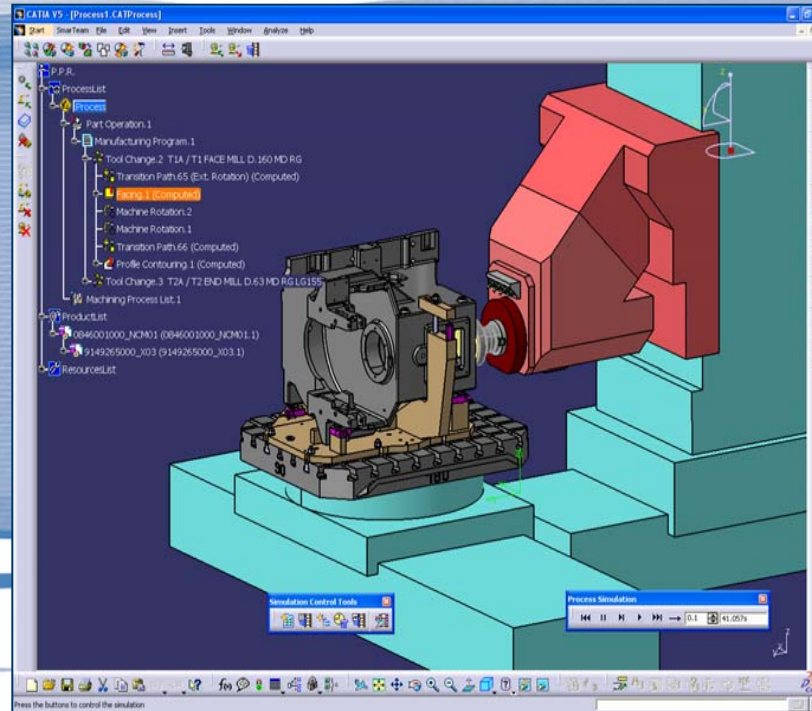


# What's New in Machining V5R16

*Bringing together NC-Programming and NC Simulation*



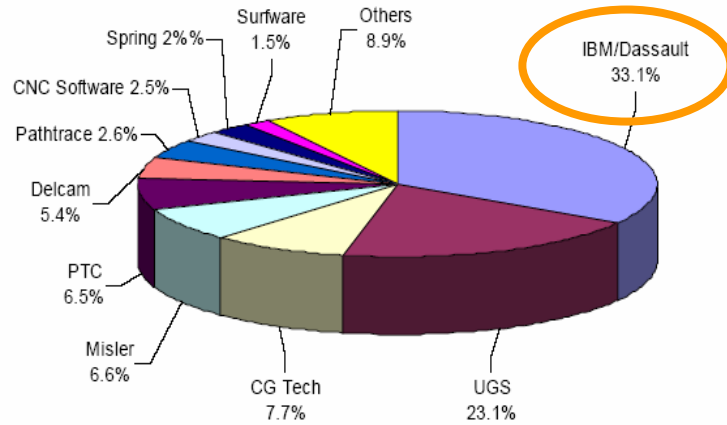
**Rose-Marie Estebe**  
Dassault Systèmes Provence  
ree@ds-fr.com



# V5 Machining : The Leading Solution

leader

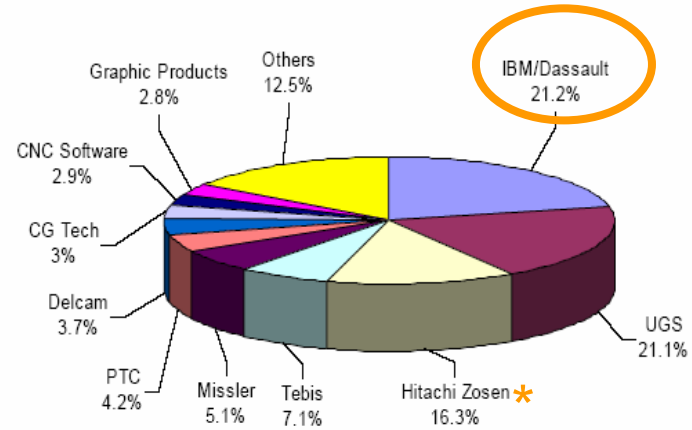
2004



Aerospace Industry

leader

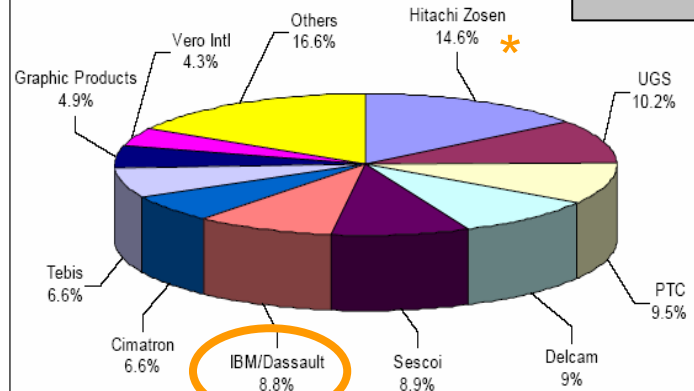
2004



Automotive Industry

challenger

2004



Mold Tool and Die

Source CIMdata 2004 "NC Software and Related Services Market Assessment"

\* CAA V5 partner



# V5 Machining : The Leading Solution

leader

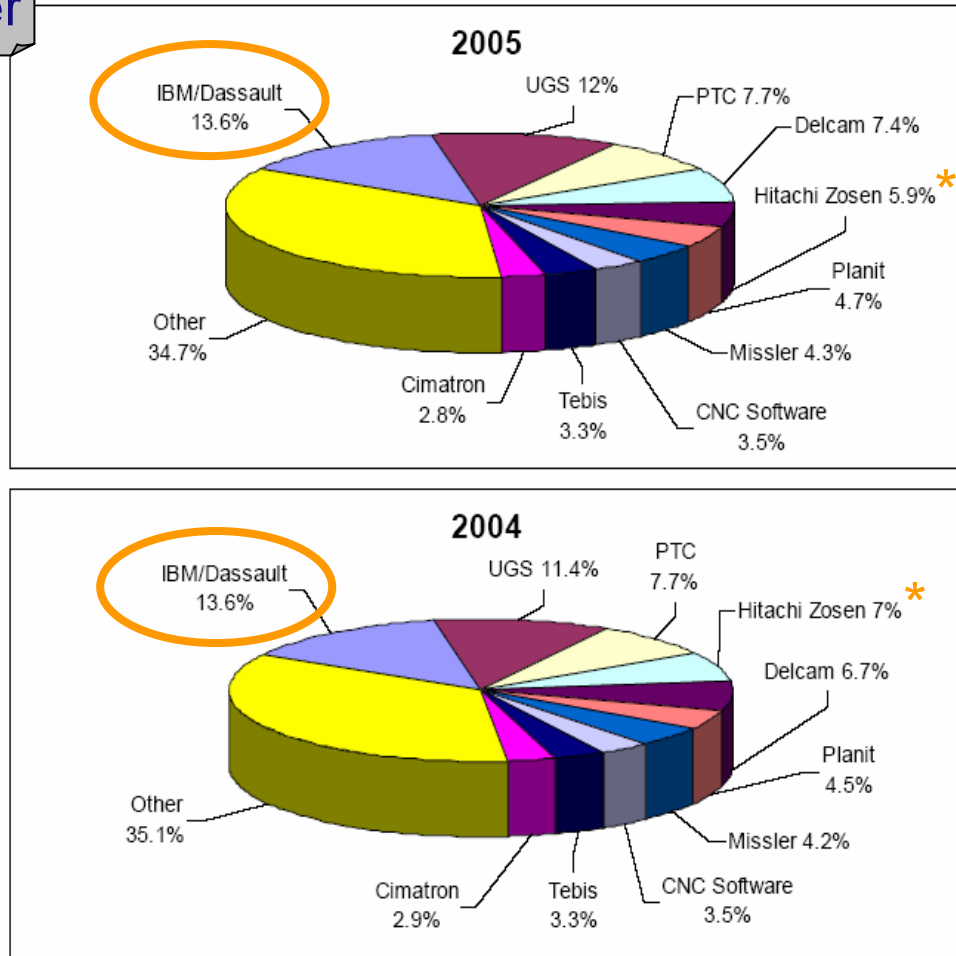


Figure 95. Market Share of the Largest NC Vendors at the End-User Level

Source CIMdata 2005 "NC Software and Related Services Market Assessment"



\* CAA V5 partner

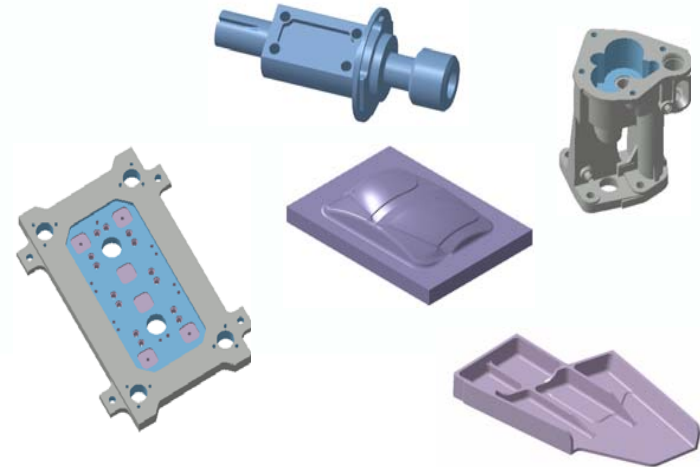
# V5 Machining in Productive Use

## ■ From prismatic to complex parts ...

... in different manufacturing segments ...

- ◆ Prototype manufacturing
- ◆ Tooling manufacturing
- ◆ Part manufacturing

... and in all industries



## ■ Aerospace, OEM & suppliers

- Airbus, Boeing, Cessna, EADS, Eurocopter, Lockheed Martin, ...
- Aircraft Philipp, CAMTech, Fokker Special Products, Messier-Dowty, Patria
- AST, Pratt&Whitney, ...

## ■ Automotive, OEM & suppliers

- Audi, DaimlerChrysler, Ilmor, Porsche, Renault, ...
- Aweba, Bosch, Gedia, Hirschvogel, Michelin, Kronprinz, TRW, ...

## ■ Consumer Goods, Fabrication & Assembly, Electric & Electronic

- ARC International, ETA/Swatch, Feber, Guy Degrenne, Smoby, ...
- Duerkopp Adler, Fredk Pollard, Grundfos, Homag, Karl Mayer, ...
- Black&Decker, Weidmueller, ...

# V5 Machining Serving PLM

## ■ Process Centric

- Unique end-to-end machining process coverage with CATIA and DELMIA solutions from process planning and NC detailing to NC simulation and post-processing
- Leading-edge, highly productive, and industry practices-compliant machining techniques (lathe to complex lathe, and all milling and drilling) and inspection strategies

## ■ Collaborative Workspace

- Expand collaboration between engineering, manufacturing departments and suppliers from rough planning to NC detailing

## ■ PPR (Product Process Resource)

- Unique PPR model for all the authoring applications to support digital manufacturing
- Effective change management due to the high level of associativity between product engineering, manufacturing processes and resources

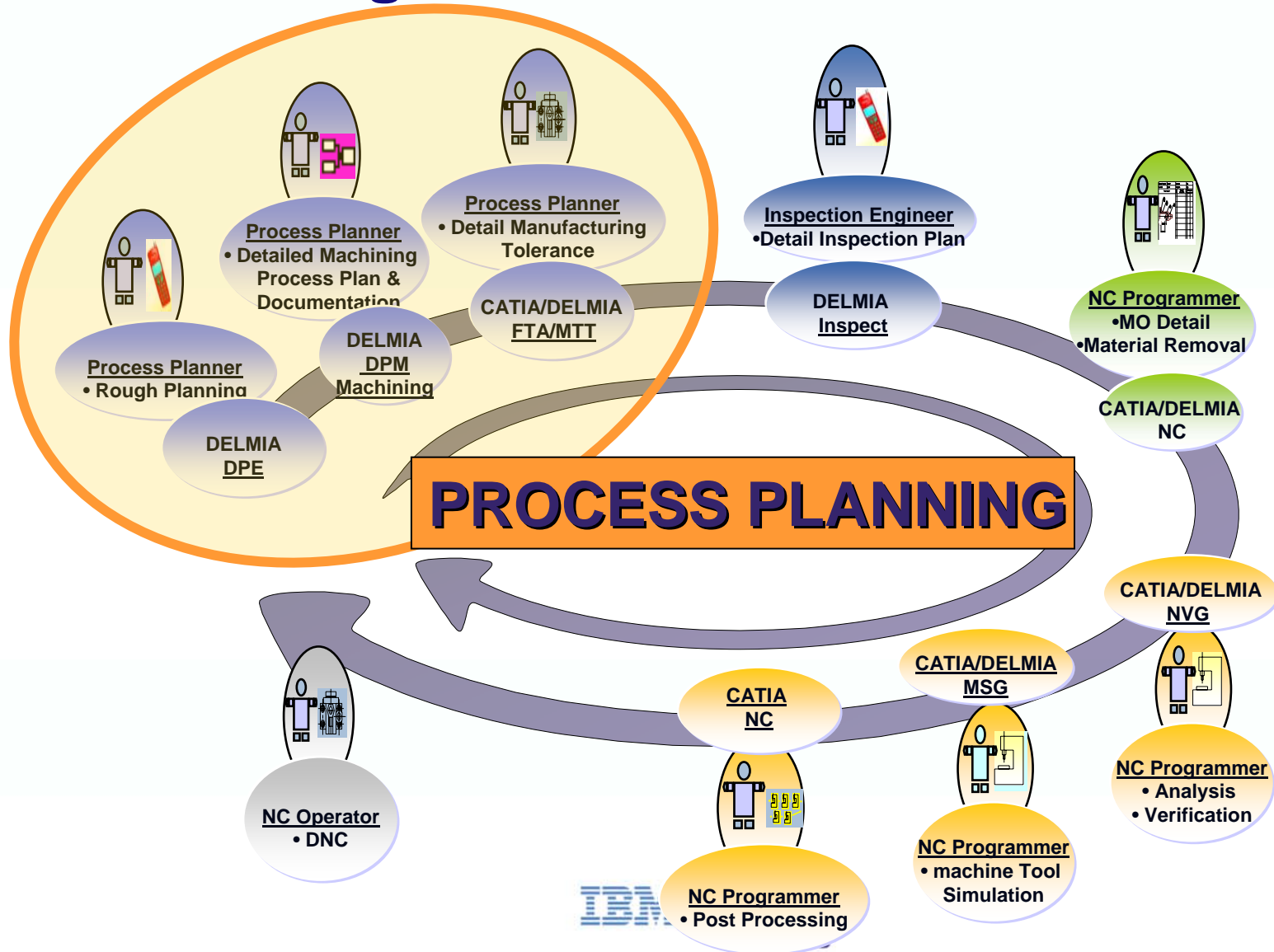
## ■ Knowledge

- High level of automation and standardization by capturing engineering intents and reusing the company's proven machining know-how and best practices

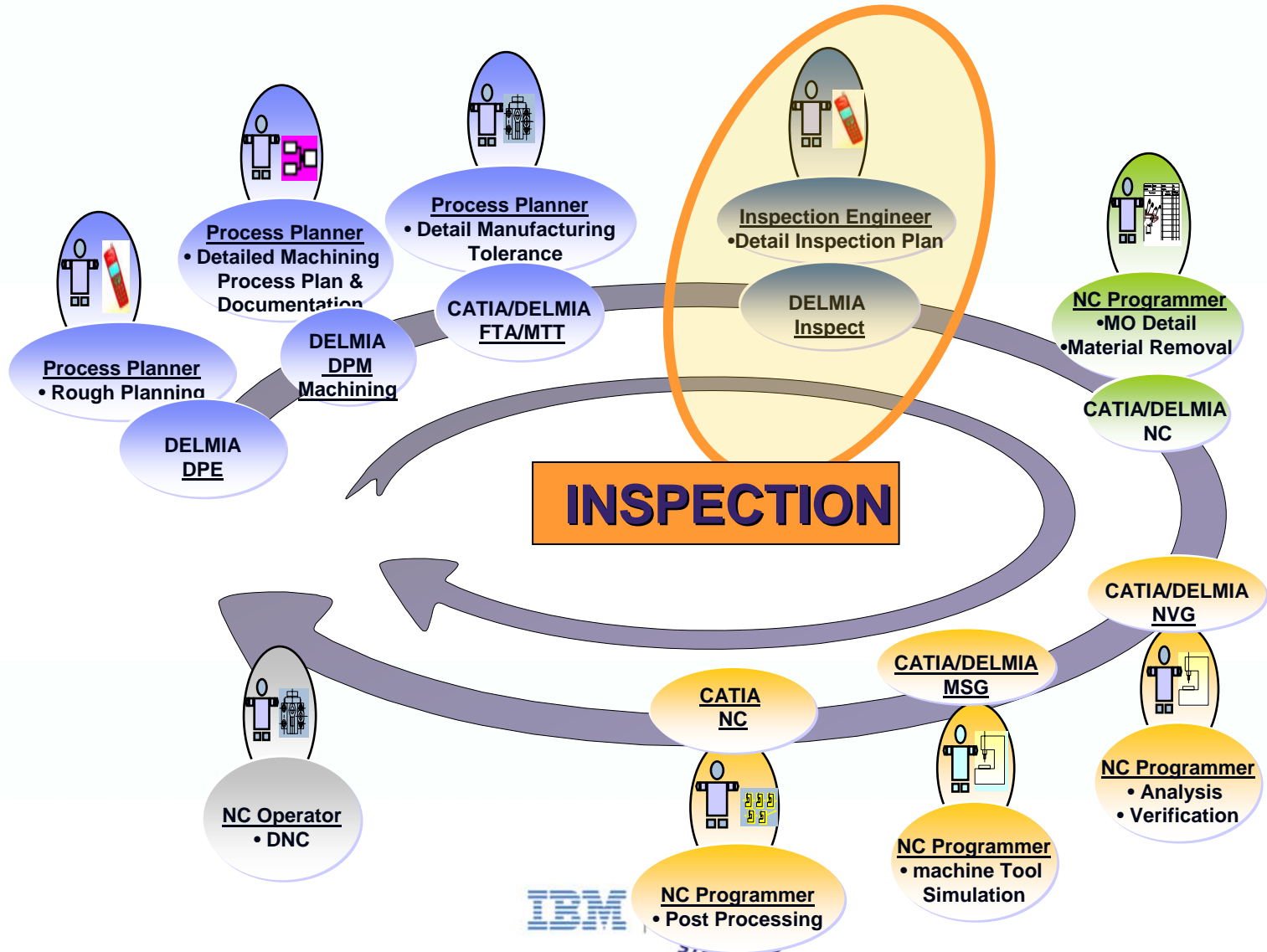
## ■ CAA V5

- CAA partners benefit from powerful V5 architecture to develop specialized applications. Together with CATIA and DELMIA machining offer, they deliver the best solution to fit the needs of all manufacturing industries.

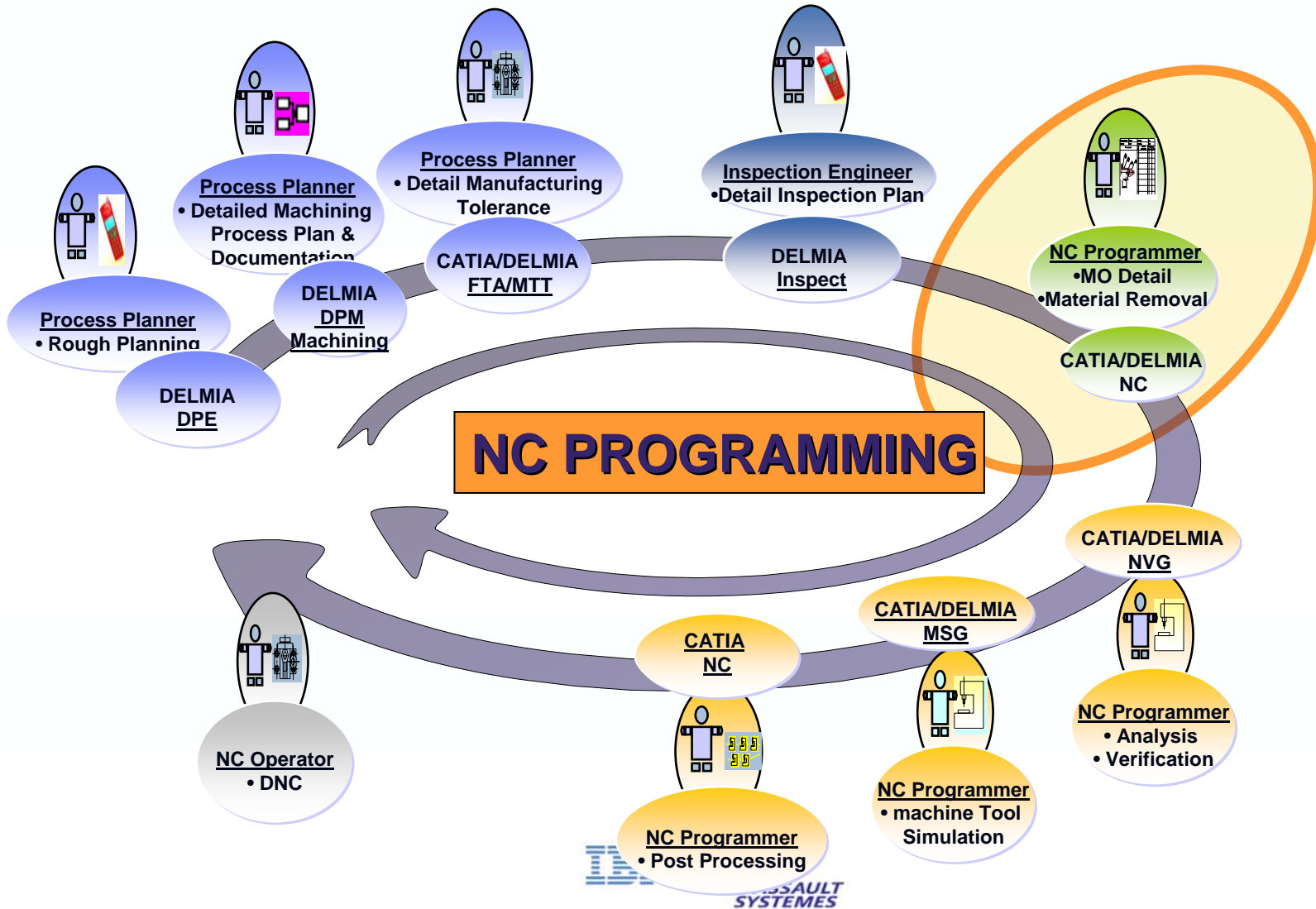
# V5 Machining : End-to-end Process Coverage



# V5 Machining : End-to-end Process Coverage

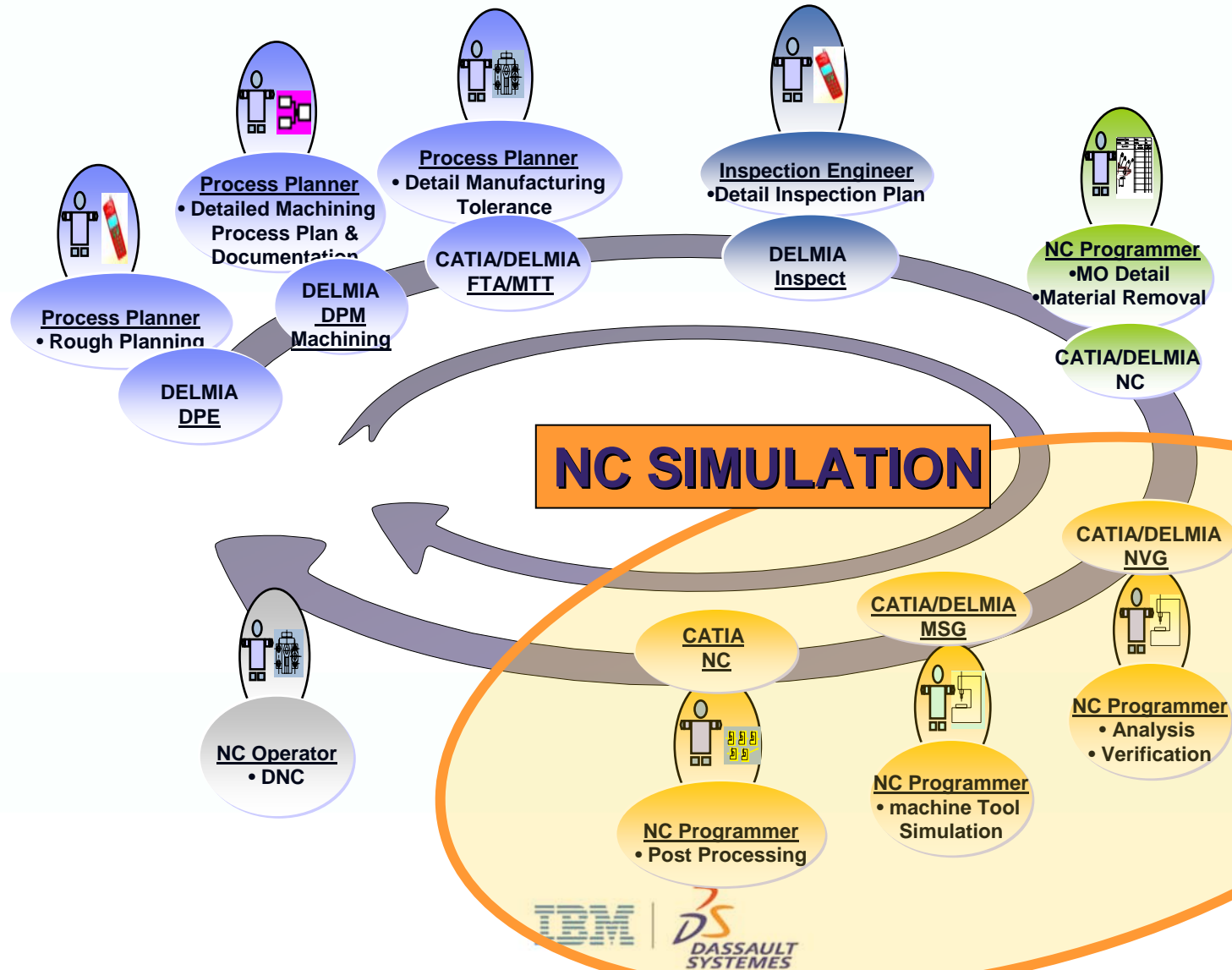


# V5 Machining : End-to-end Process Coverage

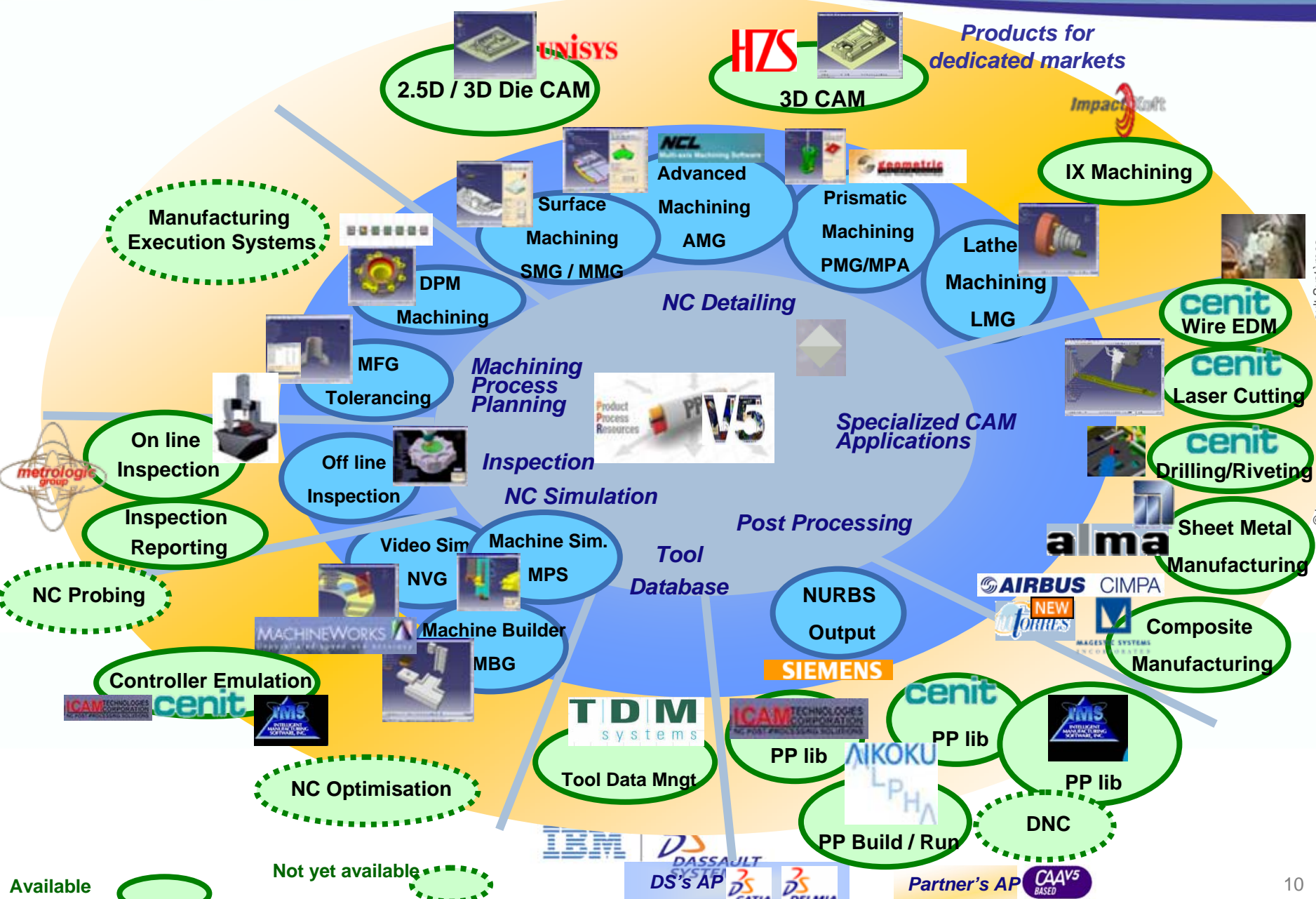




# V5 Machining : End-to-end Process Coverage



# Machining Ecosystem



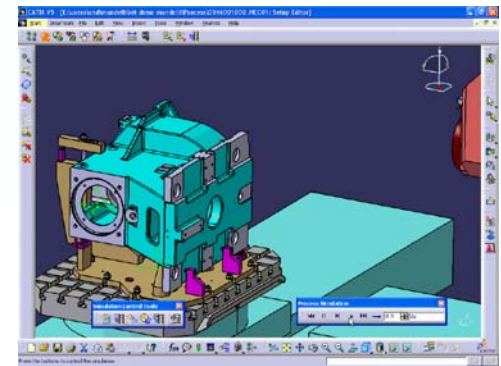
# New in V5R16 : One single Environment for Machining Programming and Simulation

- Unique integrated end-to-end V5 Machining Solutions with ISO code-based NC-machine simulation and material removal simulation :

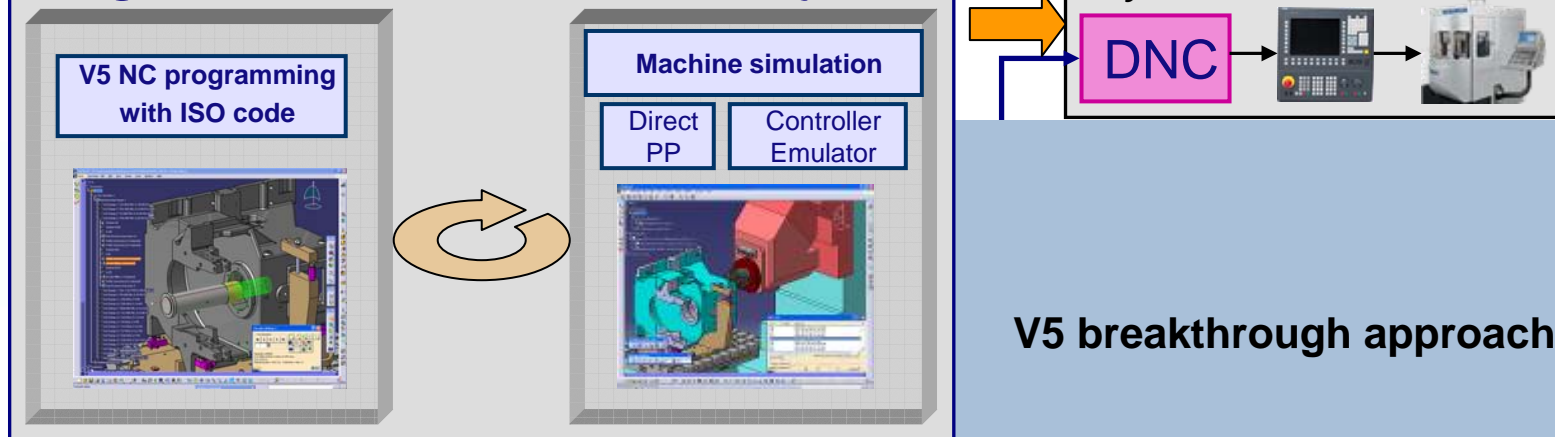
- **NEW** CATIA - NC Machine Tool Builder 2 (MBG)
- **NEW** CATIA - NC Machine Simulation 2 (MSG)

→ *Reduce lead time from programming to production*

→ *Eliminate interface issues and drastically reduce cost*

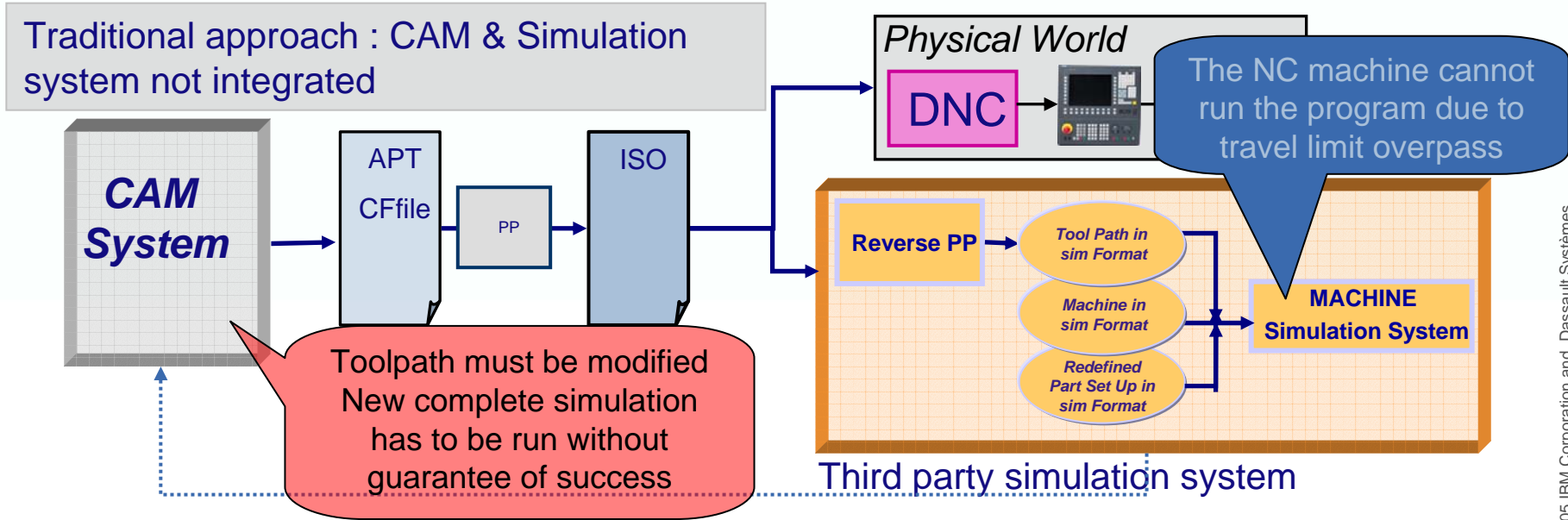


## Integrated CAM & Simulation System

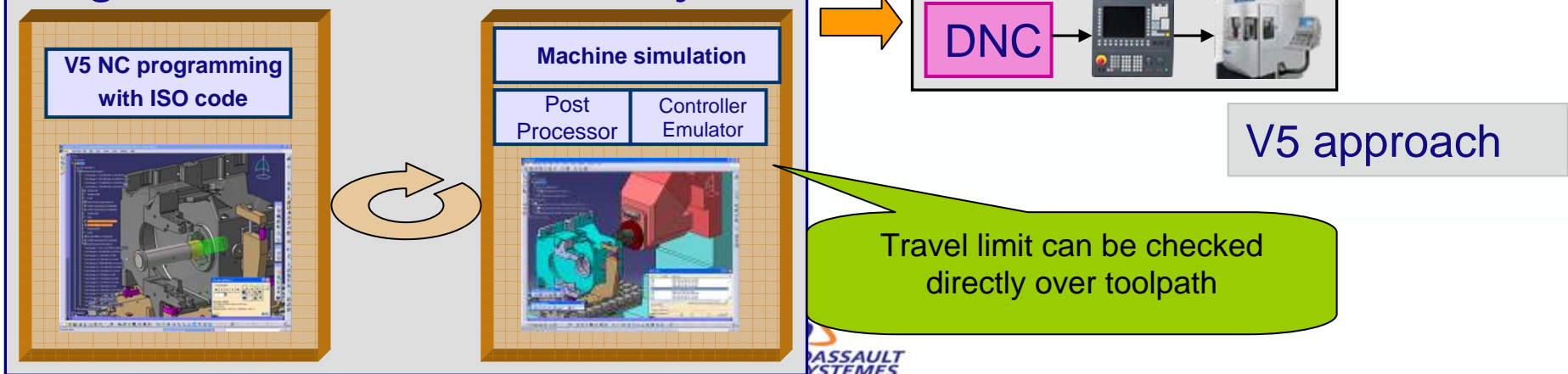


# NC-Machine Tool Simulation

## Added value 1 – Control NC-machine limits



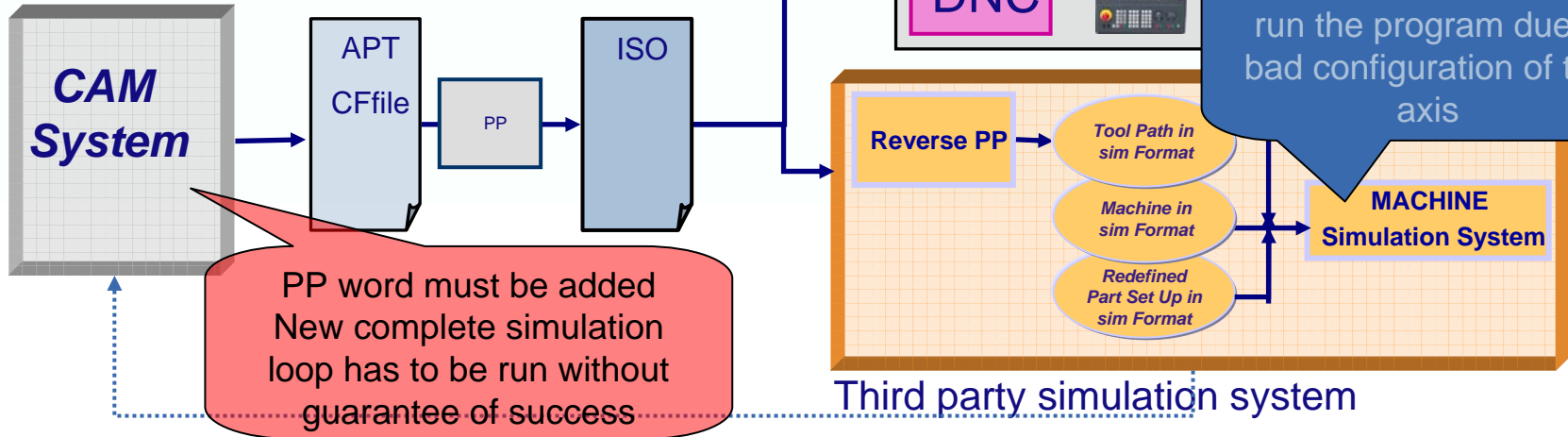
## Integrated CAM & Simulation System



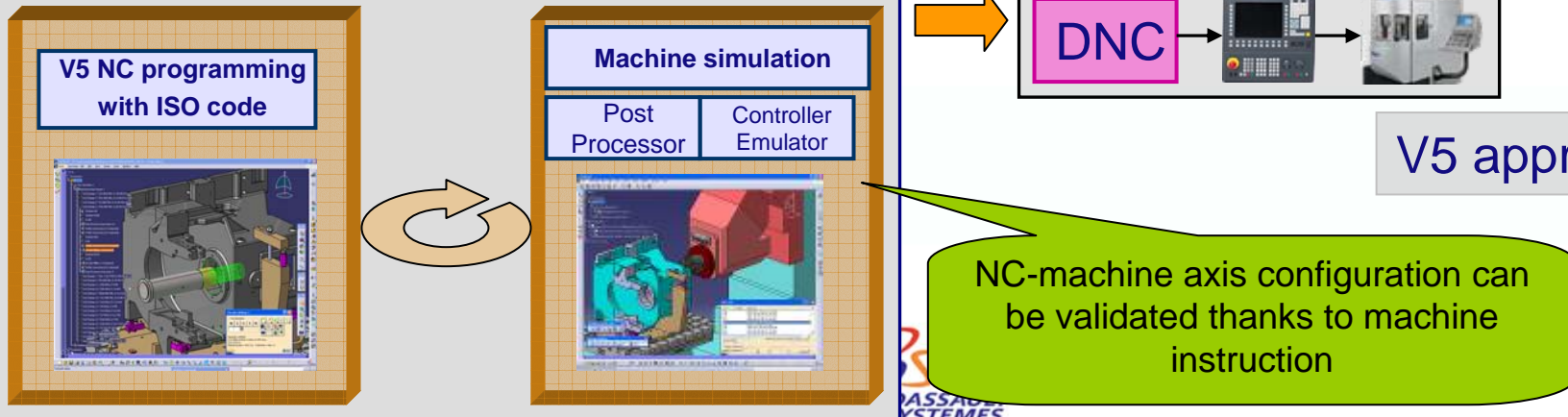
# NC-Machine Tool Simulation

## Added value 2 – Control NC-machine axis configuration

Traditional approach : CAM & Simulation system not integrated



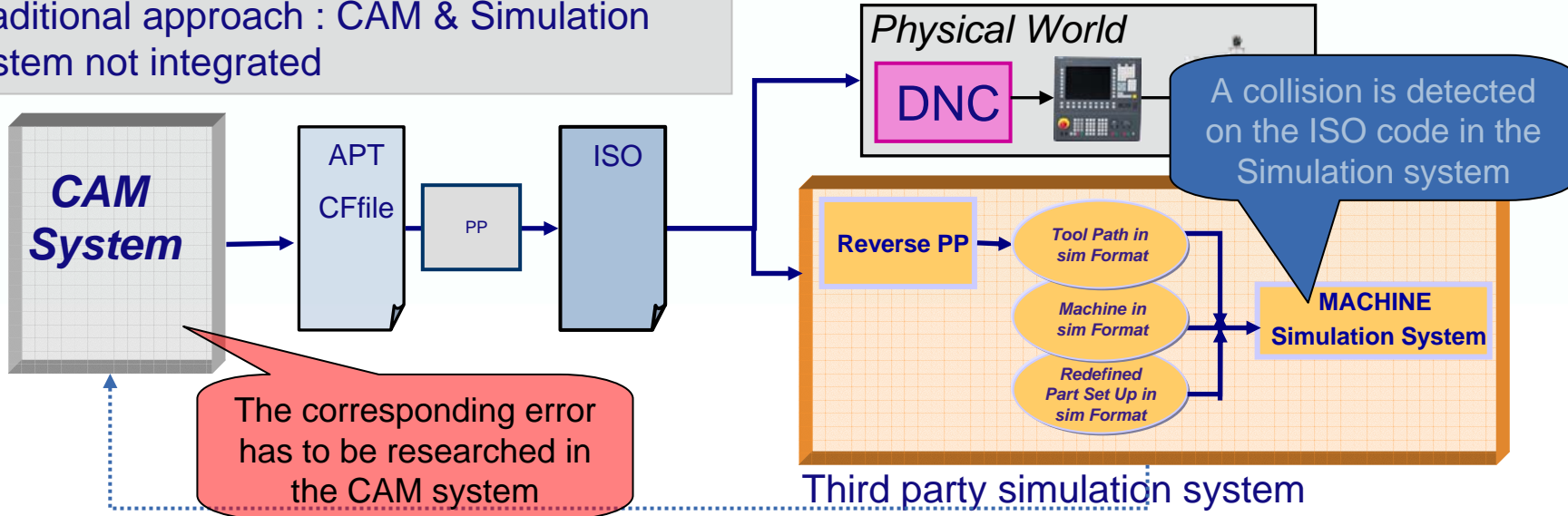
## Integrated CAM & Simulation System



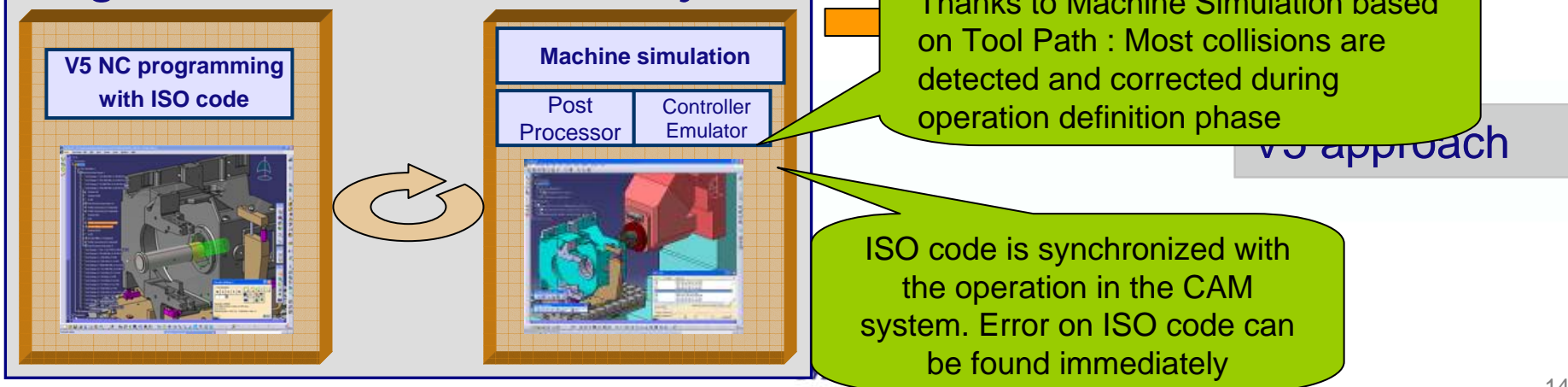
# NC-Machine Tool Simulation

## Added value 3 – Easy error detection and correction

Traditional approach : CAM & Simulation system not integrated



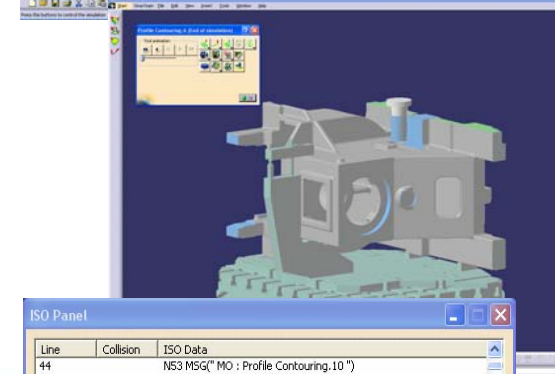
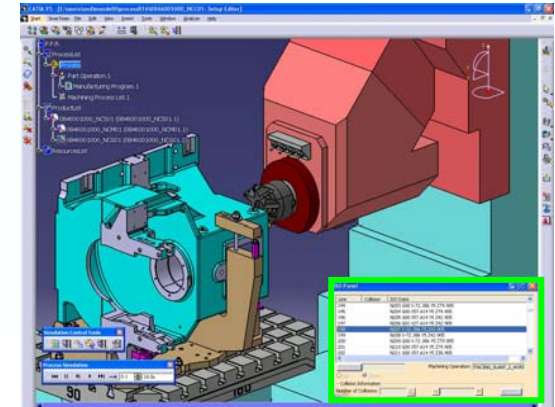
## Integrated CAM & Simulation System



# New : CATIA NC-Machine Simulation (MSG)

- Upfront integrated environment for machine simulation and material removal simulation
- Key Features :
  - Simulate NC-machine motion and material removal by using NC toolpaths or ISO Code
  - Simulation analysis and clash detection

- *Realistic simulation*
- *Easy problem detection/resolution*
- *Shortened programming time*



Line	Collision	ISO Data
44		N53 MSG(" MO : Profile Contouring,10 ")
45		N54 (.....)
46		N55 G00 X-32.348 Y92.5 Z-5
47		N56 G01 Z-15 F300
48		N57 G41 X-32.348 Y82.5 D1
49		N58 G03 X-22.348 Y72.5 I10 J0
50		N59 G01 X47.5 F1
51		N60 G03 X57.5 Y82.5 I0 J10 F1000
52		N61 G40 G01 X57.5 Y92.5

Find Next: \_\_\_\_\_ Machining Operation: Profile Contouring,10

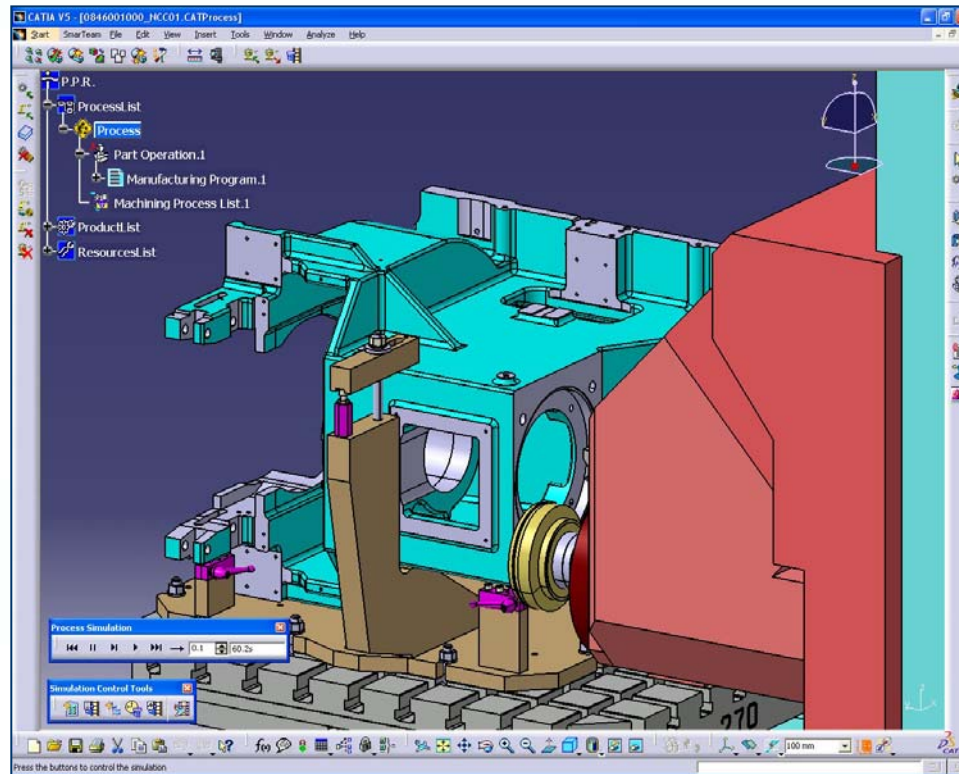
Up  Down

Collision Information

Number of Collisions: \_\_\_\_\_ Analyze

# MSG : Simulation based on Toolpath

- Simulate entire or partial Part Operation
- Validate Process during NC detailing
- Validate Machine tool setup upfront in the Machining Cycle



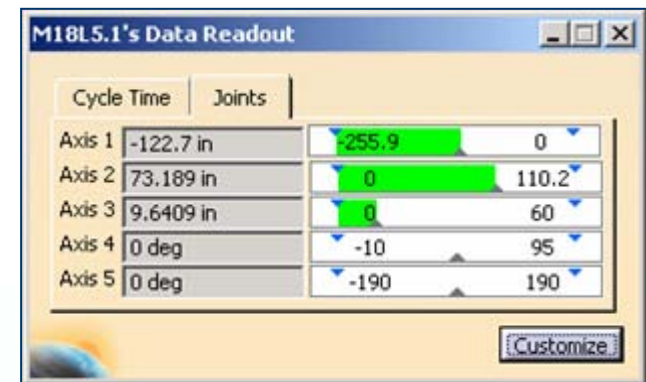
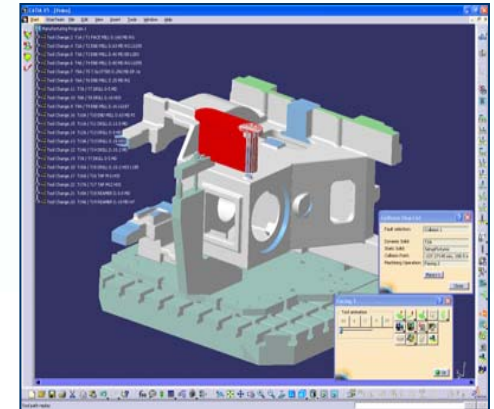




# MSG : Simulation Analysis & Collision Detection

- Axes value display
- Travel limit warning/interrupt :
  - Highlight
  - Verbose
  - Interrupt
- Distance analysis
  - Create “Distance and Band” analysis object
- Configurable Collision Options
  - Flexibility to set different classes of collision (default or specific)
- Command “Create Default Clashes” :
  - Creates interference objects
  - Switches on Analysis and sets analysis mode to “Highlight”

→ *Intuitive and easy collision detection*

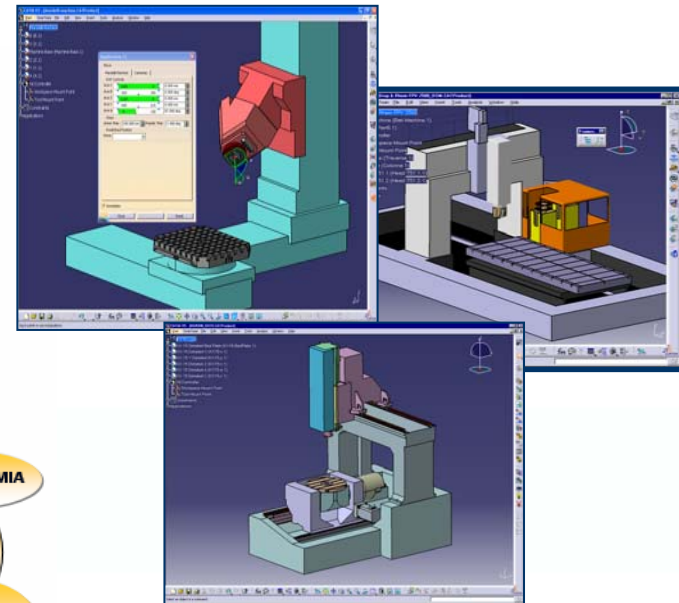
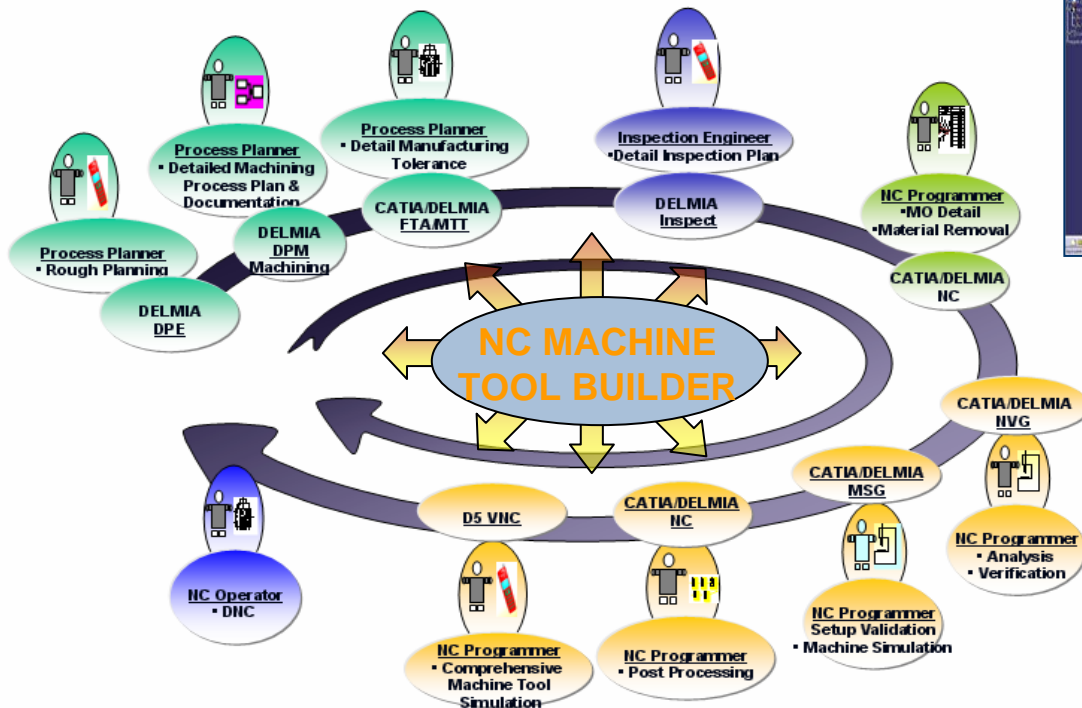


	Cycle Time	Joints	
Axis 1	-122.7 in	-255.9	0
Axis 2	73.189 in	0	110.2
Axis 3	9.6409 in	0	60
Axis 4	0 deg	-10	95
Axis 5	0 deg	-190	190



# New : CATIA NC-Machine Tool Builder (MBG)

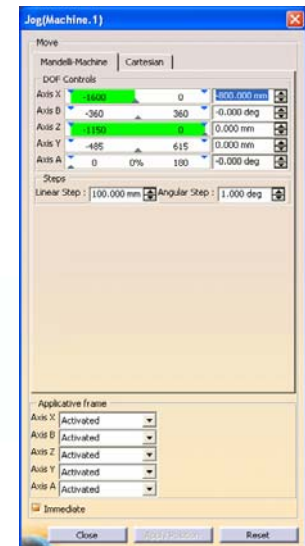
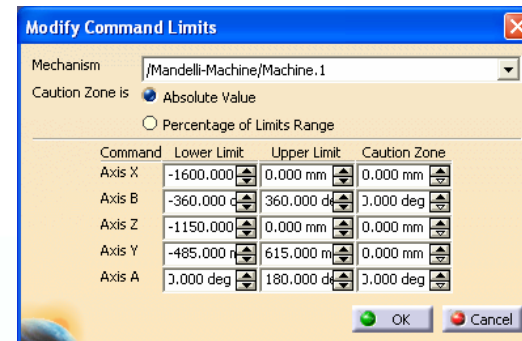
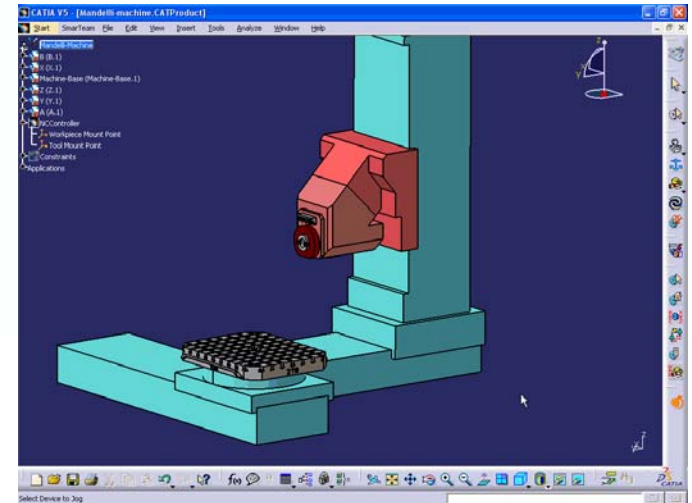
- Enable users to easily build unique NC-machine resources reusable in the entire Machining Process :
  - Process planning
  - NC Detailing, including automatic transition path generation
  - Simulation and Verification
  - Shopfloor output



# CATIA NC-Machine Tool Builder (MBG)

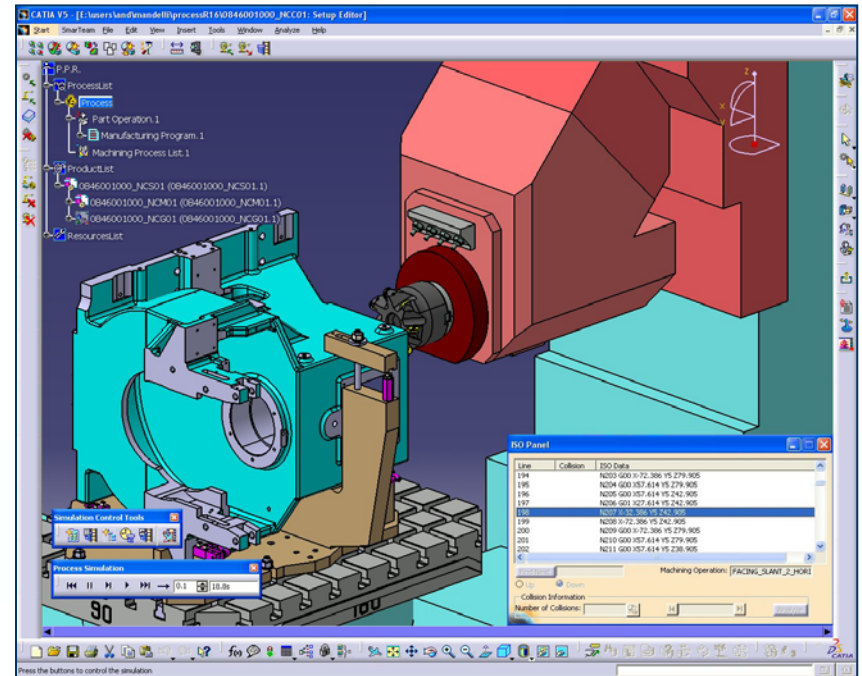
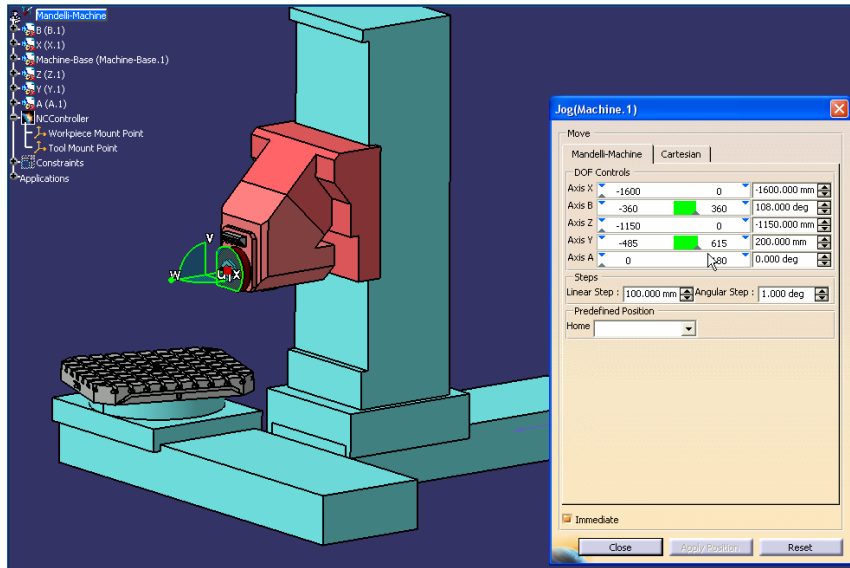
## ■ NC-Machine and peripheral resource Modeler :

- Model resources with kinematics (NC-Machine, Tool and Pallet Changers)
- Comprehensive NC Machine definition :
  - ◆ Geometry
  - ◆ Kinematics – forward and inverse
  - ◆ Technological information
  - ◆ Post-Processor/Controller Emulator selection
- Machine Table, Spindle and Tool change definition
- Early kinematic validation
- Reuse D5 VNC machines



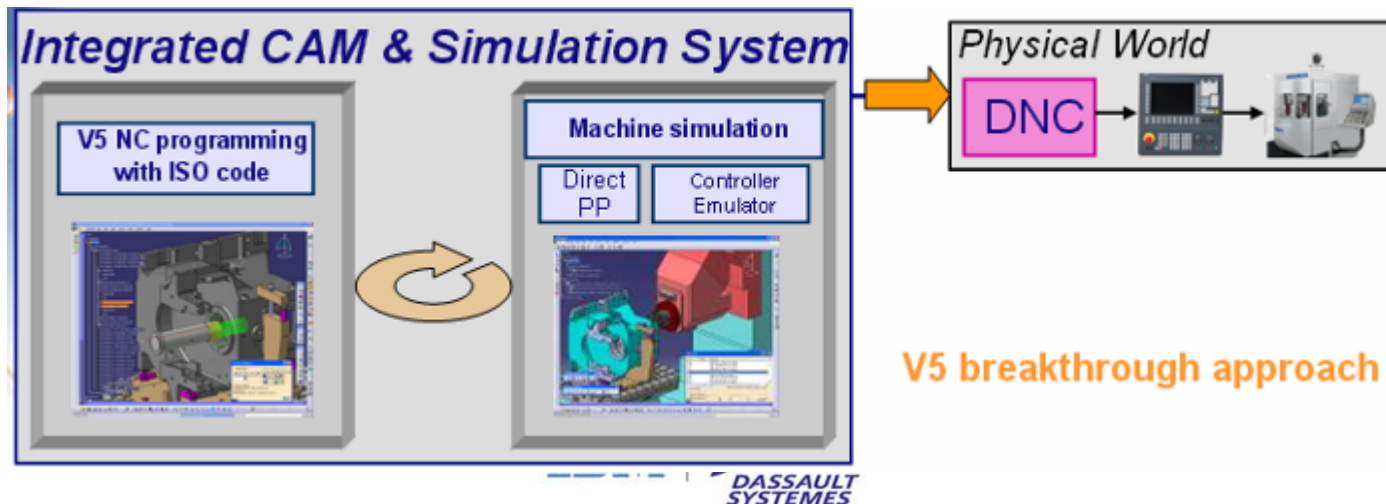
→ Easily define and validate machine tools

# Let us Have a Closer Look ...



# To Sum Up : V5 Machining Simulation Added Value

- One single system for Programming and Simulation : same data, same interface, effective change management
- Integrated, realistic ISO code-based machine simulation and material removal simulation
- Efficient problem detection and resolution thanks to simulation at an early stage in the process
- No software interface issues



**Thank You !**

