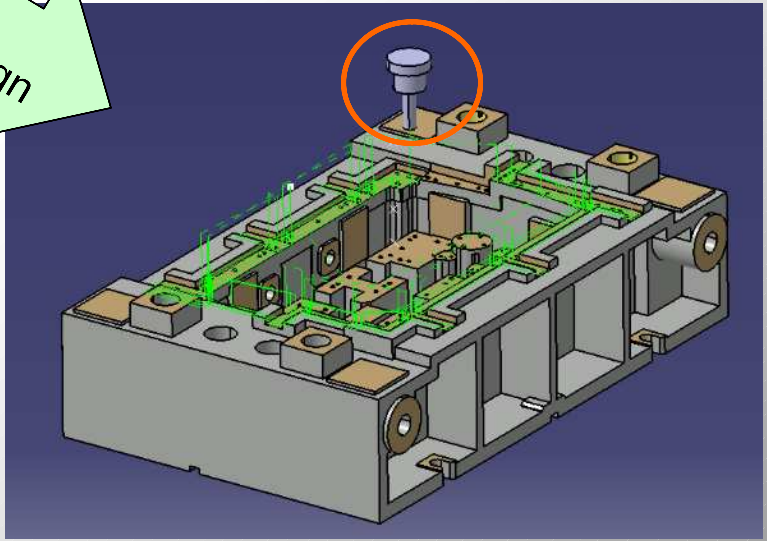
Automatically defined tool



Hole machining



Planar machining by the use of an attachment
(5 face machining)



Pocket machining (open type)

Automatic machining design (1)

Optimum machining procedure and tool system without machining residue and interference are determined at machining areas (hole, planar, pocket) by referring knowledge.

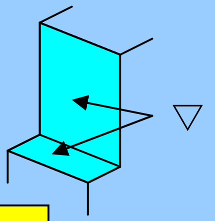
Automatic definition items

- Machining process set
- Tool axis direction
- Attachment
- Tool system (tool, chuck, holder)
- W axis control (quill extrusion/cross rail position)
- Process parameter (cutting pitch, feed rate)

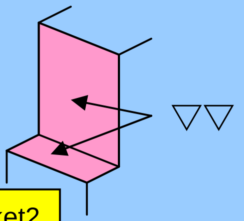
Ex. 1: Machining process set

-Rough machining is applied for ▽ surface

-Finishing is necessary for ▽▽ or more surfaces



- Pocket 1
  - 1: Wall rough
  - 2: Bottom rough

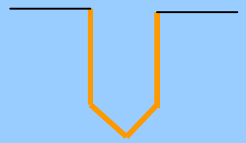


- Pocket2
  - 1: Wall rough
  - 2: Bottom rough
  - 3: Bottom finishing
  - 4: Wall finishing

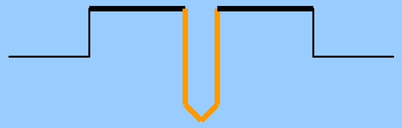
Ex. 2: Machining process set

- One more prepared hole for large hole diameter.

- Only tap prepared hole for small holes.



- Tap hole 1 (large)
  - 1: Center hole
  - 2: Prepared hole
  - 3: Tap prepared hole
  - 3: Tap

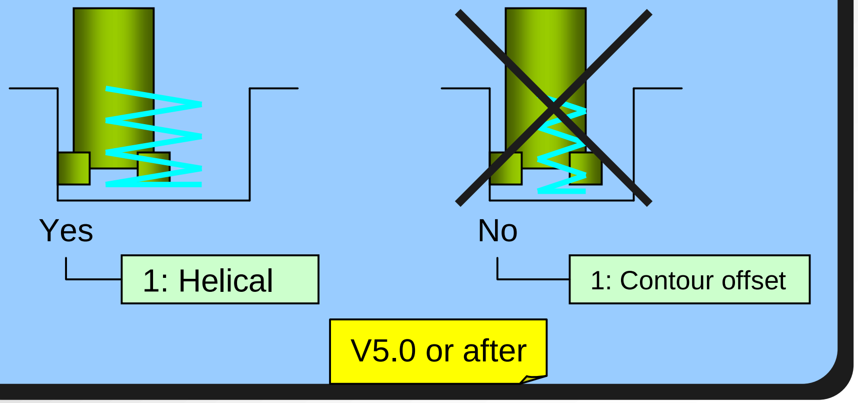


- Tap hole 2 (small)
  - 1: Center hole
  - 2: Tap prepared hole
  - 3: Tap

Automatic machining design (2)

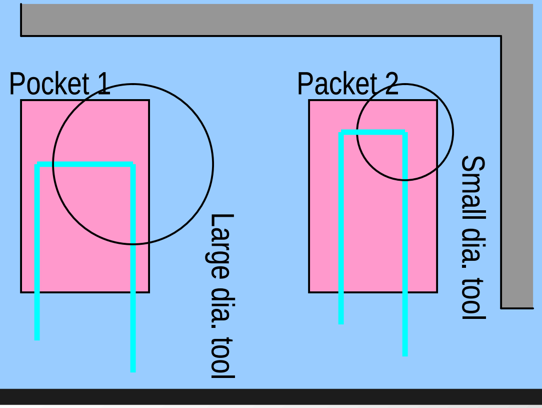
Ex. 3: Machining process composition

- Helical machining is used if a helical tool can be applied.
- Otherwise contour machining is applied.


Yes
1: Helical
No
1: Contour offset
V5.0 or after

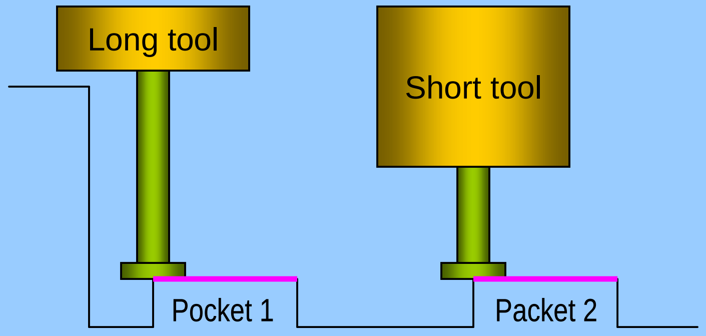
Ex. 4: A tool without rest of machining

- Large diameter tool is used when no rest of machining.
- Small diameter tool is used when rest of machining exists


Pocket 1
Packet 2
Large dia. tool
Small dia. tool

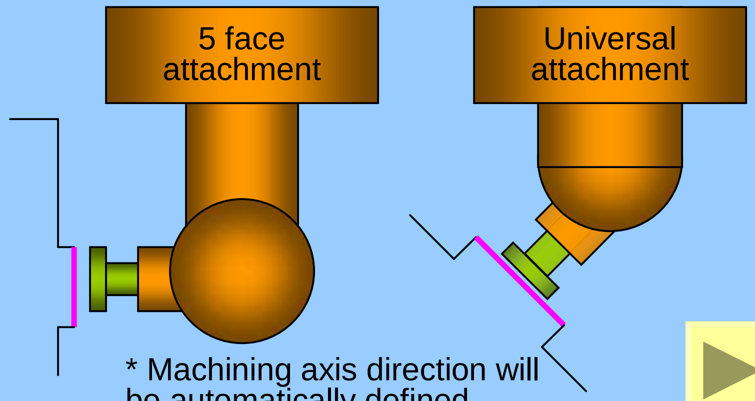
Ex. 5: No interference tool set

- Long tool is used when an interference object exists around.
- Short tool is used when no interference object exists around.


Long tool
Short tool
Pocket 1
Packet 2

Ex. 6: Attachment

- 5 face machining
- Fixed slope machining


5 face attachment
Universal attachment

* Machining axis direction will be automatically defined.

Automatic machining design (3)

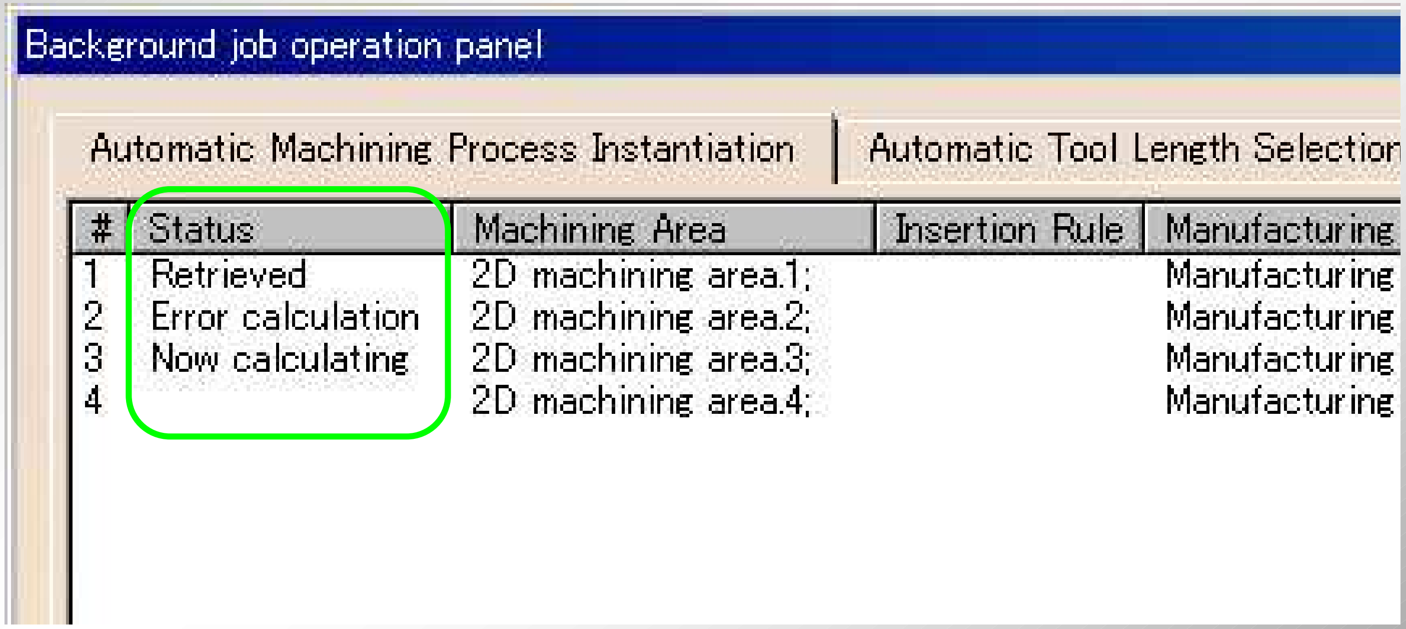
- Improvement of batch management panel

Abstract

(1) Batch management panel is changed to be a resident panel.

(2) Each job status of calculation is displayed on the batch control panel.
Status is displayed such as “Not registered”, “waiting in BGJ” and “Calculation in BGJ”.

(3) Calc-completed job can be scheduled for re-calculation.



Background job operation panel

Automatic Machining Process Instantiation
Automatic Tool Length Selection

#	Status	Machining Area	Insertion Rule	Manufacturing
1	Retrieved	2D machining area.1;		Manufacturing
2	Error calculation	2D machining area.2;		Manufacturing
3	Now calculating	2D machining area.3;		Manufacturing
4		2D machining area.4;		Manufacturing

Automatic machining design (4)

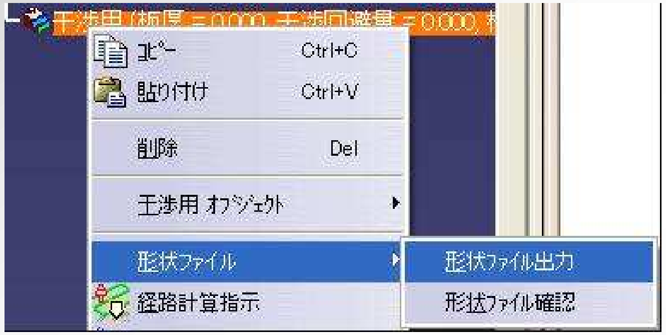
- Use of pre-output of the object shape

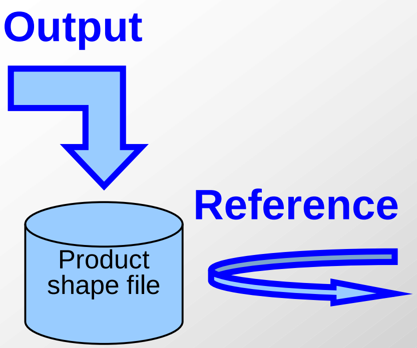
Abstract

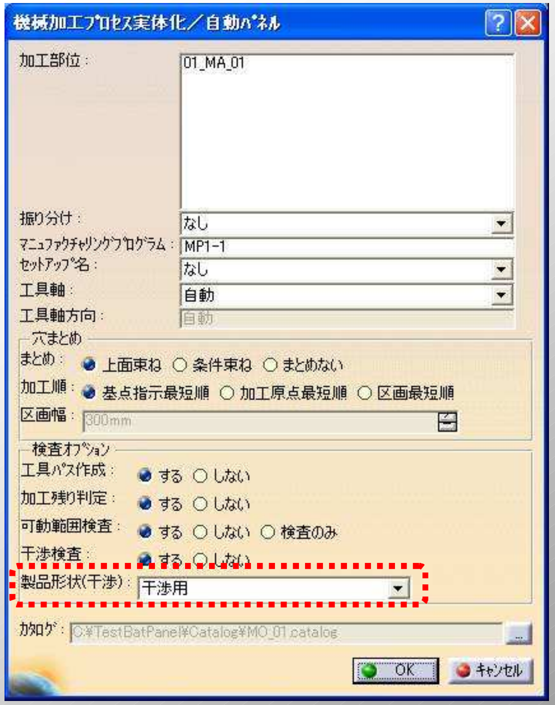
Calculation can run by referring the product shape previously output at automatic machining design.

Target function

Automatic machining design, tool path calculation (batch), automatic definition of tool sets


干渉用 (板厚 = 0.000 干渉回避量 = 0.000
ｺﾋﾟｰ Ctrl+C
貼り付け Ctrl+V
削除 Del
干渉用 ｵﾌﾞｼﾞｪｸﾄ
形状ファイル
経路計算指示
形状ファイル出力
形状ファイル確認


Output
Product shape file
Reference



機械加工ﾌﾟﾛｾｽ実体化／自動ﾊﾟﾈﾙ

加工部位 : 01_MA_01

振り分け : なし

ﾏﾆｭﾌｧｸﾁｬﾘﾝｸﾞﾌﾟﾛｸﾞﾗﾑ : MP1-1

ｾｯﾄｱｯﾌﾟ名 : なし

工具軸 : 自動

工具軸方向 : 自動

穴まとめ

まとめ : ● 上面束ね ○ 条件束ね ○ まとめない

加工順 : ● 基点指示最短順 ○ 加工原点最短順 ○ 区画最短順

区画幅 : 300mm

検査ｵﾌﾟｼｮﾝ

工具ﾊﾟｽ作成 : ● する ○ しない

加工残り判定 : ● する ○ しない

可動範囲検査 : ● する ○ しない ○ 検査のみ

干渉検査 : ● する ○ しない

製品形状(干渉) : 干渉用

ｶﾀﾛｸﾞ : C:¥TestBatPanel¥Catalog¥MO_01.catalog

Automatic machining design (5)

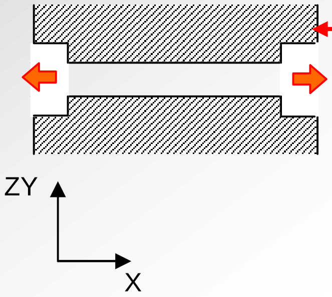
- Pocket machining for a through hole

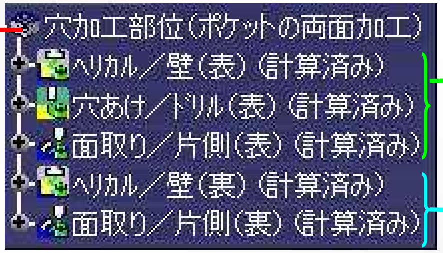
Abstract

Enable both side machining in pocket machining for a through hole.

Target machining

- Contour offset / bottom, wall
- Helical / bottom, wall
- Vertical / wall, sloped wall
- Chamfer / one side
- Hole / center, drill, helical, pocket, pocket helical, bottom, chamfer
- Down hole / center, drill, helical, pocket, pocket helical, bottom




穴加工部位（ポケットの両面加工）
ヘリカル／壁（表）（計算済み）
穴あけ／ドリル（表）（計算済み）
面取り／片側（表）（計算済み）
ヘリカル／壁（裏）（計算済み）
面取り／片側（裏）（計算済み）

Front
Axis: +X
Step: 1-2

Rear
Axis: -X
Step: 1

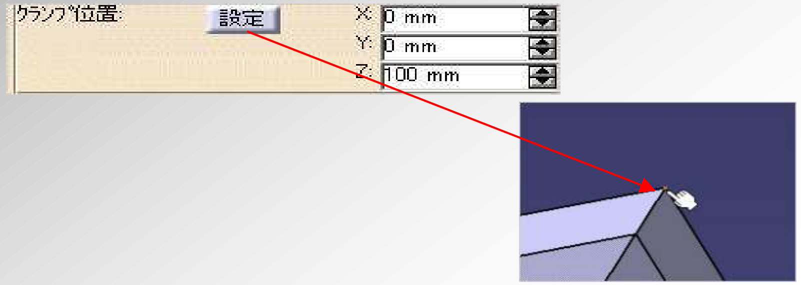
<Before V9.2>
- Simultaneous pocket m/c for front and rear is not available.
- Only available for hole m/c.

<V9.2 new functions>
- Simultaneous m/c at front and rear side is available for not only hole m/c but also pocket m/c .

Setup

- Part operation definition dedicated to Dynavista

- CAD element can be specified by coordinate value input.

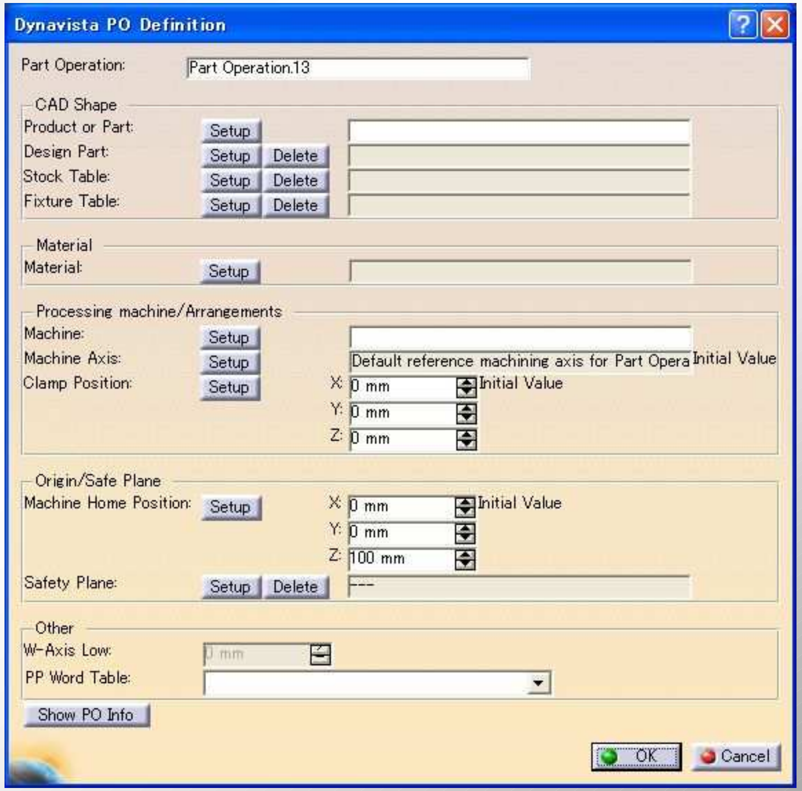


ｸﾗﾝﾌﾟ位置:
X: 0 mm
Y: 0 mm
Z: 100 mm

- Consistency is guaranteed for parameter change. (Whether to delete all paths or to delete and re-create is selectable)

- Part operation feature will be created.

* Part operation
A feature which has CAD shape, material, machining tool, machining base point and safety height, etc.



Dynavista PO Definition

Part Operation: Part Operation.13

CAD Shape
Product or Part:
Design Part:
Stock Table:
Fixture Table:

Material
Material:

Processing machine/Arrangements
Machine:
Machine Axis: Default reference machining axis for Part Opera Initial Value
Clamp Position: X: 0 mm Initial Value
Y: 0 mm
Z: 0 mm

Origin/Safe Plane
Machine Home Position: X: 0 mm Initial Value
Y: 0 mm
Z: 100 mm
Safety Plane: ---

Other
W-Axis Low: 0 mm
PP Word Table:

Dynavista PO definition

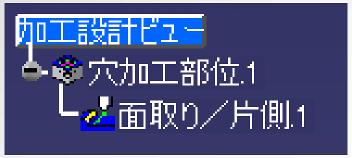
Path calculation

- Hole on a sloped surface at one sided chamfer machining

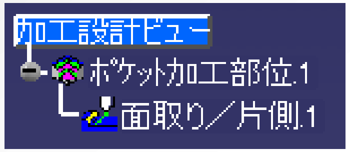
Abstract
Create a tool path of one side chamfer for a hole with sloped top surface

Purpose
Because no “One side chamfer” tool path can be created so far, tool paths were created by making a hole portion as a pocket portion.
Man hour of the change will be reduced (also a risk of machining trouble will be reduced) by enabling “One side chamfer” tool path calculation.

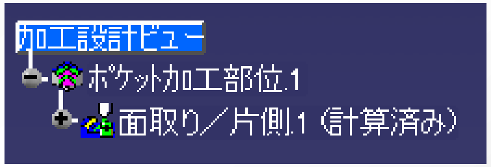
<Before V9.2>


加工設計ビュー
穴加工部位.1
面取り／片側.1

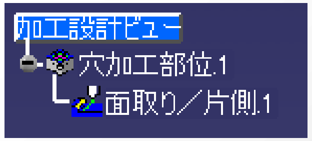
Change to pocket

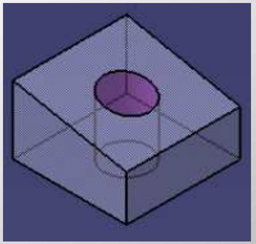

加工設計ビュー
ポケット加工部位.1
面取り／片側.1

Path calculation

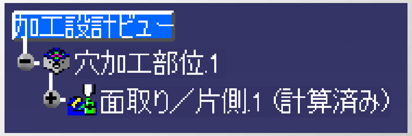

加工設計ビュー
ポケット加工部位.1
面取り／片側.1 (計算済み)

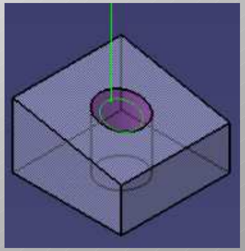
<V9.2 new function>


加工設計ビュー
穴加工部位.1
面取り／片側.1



Path calculation


加工設計ビュー
穴加工部位.1
面取り／片側.1 (計算済み)



Process Plan view

- Improvement of warning path

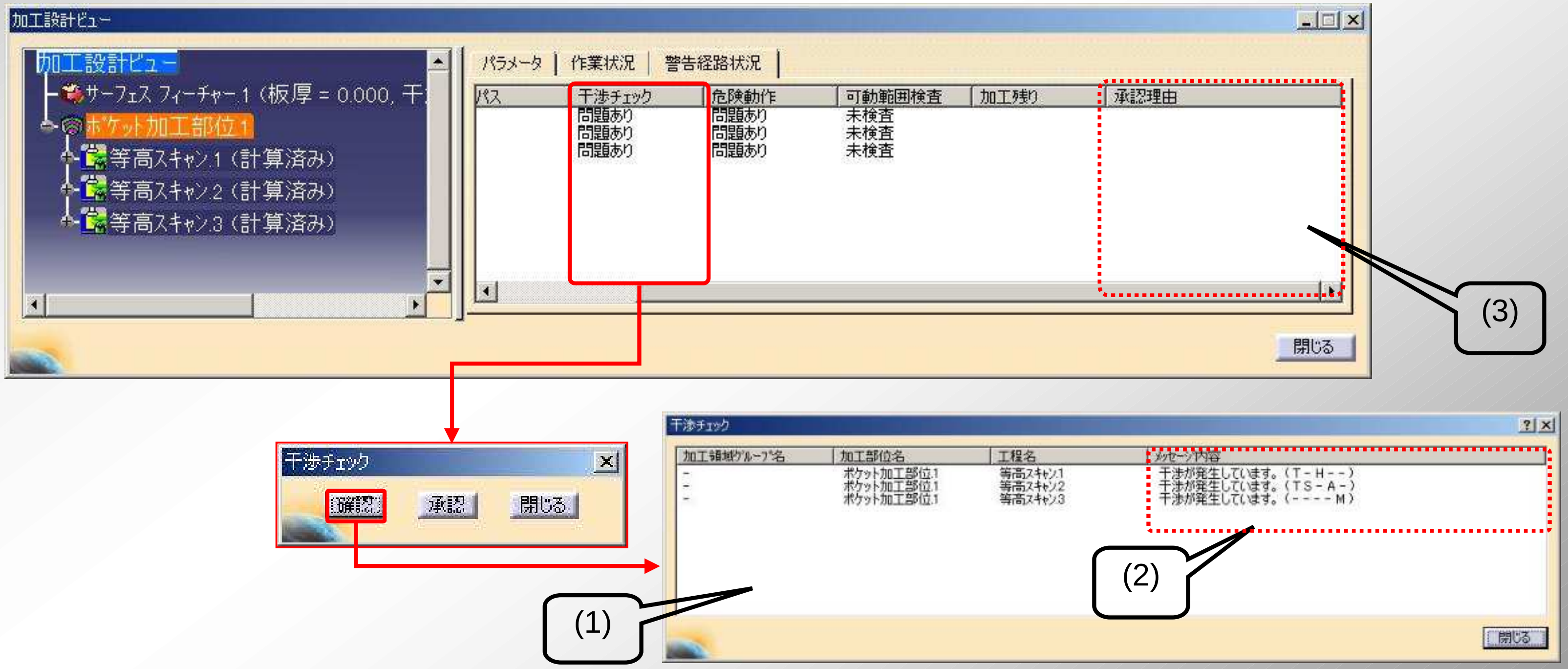
Abstract

Followings are improved for machining design view/warning tool path tab.

(1) Confirmation message panel of warning tool path will be resident.

(2) Interference portions (tool, step, holder, attachment and machine) will be shown at “Confirmation” of a interference check.

(3) “Reason of accept” column is added in a warning tool path list. Filtering by “Accepted” is added.


加工設計ビュー
加工設計ビュー
サーフェス フィーチャー.1 (板厚 = 0.000, 干
ポケット加工部位.1
等高スキャン.1 (計算済み)
等高スキャン.2 (計算済み)
等高スキャン.3 (計算済み)
パラメータ
作業状況
警告経路状況
閉じる
(3)
干渉チェック
確認
承認
閉じる
(1)
(2)
閉じる

パス	干渉チェック	危険動作	可動範囲検査	加工残り	承認理由
	問題あり	問題あり	未検査		
	問題あり	問題あり	未検査		
	問題あり	問題あり	未検査		

干渉チェック

加工領域グループ名	加工部位名	工程名	メッセージ内容
-	ポケット加工部位.1	等高スキャン.1	干渉が発生しています。(T-H--)
-	ポケット加工部位.1	等高スキャン.2	干渉が発生しています。(TS-A-)
-	ポケット加工部位.1	等高スキャン.3	干渉が発生しています。(----M)

DynAvistA

Tool display

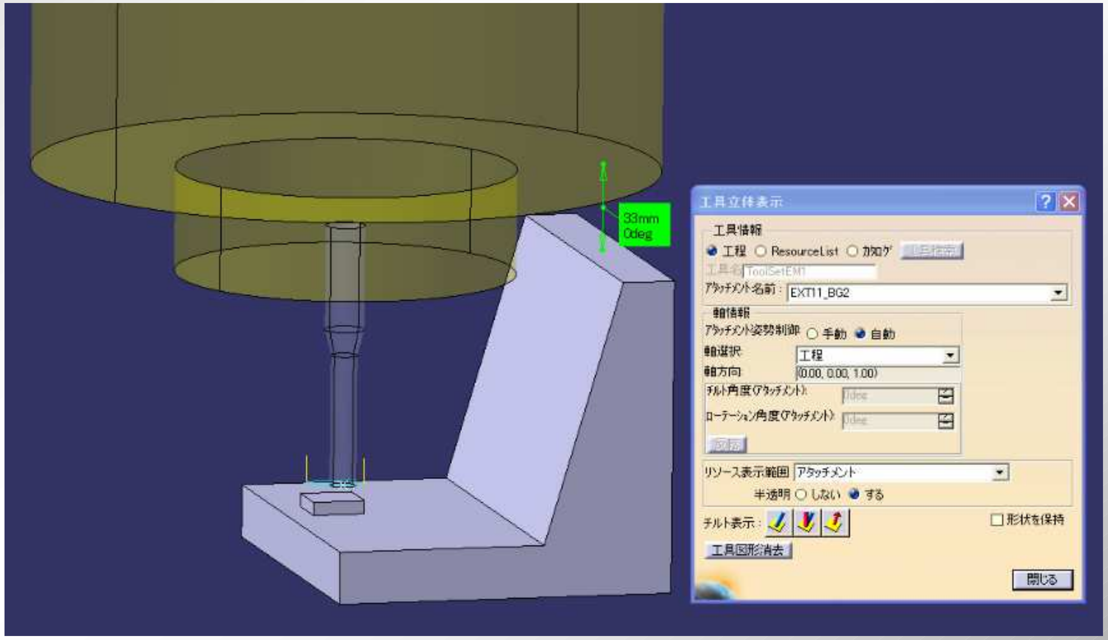
- Improvement of tool display in tool path display – Tool solid display -

Abstract

Tool display commands activated in Tool path edition / Tool path display /Interference check result command are unified and following functions are added.

(1) Tool display by a solid defined in tool definition tool (It is selectable to keep it or not at the command termination.

(2) Half transparent display of a tool



● 工程 ○ ResourceList ○ カタログ

工具名 ToolSetEM1

アタッチメント名前： EXT11_BG2

アタッチメント姿勢制御 ○ 手動 ● 自動

軸選択 工程

軸方向 (0.00, 0.00, 1.00)

チルト角度(アタッチメント)： 0deg

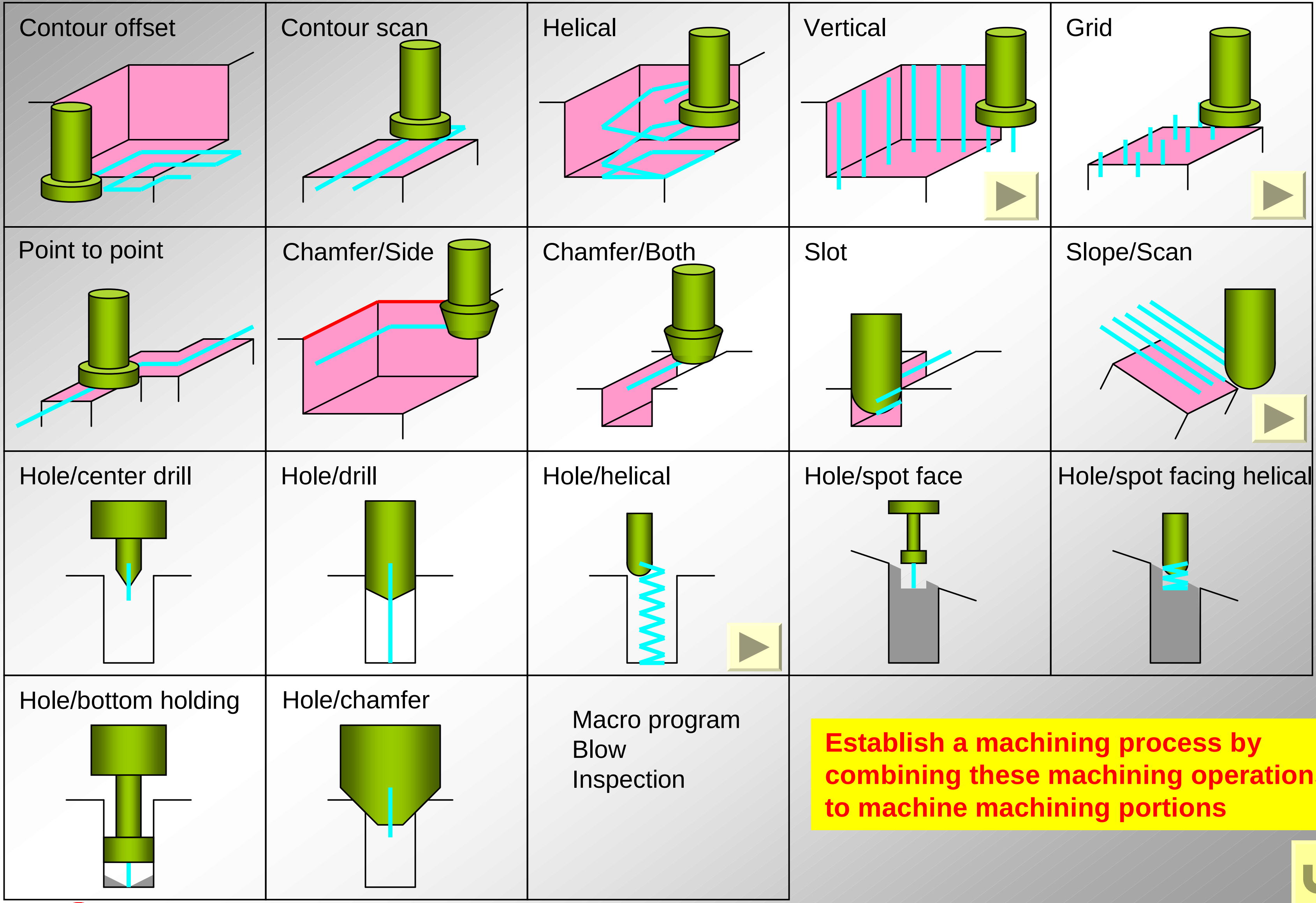
ローテーション角度(アタッチメント)： 0deg

リソース表示範囲 アタッチメント

半透明 ○ しない ● する

□ 形状を保持

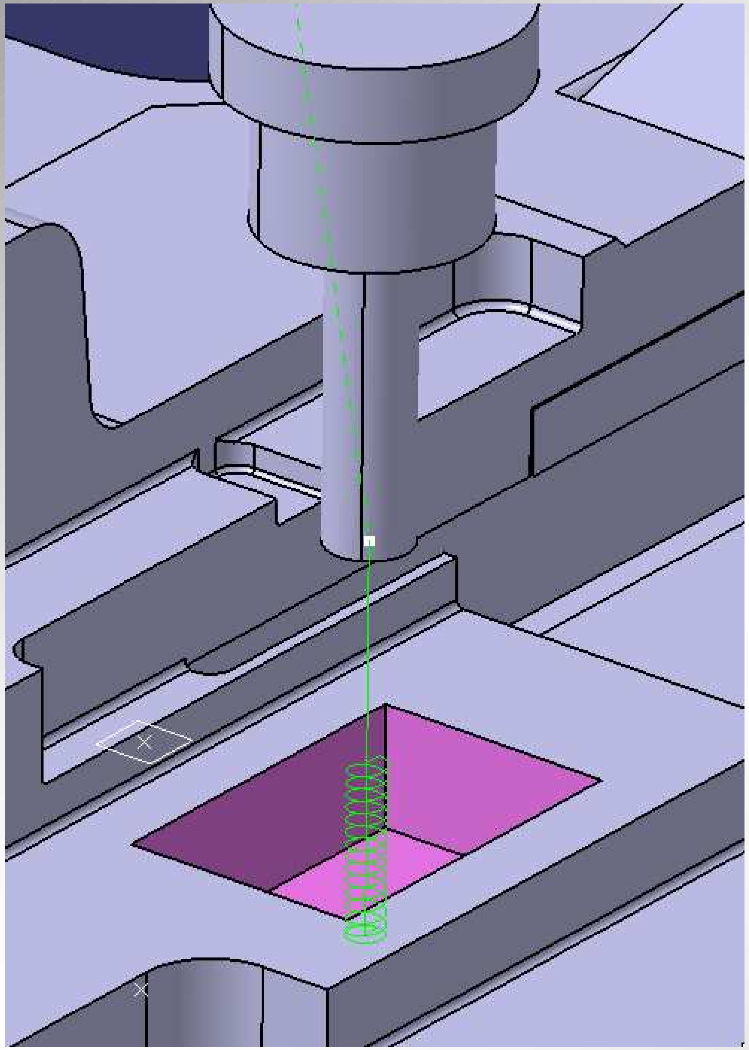
Machining functions


Contour offset
Contour scan
Helical
Vertical
Grid
Point to point
Chamfer/Side
Chamfer/Both
Slot
Slope/Scan
Hole/center drill
Hole/drill
Hole/helical
Hole/spot face
Hole/spot facing helical
Hole/bottom holding
Hole/chamfer

Macro program
Blow
Inspection

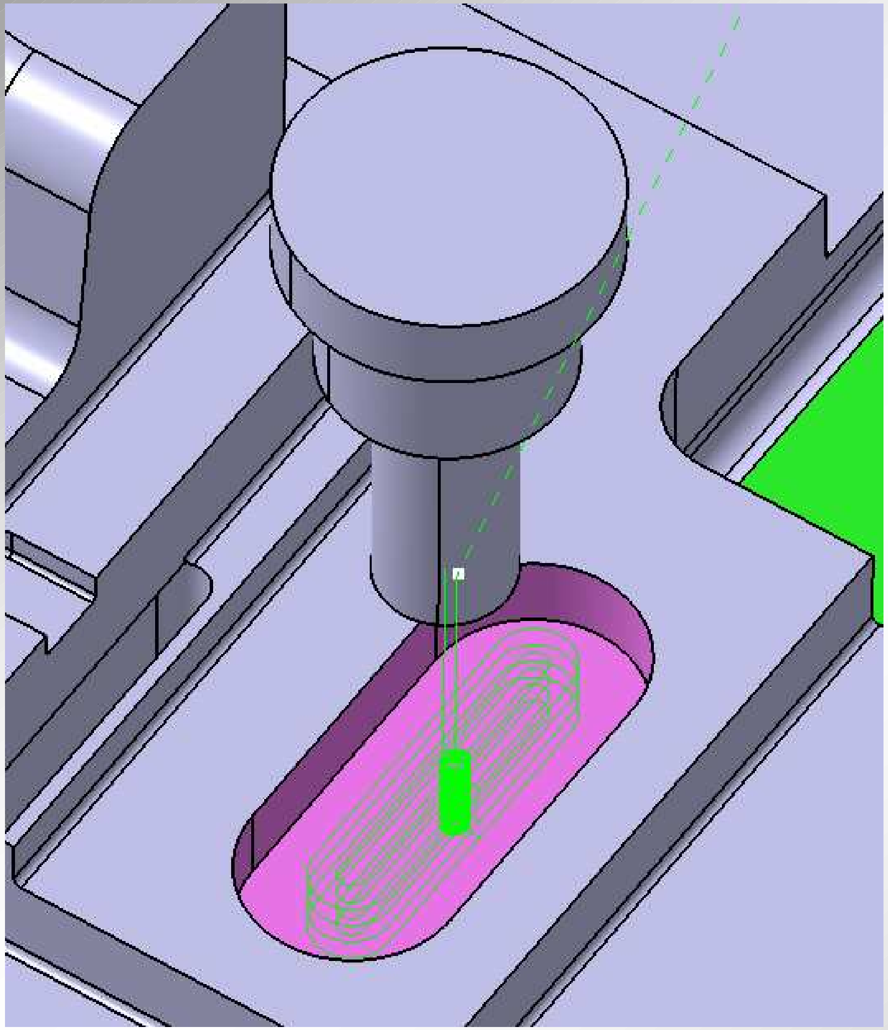
Establish a machining process by combining these machining operations to machine machining portions

Characteristic machining (1)
- Pocket / Down hole / Helical machining



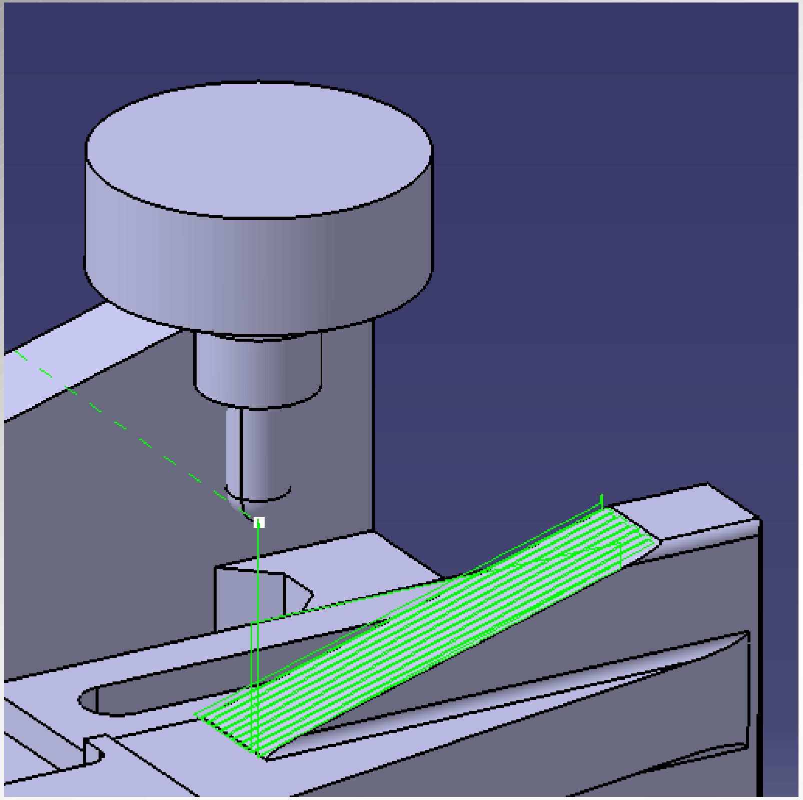
Characteristics：
A down hole is created by helical machining when a pocket shape is created for a solid material.

Characteristic machining (2)
- Contour offset machining (helical approach)

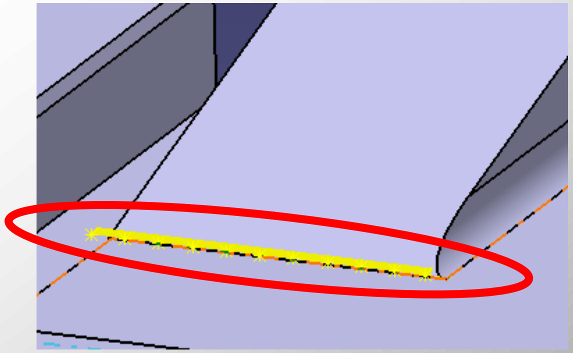


Characteristics:
Contour offset machining for pocket machining for solid material.
In this case, helical machining approach is attached to moving from one layer to another.

Characteristic machining (3)
- Slope surface machining



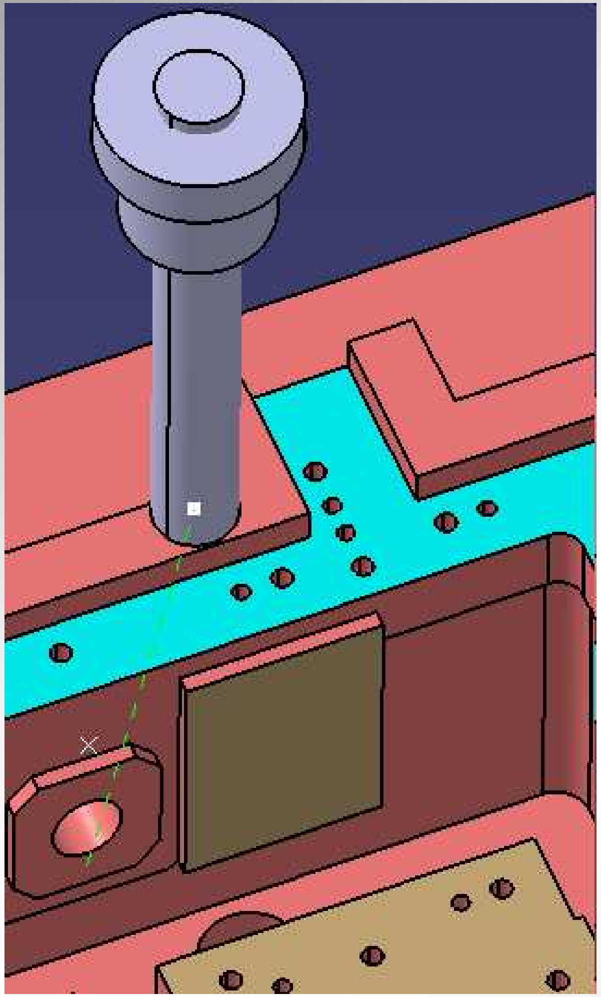
Characteristics:
Automatic creation of CL is possible by recognizing a sloped upper surface as a machining portion. (The left picture shows a CL of a machining by the use of a ball-end mill.)



It is possible to find out a rest portion of machining and to temporarily display it.
It is useful to check a machining process when registering it as a knowledge.

Dynavista

Characteristic machining (4)
- Vertical machining

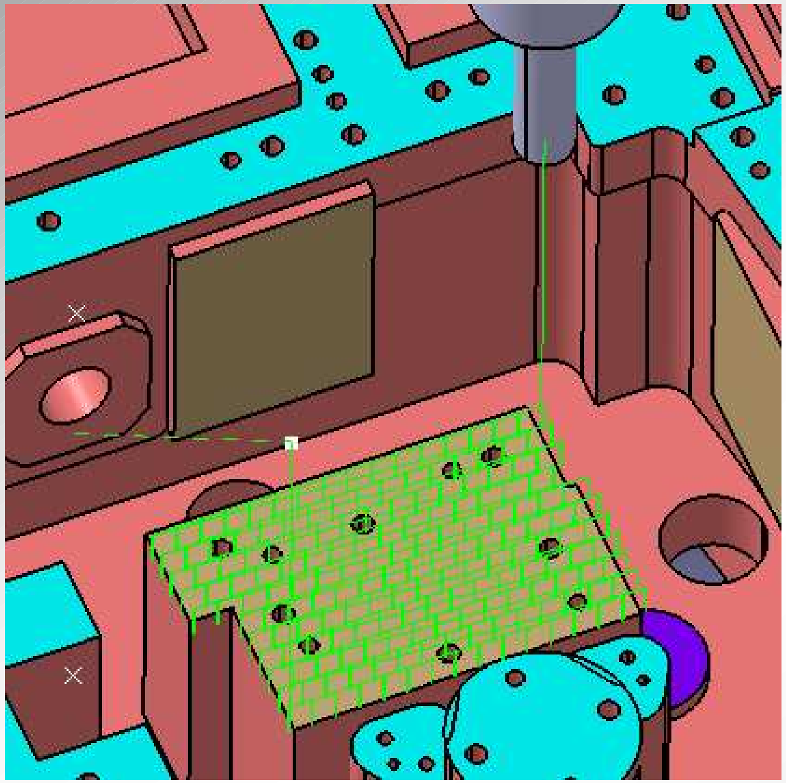


Characteristics:
A machining for a rough machining of casting press parts.

It is effective for a rough machining in a short time frame using a long length tool under a high load.

It is effective for a portion where a slide plate will be placed and where an attachment cannot be used.

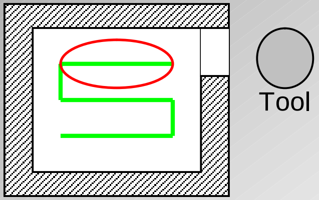
Characteristic machining (5)
- Pocket / Grid machining



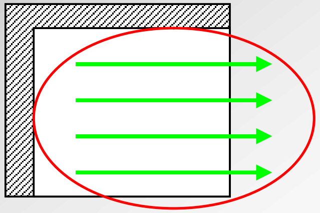
Characteristics:
A heavy load rough machining by the use of long length tool in order to avoid interference
High efficiency machining will be realized.

Alert of dangerous motion

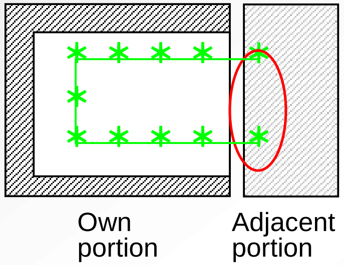
- If there is a dangerous motion in the tool path, color of a the dangerous tool path position is changed position in order to ease visual check.



No tool can reach from out side.

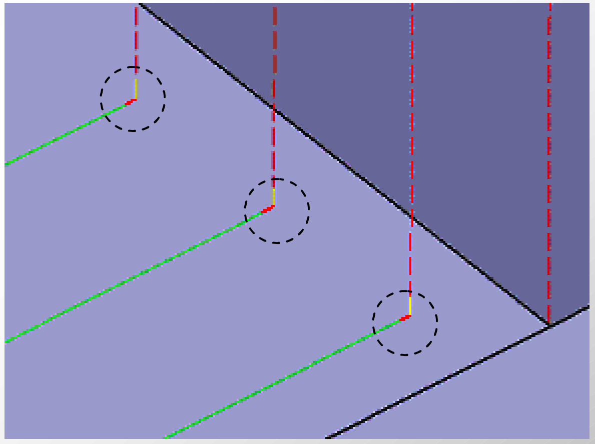


Start points of a tool path are created at no open area.



A tool path starts from an adjacent portion in a lattice plunge machining.

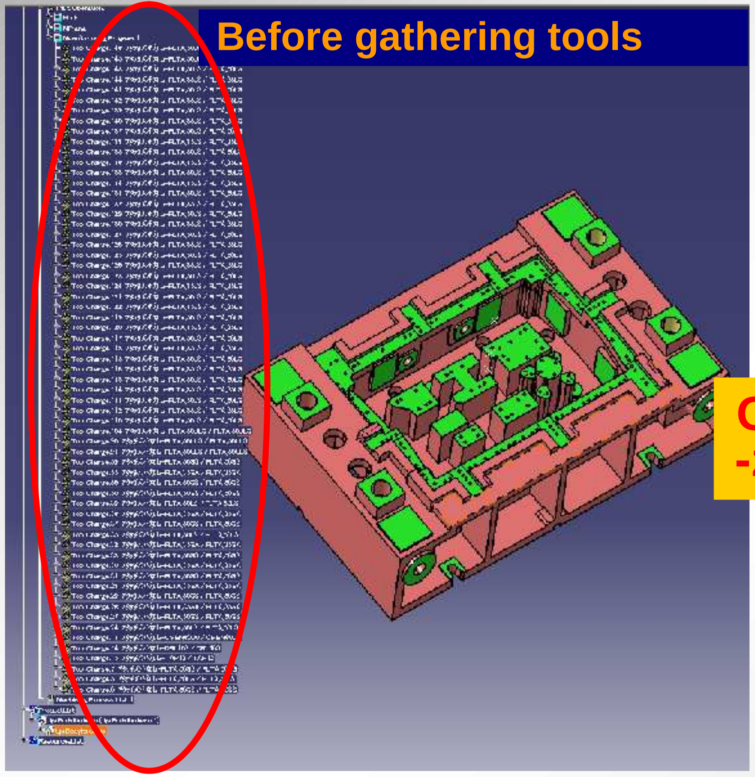
- 🟩 Cutting
- 🟨 Approach
- 🟦 Retract
- ⭕ Dangerous motion



The dangerous motions will be displayed in a fat line with a different color.

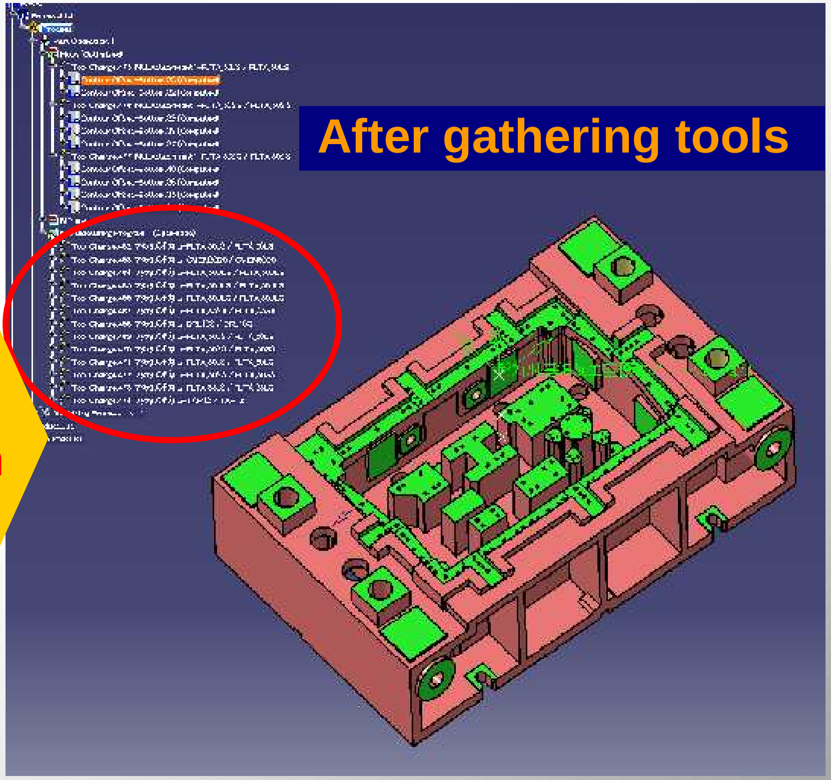
Optimization

Tools are independently registered in machining programs for each machining portion immediately after an automatic tool path calculation.
They are gathered for each tool considering tools, whether to use attachments and priority of machining, etc. and are sorted minimizing a air cut.



Before gathering tools

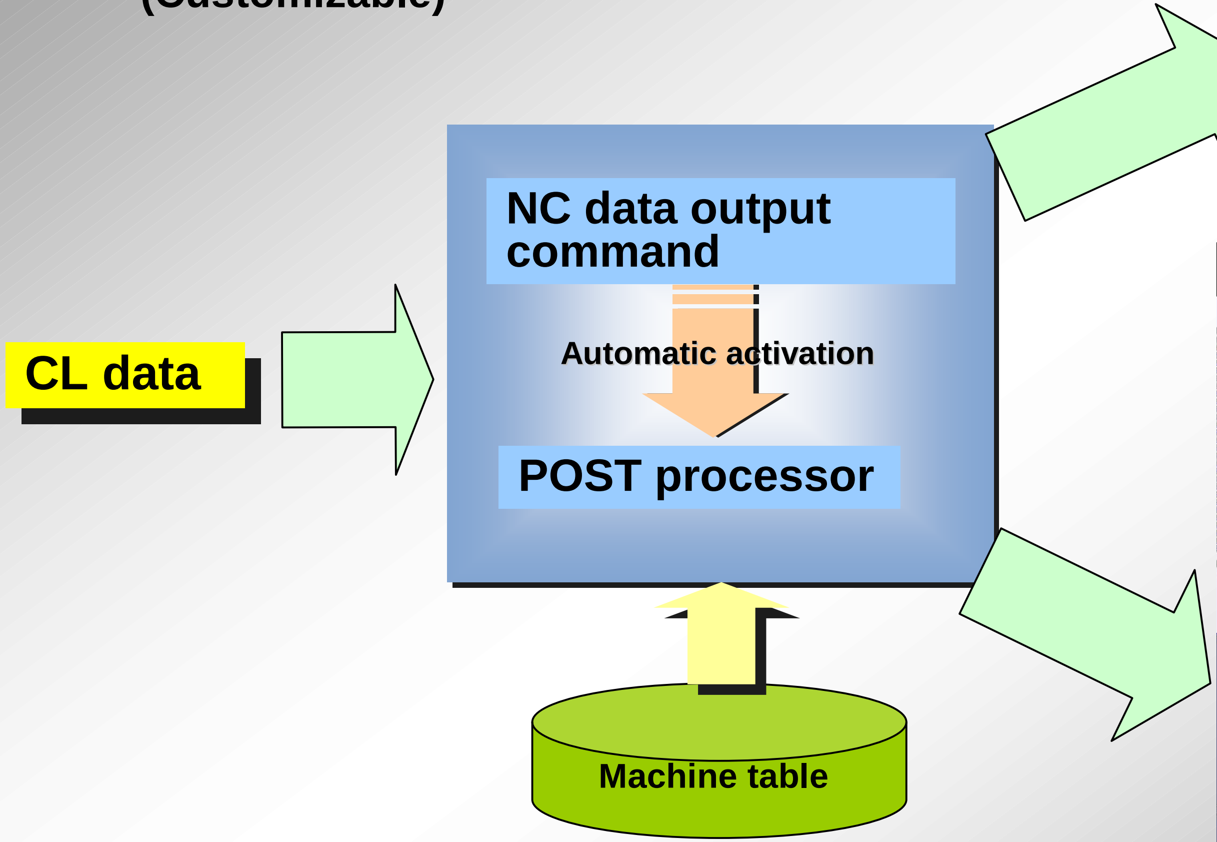
Optimization

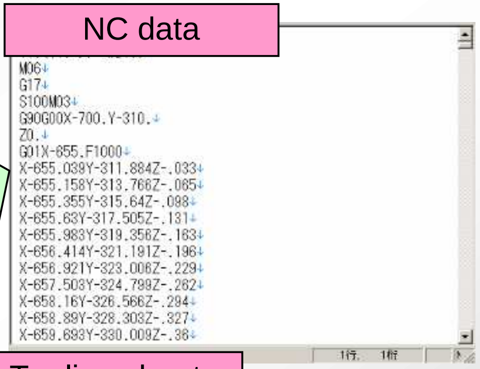


After gathering tools

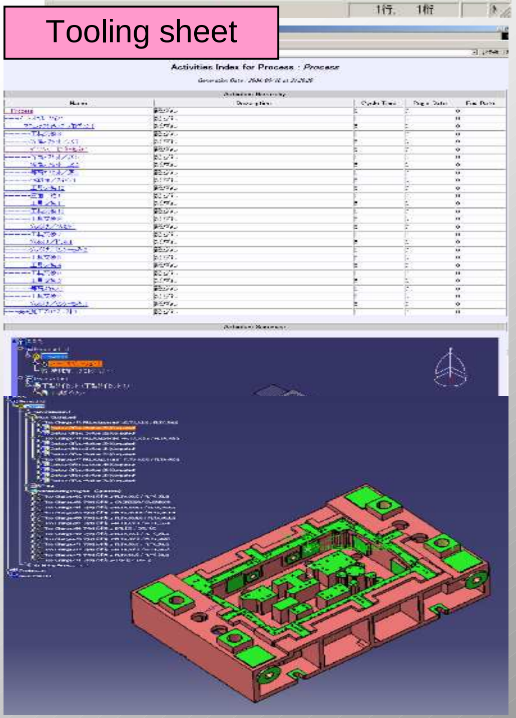
NC data creation

NC data are created to adapt to the various machine tools.
Tooling sheets satisfying the user's needs.
(Customizable)


CL data
NC data output command
Automatic activation
POST processor
Machine table



```
M06
G17
S100M03
G90G00X-700.Y-310.
Z0.
G01X-655.F1000
X-655.039Y-311.884Z-.033
X-655.158Y-313.766Z-.065
X-655.355Y-315.64Z-.098
X-655.63Y-317.505Z-.131
X-655.983Y-319.356Z-.163
X-656.414Y-321.191Z-.196
X-656.921Y-323.006Z-.229
X-657.503Y-324.799Z-.262
X-658.16Y-326.566Z-.294
X-658.89Y-328.303Z-.327
X-659.693Y-330.009Z-.36
```

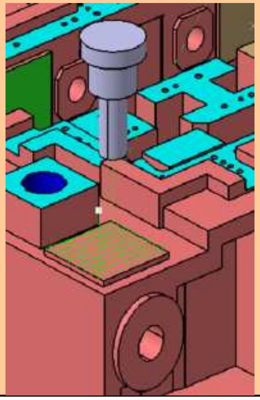

Tooling sheet
Activities Index for Process : Process

Automatic selection of tools (Check)

- CL using an attachment will be created in automatic process allocation.

Machining process **Check**

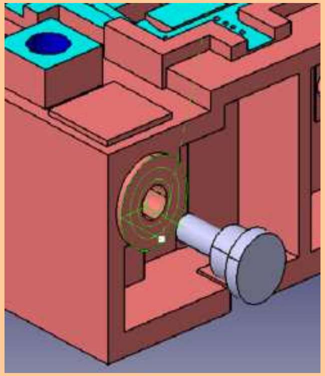
- pedestal
  - ZA — A normal of a bottom is Z direction.
    - Contour offset



A CL is created having a machining process name “Pedestal” and not using an attachment because a normal vector of the bottom is parallel to the Z axis.

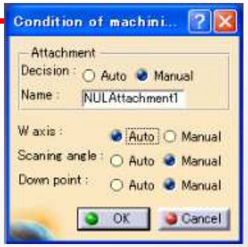
Machining process **Check**

- pedestal
  - ZA_Machine1_Attachment1 — A normal of a bottom is Y direction.
    - Contour offset



A CL is created having a same machining process name “Pedestal” and using an attachment because a normal vector of the bottom is parallel to the Y axis.

Automatic definition of machining conditions



Condition of machini...

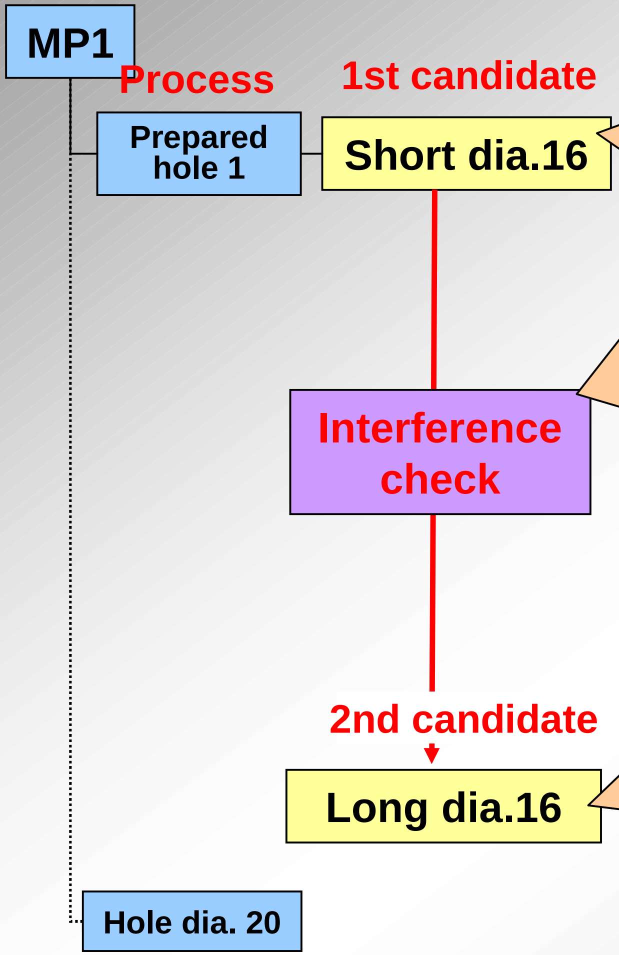
Attachment
Decision : ○ Auto ● Manual
Name : NULAttachment1

W axis : ● Auto ○ Manual
Scaning angle : ○ Auto ● Manual
Down point : ○ Auto ● Manual

This machining operation uses an attachment “NULAttachment1”.

Automatic selection of tools (Interference check)

- A process of 20-diameter hole will be created in automatic process definition.



MP1

Process

1st candidate

Prepared hole 1

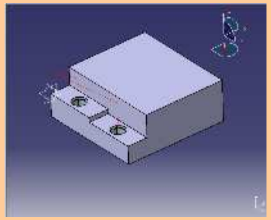
Short dia.16

Interference check

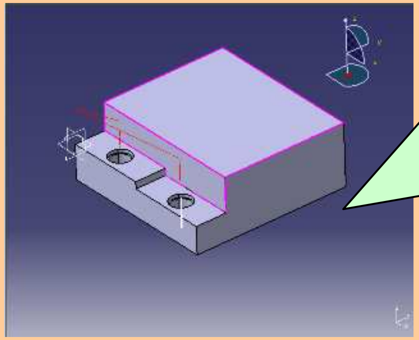
2nd candidate

Long dia.16

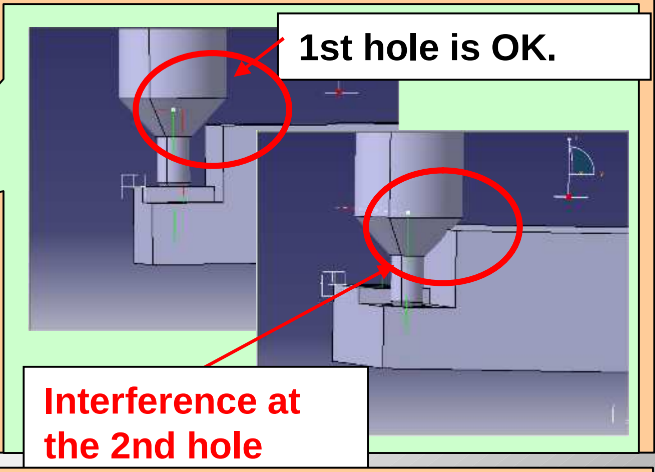
Hole dia. 20



2 hole paths are created with short dia.16 tool.

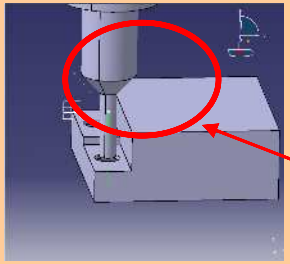


Interference at the 2nd hole is found by the check.



1st hole is OK.

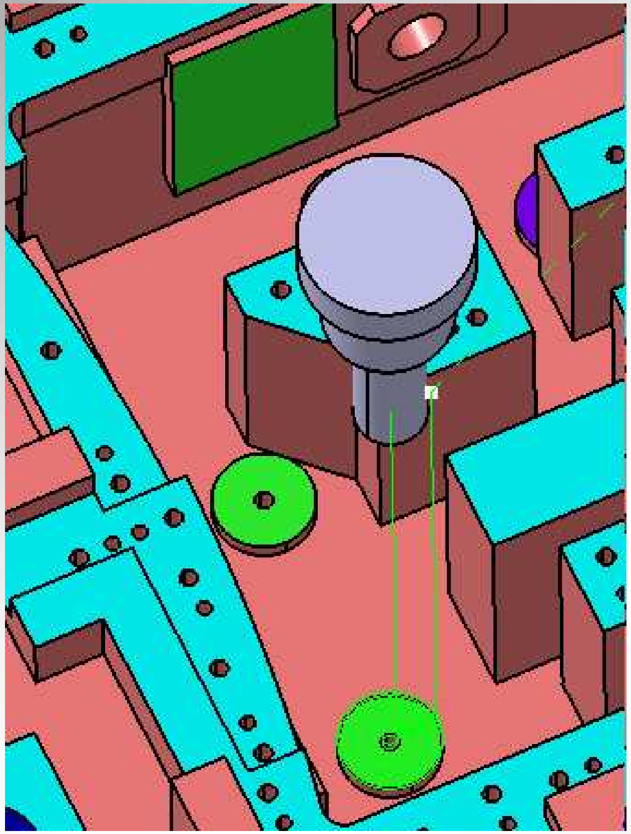
Interference at the 2nd hole



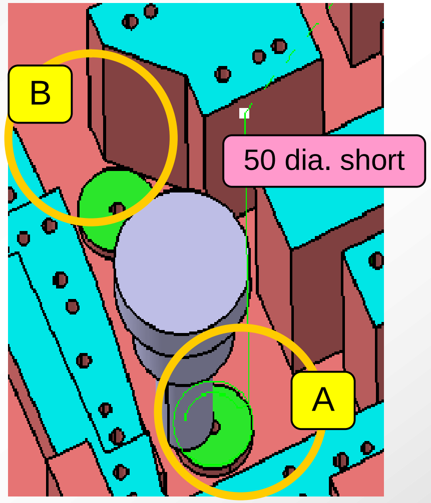
Tool path will be created with Long dia.16 tool.

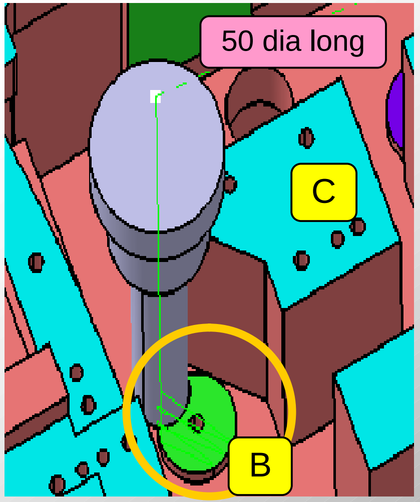
Creation of interference-free CL

Selection of a tool avoiding the interference



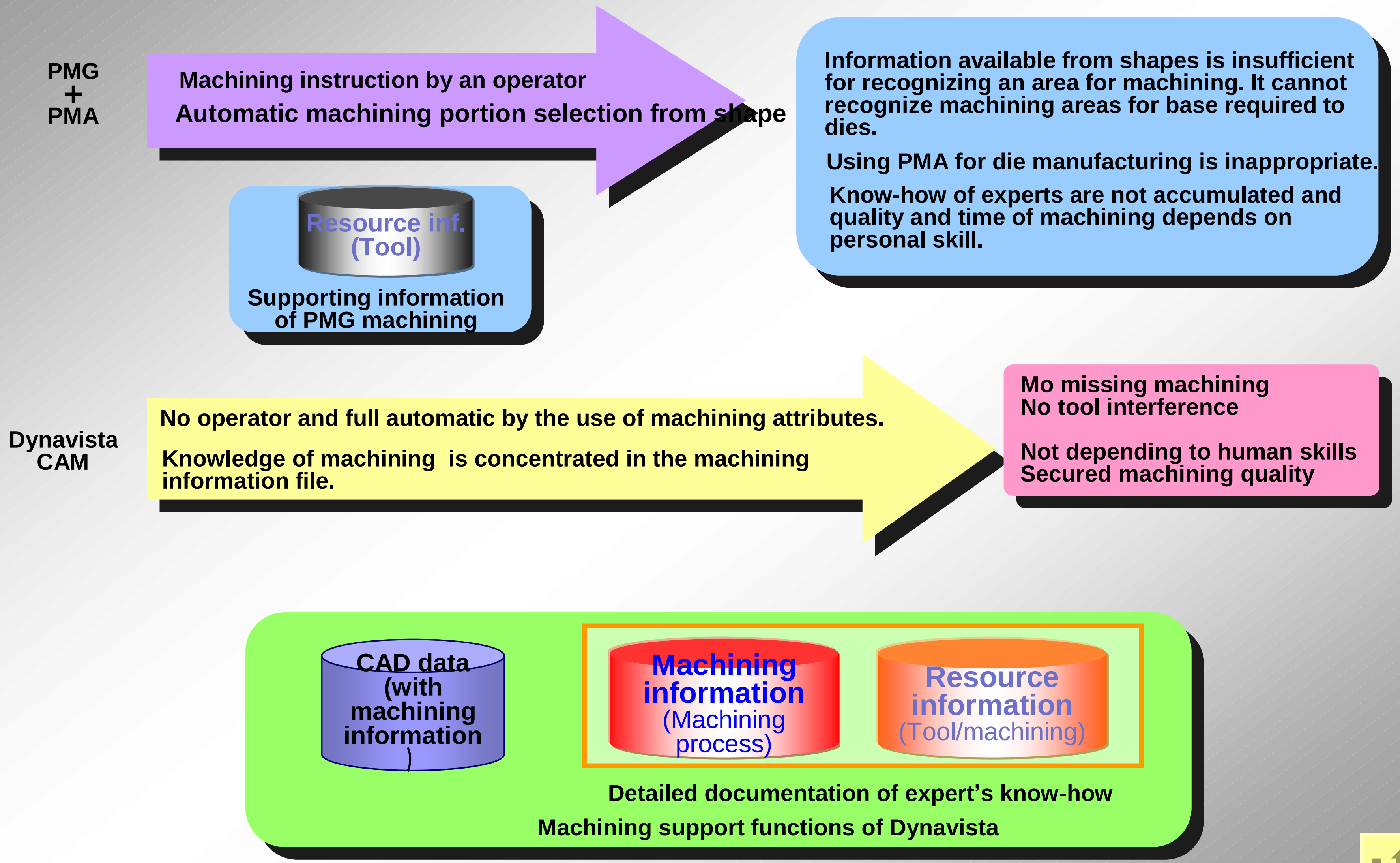
Candidate tools are specified so that tool can be evaluated in the order of short length to long.





**Tools in a machining operation is checked from short one.
A short tool is used because there is no interference even the short one is used in machining portion in the machining portion A.
Since it interferes with C with a short tool, no short tool will be used but a long tool will selected to avoid interference.**

Difference between a goal of Dynavista and PMG + PMA



PMG
+
PMA

Machining instruction by an operator

Automatic machining portion selection from shape

Information available from shapes is insufficient for recognizing an area for machining. It cannot recognize machining areas for base required to dies.

Using PMA for die manufacturing is inappropriate.

Know-how of experts are not accumulated and quality and time of machining depends on personal skill.

Resource inf.
(Tool)

Supporting information of PMG machining

Dynavista CAM

No operator and full automatic by the use of machining attributes.

Knowledge of machining is concentrated in the machining information file.

Mo missing machining
No tool interference

Not depending to human skills
Secured machining quality

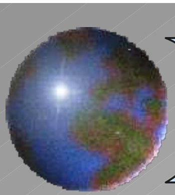
CAD data (with machining information)

Machining information
(Machining process)

Resource information
(Tool/machining)

Detailed documentation of expert's know-how

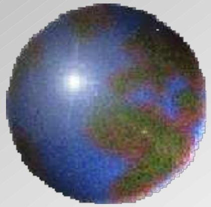
Machining support functions of Dynavista



Advantage of Dynavista

High precision, interference free 2D CL will be created considering 3D shape.

	PMG	Dynavista / DieCAM 2.5D
Shape	3D solid shape	3D solid shape
Combination with	Possible to use with Dynavista	Possible to use with PMG
Mixture of 3D	Coexistence with SMG and Dynavista	Coexistence of paths of SMG, PMG and Dynavista/DieCAM
CAD association	Machining portion can be detected by the use of Prismatic Machining Preparing Assistant (PMA). Holes and plane features can be detected but modeling method is restricted. No pocket nor slope can be detected.	Attribute association with Dynavista / Die Structure Design and Mold Design. Machining portions will automatically be detected by the use of machining attributes for a final shape. No restriction on the modeling method. (Automatic machining portion detection and process allocation are possible even for a shape imported by data exchange if machining attributes are attached.)
Automation	Machining portion creation by PMA	Automatic machining portion creation
	Automatic process allocation and tool selection by PMA	Automatic tool selection and automatic process allocation
	Optimization is possible.	Optimization is possible.
Interference	Interference is avoided by specifying a shape of interference avoidance shape. Only tool tip interference is checked.	Automatic solid shape detection and avoidance of interference. Interference is checked for a tool system including tool tip and chuck holder.
Machining function	Standard machining patterns such as hole, planer machining.	Various machining patterns such as collective pocket, contour offset, helical and lattice plunge, etc. in addition to standard machining patterns.



Dynavista

CAA V5 based

http://www.unisys.co.jp/e/dynavista/

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