

# Industry Forum 2008

## BiW Tooling Methodology using Cadenas solutions



# AGENDA

- Introducing ABB
- Lead Center Body-In-White overview
- Body-In-White Product Range
- ABB & Cadenas collaboration



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# Facts about ABB



- Headquarters: Zurich, Switzerland
- More than 110,000 employees in around 100 countries
- Orders in 2006: \$28.4 billion
- Revenues in 2006: \$24.4 billion
- Listed on Stockholm, Swiss & New York exchanges; traded on virt-x

- A leading power and automation technology company with strong market positions in its core businesses
- Core business organized into 5 divisions; Power Products, Power Systems, Automation Products, Process Automation, and Robotics



# ABB's vision

As one of the world's leading engineering companies, we help our customers to use electrical power efficiently, to increase industrial productivity and to lower environmental impact in a sustainable way.

**Power and productivity for a better world**



# ABB's mission



## Improve performance

ABB helps customers improve their operating performance, grid reliability and productivity whilst saving energy and lowering environmental impact.



## Drive innovation

Innovation and quality are key characteristics of our product, systems and service offering.



## Attract talent

ABB is committed to attracting and retaining dedicated and skilled people and offering employees an attractive, global work environment.



## Act responsibly

Sustainability, lowering environmental impact and business ethics are at the core of our market offering and our own operations.

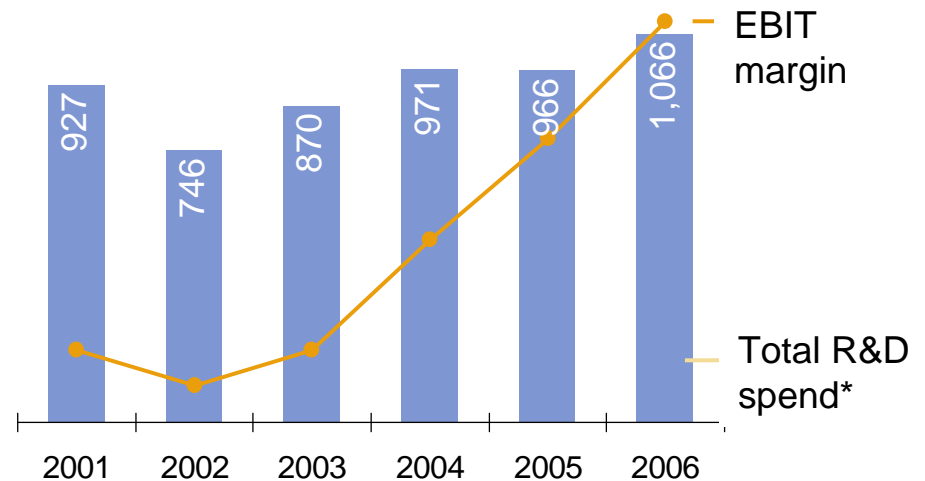




# Innovation: key to competitive advantage



ABB's current strong market position has been built through consistent R&D investment



- \$1.1 billion spent on research and order-related development in 2006, a 10 percent increase compared with 2005
- 6,000 researchers and developers worldwide
- R&D and new product focus in both power and automation:
  - *Energy efficiency (e.g., advanced transmission systems, high-efficiency motors and drives)*
  - *Flexibility and productivity (e.g., automation and control software, wireless communication systems)*

The heart of Robotics



\* Comprises Non-order related R&D and order-related development for ABB's five core division and excludes expenditures in Non-core activities

# What we offer: divisional structure and portfolio

2006 revenues (US\$) and employees per division



## Power Products

\$7.4 billion  
30,000 employees

Transformers, high- and medium-voltage switchgear, breakers, automation relays



## Power Systems

\$4.5 billion  
13,000 employees

Substations, FACTS, HVDC, HVDC Light, power plant & network automation



## Automation Products

\$6.8 billion  
30,500 employees

Low-voltage products, drives, motors, power electronics, and instrumentation



## Process Automation

\$5.4 billion  
24,000 employees

Control systems and application-specific automation solutions for process industries



## Robotics

\$1.3 billion  
4,500 employees

Robots, peripheral devices and modular manufacturing solutions for industry

- Market-leading positions in most key product areas
- Integrated solutions for grid reliability, productivity and energy efficiency
- Robust global value chain to serve established and emerging markets
- Extensive global network of value-added channel partners





# Robotics division



## Key deliverables

Products, systems and services for industrial robotics

- Robots, related equipment and software
- Standardized manufacturing cells for material handling, machine tending, welding, cutting, painting, finishing, etc.
- Engineering for turnkey solutions in press automation, body-in-white, paint process automation, power train assembly
- Product, system and asset management services

## Markets served

- Automotive and Tier 1 suppliers
- General industries such as foundry, metal fabrication, plastics, electronics, consumer industries



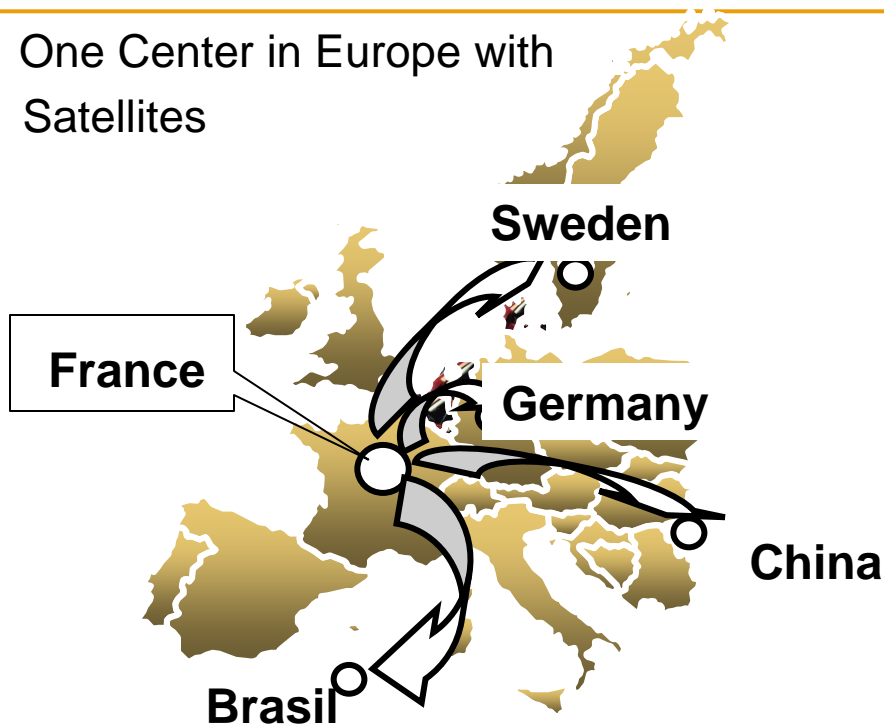
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# Global Lead Center - BIW

One Center in Europe with  
Satellites



## Company profile

407 Employees

170 Working stations (simulation & design)

R&D Center for the GLC BIW activity

20 000 m<sup>2</sup> of workshop

One Center in North America  
Manufacturing Center in Canada



## Company profile

114 Employees

50 Working stations (simulation  
and design)

55 000 m<sup>2</sup> of workshop



# BiW Organisation

**GLC Body-in-White**  
**Bernard Negre**



**FRANCE**

Marc Troïa

**USA/CANADA**

Bernard Negre

**SWEDEN**

Kenneth Jonsson

**GERMANY**

Serge Abou-Jaoudé

**BRAZIL**

Ronaldo Venite

**CHINA**

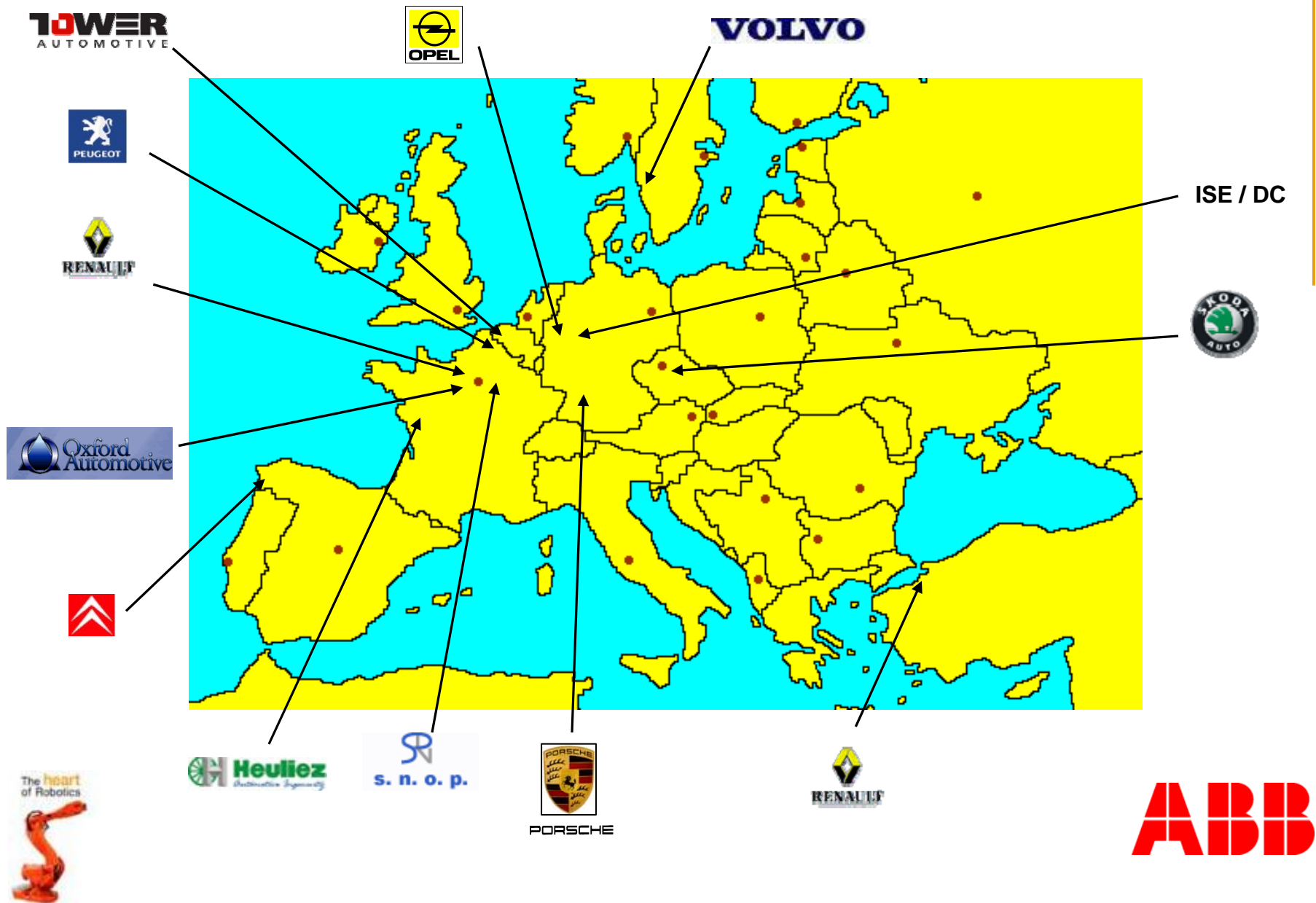
James-Gang Li /  
Hervé Chevalier

**INDIA**

Arvind Vasu

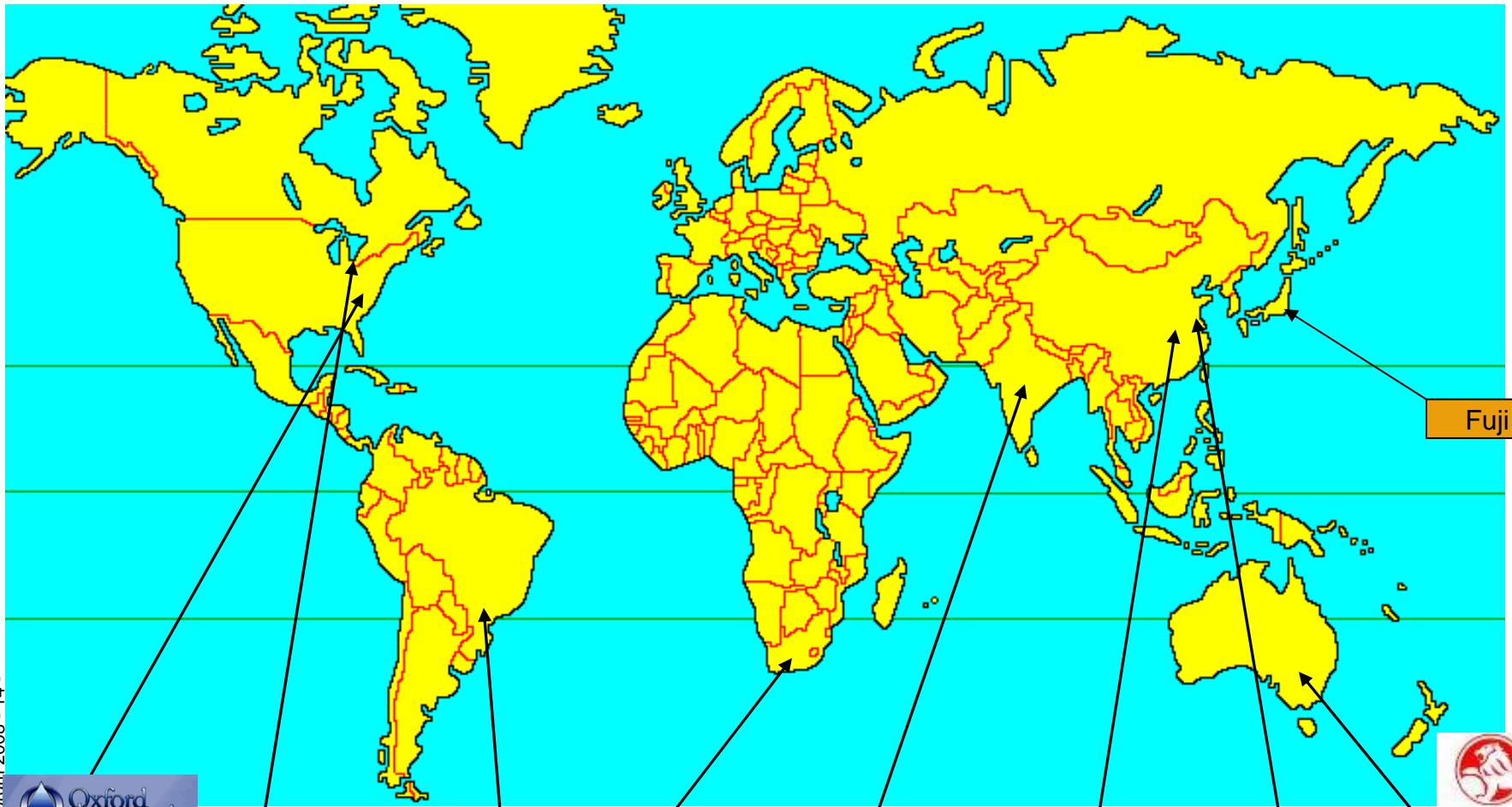


# Some references





# Some references



# Body-in-White Offer

## ABB Body-in-White Supplies

Complete Body and Closure Assembly Solutions,

- From process engineering to complete commissioning and optimisation
- based on standardized systems and components,
- with a project development based on standardized engineering methods and softwares.

Creating high product quality, capacity to adjust production volume, minimizing life cycle cost, lowering maintenance, shortening lead times through simultaneous engineering methods, and flexibility allowing for the fullest production.



# Body-in-White Solutions

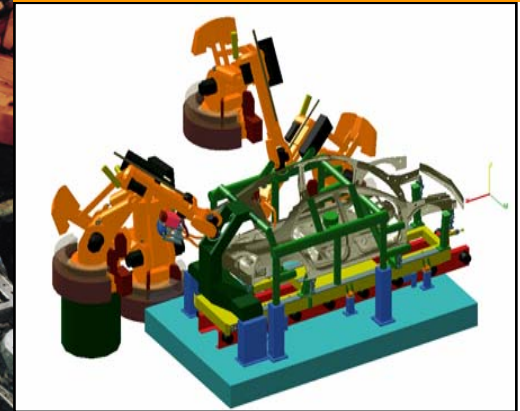
*From component assembly to body complete ...*



**FlexiCell**



**FlexFramer**

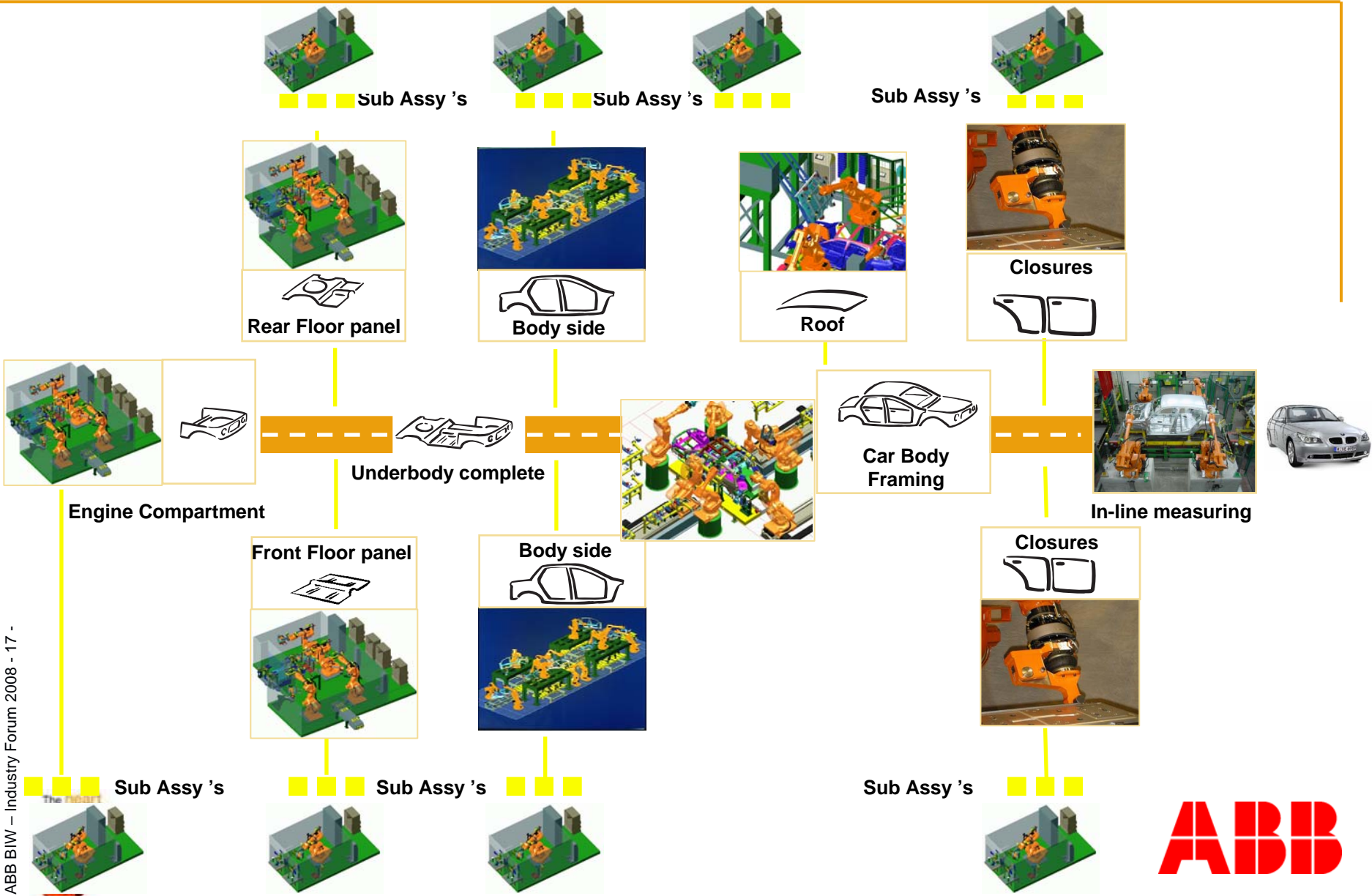


*... Plug and produce solutions !*



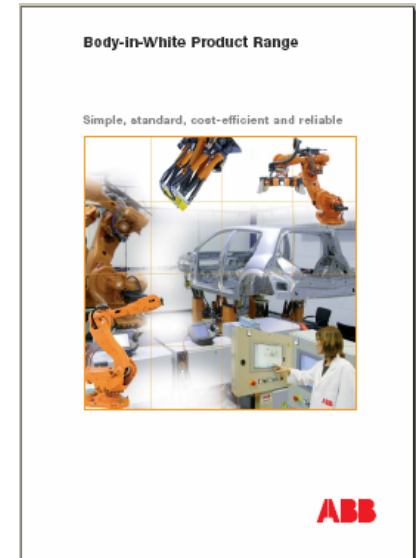


# Standard Production Systems



# AGENDA









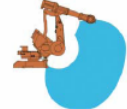



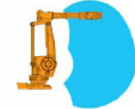

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# Robots

## Robots

							
	IRB 4400	IRB 4450S	IRB 6640	IRB 6620	IRB 6650S	IRB 6660	IRB 7600
							
A complete range of robots adapted to the different main applications of the automotive industry	Arc Welding Assembly Cleaning/Spraying Cutting/Deburring Gluing/Sealing Grinding/Polishing Machine Tending Material Handling Packing Palletizing Press Brake Tending	Assembly Cutting/Deburring Grinding/Polishing Machine Tending Material Handling Spraying	Machine Tending Material Handling Spot Welding	Assembly Cleaning/Spraying Cutting/Deburring Gluing/Sealing Grinding/Polishing Machine Tending Material Handling Packing Palletizing Press Brake Tending Spot Welding	Assembly Cutting/Deburring Grinding/Polishing Machine Tending Material Handling Spraying	Material Handling Machine Tending Press Tending	Assembly Cast Cleaning Machine Tending Material Handling Press Brake Tending Spot Welding
Load (kg)	10 - 60	30	130 - 235	150	90 - 200	130	150 - 500
Reach (m)	1.95 - 2.55	2.4	2.55 - 3.2	2.2	3.0 - 3.9	3.1	2.55 - 3.50
Protection							
IP-Class	54 - 67	54 - 67	67	54	66 - 67	67	67
Clean Room ISO Class	5		5				5
Foundry Plus/Prime	Foundry plus/Prime	Foundry Plus	Foundry Plus/Prime		Foundry Plus/Prime		Foundry Plus/Prime
Wash/Wash Down	Wash	Wash					
High Pressure Steam Washable		Yes		Yes	Yes		
Mounting	Floor Shelf	Shelf	Floor	Floor Tilted Inverted	Shelf		Floor
Models	IRB 4400-45-60 IRB 4400L-10-30 IRB 4450S	IRB 4450S	IRB 6640-180/2.55 IRB 6640-235/2.55 IRB 6640-205/2.75 IRB 6640-185/2.8 IRB 6640-130/3.2 IRB 6640ID-200/2.55 IRB 6640ID-170/2.75	IRB 6620	IRB 6650S-90/3.9 IRB 6650S-125/3.5 IRB 6650S-200/3.0	IRB 6660	IRB 7600-500/2.55 IRB 7600-400/2.55 IRB 7600-340/2.8 IRB 7600-150/3.50

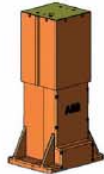
## Robots

# Programmable Positioners

## Programmable Positioners



3 axes programmable positioner, with linear axis, designed for positioning (programmed paths of parts and equipment)



FlexPLP Linear

FlexPLP Linear horizontal

FlexPLP Linear vertical

FlexPLP Tripod



	IRPLP Linear	IRPLP Linear H300	IRPLP Linear H400	IRPLP Linear V200	
Repeatability	+/- 0.05 mm	+/- 0.05 mm	+/- 0.05 mm	+/- 0.05 mm	+/- 0.05 mm
Speed	100 mm/s	100 mm/s	100 mm/s	100 mm/s	250 mm/s
Strokes	X = 400 Y = 300 Z = 200	300 mm	400 mm	200 mm	
Length		554 mm	654 mm		
Weight	130 kg	44 kg	46 kg	40 kg	50 kg
Dynamic Load	30 kg	50 kg	50 kg	50 kg	30 kg
Static Load	150 kg	150 kg	150 kg	150 kg	150 kg

Simple and flexible programmable gripper units avoids tool changing (on robot and on gripper)



FlexGrip

FlexGrip HD



	IRBG BW-S 3 axes / 1 axis		IRBG BW-L 3 axes
Repeatability	+/- 0.1 mm	+/- 0.1 mm	+/- 0.1 mm
Speed	100 mm/s	100 mm/s	100 mm/s
Strokes		150 mm	
Weight	35 kg	10 kg	40 kg
Dynamic Load	25 kg	30 kg	25 kg
Static Load	55 kg	70 kg	100 kg

## Conveying Systems

Material handling track motion: compact, entirely protected, heavy load capability, high transfer speed and acceleration and positioning of part and robot



	FlexTrack			
	IRT 501-66	IRT 501-66R	IRT 501-90	IRT 501-90R
Repeatability	+/- 0.1 mm	+/- 0.1 mm	+/- 0.1 mm	+/- 0.1 mm
Acceleration	2.1 m/s	1.5 m/s	1.5 m/s	1 m/s
Travel Speed	2 m/s	1.5 m/s	1.5 m/s	1.2 m/s
Weight	439kg + 96kg/m	439kg + 96kg/m	559kg + 112kg/m	559kg + 112kg/m
Maximum Payload	900 kg	2000 kg	2000 kg	2950 kg

Track motion for robots



	IRBT X004		
	IRBT 4004	IRBT 6004	IRBT 7004
Speed	2.0 m/s	1.6 m/s	1.2 m/s
Protection	'Foundry Plus'	'Foundry Plus'	'Foundry Plus'
Robots	IRB 4400 IRB 4450S	IRB 6600/IRB 6600ID IRB 6650/IRB 6650S IRB 6650ID	IRB 7600

The high speed roller table improves pallet positioning and reduces wear on rollers, pins and bushings



	Roller Table	
	STANDARD	WITH LIFT
Repeatability	+/- 5 mm (+/- 0.1 mm Pallet on Datum Frame)	+/- 5 mm (+/- 0.1 mm Pallet on Datum Frame)
Speed	1.8 m/s	1.8 m/s
Acceleration	1.6 m/s	1.6 m/s
Weight	850 kg	850 kg
Maximum Payload	2000 kg	2000 kg

For Large tools and parts handling



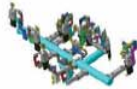
	Geo Pallet
Weight	700 kg
Maximum Payload	800 kg

# Tooling

## End Effector Tooling



All grippers are compatible with tool changer to enhance the future flexibility of the solution



	IRB Gripper - Small	IRB Gripper - Medium	IRB Gripper - Large	IRB Gripper - XLarge
Part weight	1 to 10 Kg	5 to 30 Kg	20 to 80 Kg	60 to 90 Kg
End effector weight	30 to 50 Kg	50 to 120 Kg	150 to 350 Kg	300 to 400 Kg
Number of clamping and locating units	4 to 6	6 to 8	8 to 14	14 to 18

## Fixtures



The IRB Tool fixtures are designed to improve the modularity of jig by using standard components, without compromise on stiffness



	IRB Tool - Small	IRB Tool - Medium	IRB Tool - Large
Part weight	1 to 10 Kg	5 to 25 Kg	20 to 80 Kg
Number of clamping and locating units	4 to 6	8 to 10	10 to 20

## Material Handling



Simple, economic and standard for material handling applications: stamping, packaging and palletizing, handling, etc...



	IRB Gripper Small	IRB Gripper Medium / Large	IRB Gripper Large / XLarge
Part weight	1 to 10 Kg	5 to 25 Kg	20 to 40 Kg
End effector weight	3 to 7 Kg	6 to 15 Kg	20 to 40 Kg
Number of suction cups and locating units	3 to 6	4 to 8	6 to 12

## Additional Products

The risers allow to increase the height of the robot required for some applications in the automotive industry



	Robot Risers
Height	250 mm to 2500 mm

Standard modular electro-pneumatical manifold allows reduction of time for cabling, piping, tests, and reduction of stocks



	Flexair
Number of sequences	1 to 5
Number of cylinders per module	8
IP Class	65

The pivot arm allows an angular movement of a reference support, and is operated by a cylinder with blocking and locked with a 3 point system in working position



	Locking Pivot Arm	
	T 100	T 130
Repeatability	+/- 0.05 mm at 400 mm	+/- 0.05 mm at 400 mm
Number of cycles	> 1 500 000	> 1 500 000
Payload	35 kg at 400 mm	50 kg at 500 mm
Opening Time 45°	2.3 sec	2.8 sec
Opening Time 90°	2.6 sec	3.2 sec

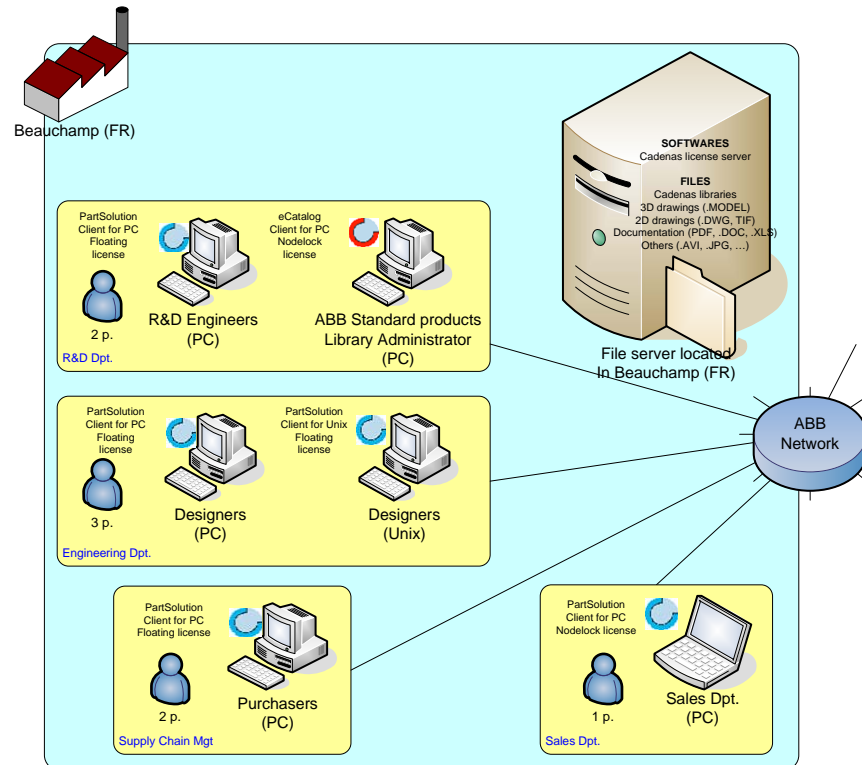
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# Collaboration with Cadenas – Step 1

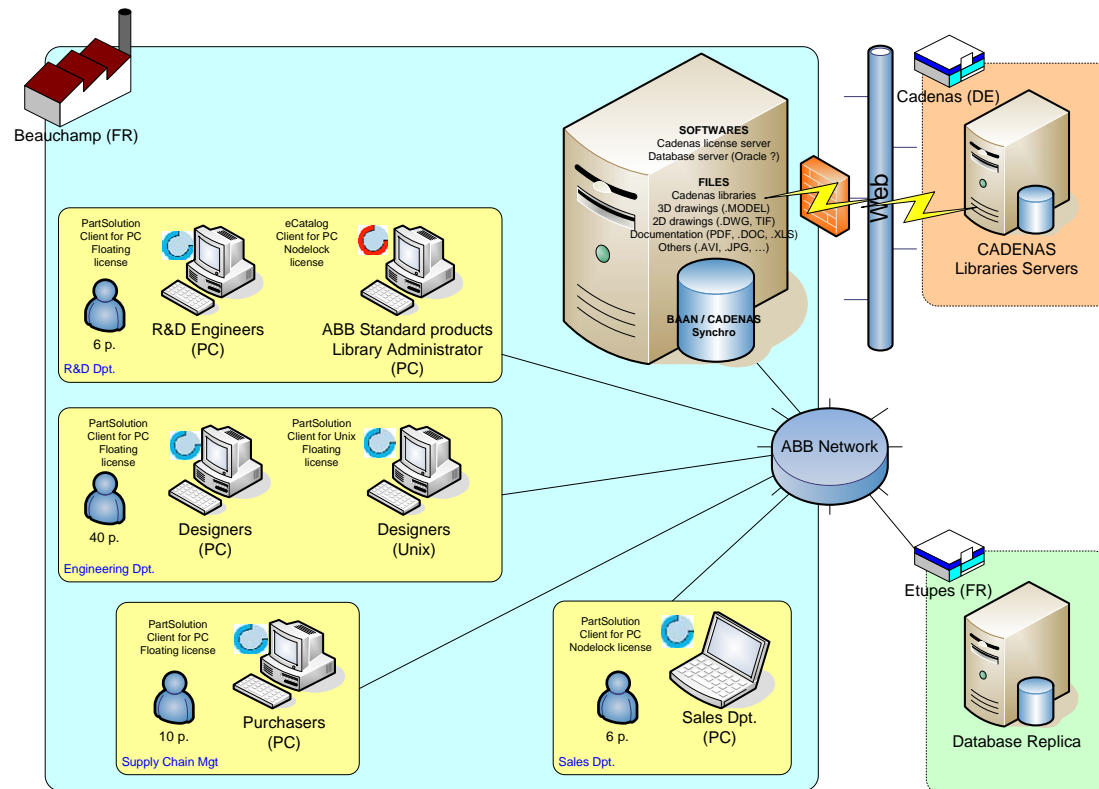
- Step 1 – Q1-06 to Q2-07
  - ABB BiW France started to work with Cadenas in 2006
  - As a first step, it was decided to start an evaluation of the Cadenas platform, involving only one plant (FR) & a limited number of users.
  - The focus has been on the end-effector tooling components, most commonly used by designers.
  - It was mandatory to verify the acceptance of the tool by end users, before a larger deployment in the Lead Center.





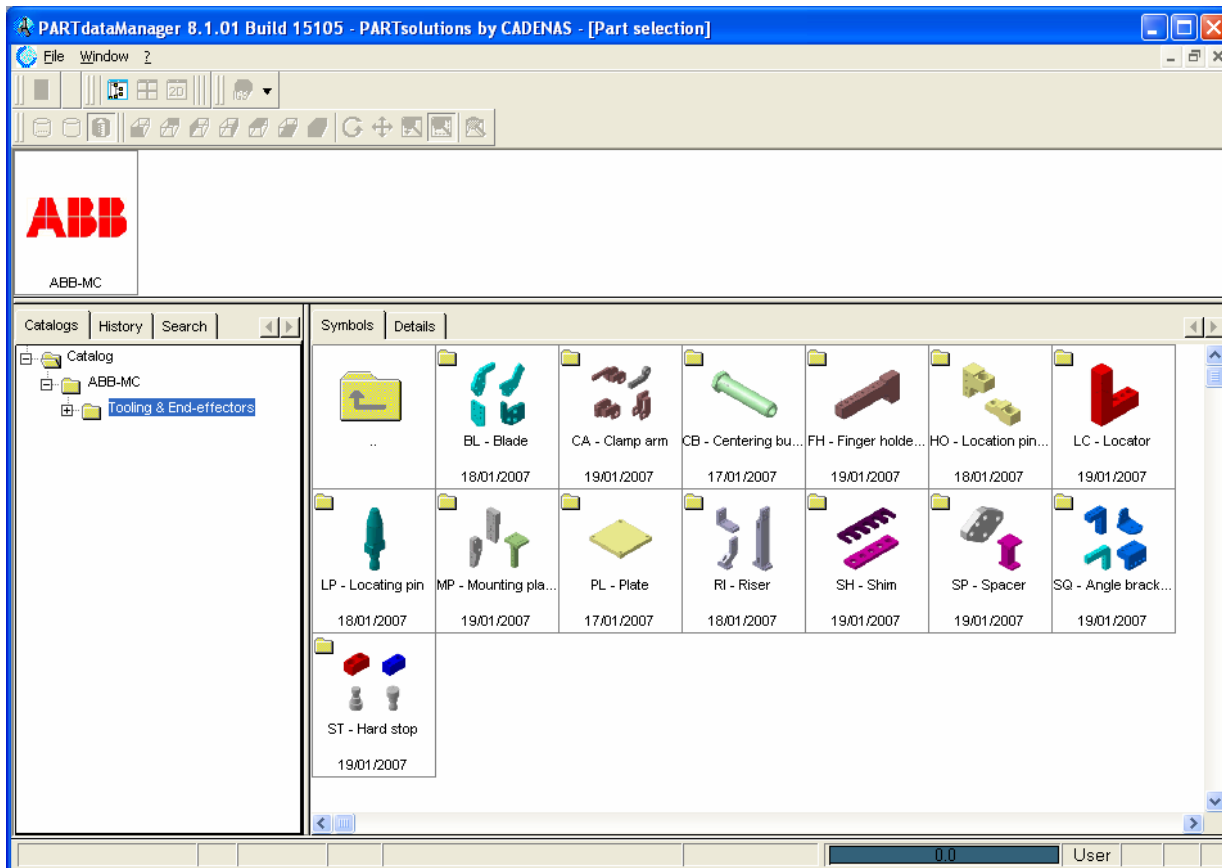
# Collaboration with Cadenas – Step 2

- Step 2 – Mid term evolution – Q3-07 to Q1-09
  - After a successful validation phase, internal users were expressively requesting us to scale the system such as the whole engineering department (40 people) can access the database.
  - Besides the tooling components, the designers were happy to find most of the suppliers catalog they need, with documentation and 3D immediately available.
  - This said we had also to take care of the catalog updates, which has been very simple with the automatic update feature included in PARTsolutions.



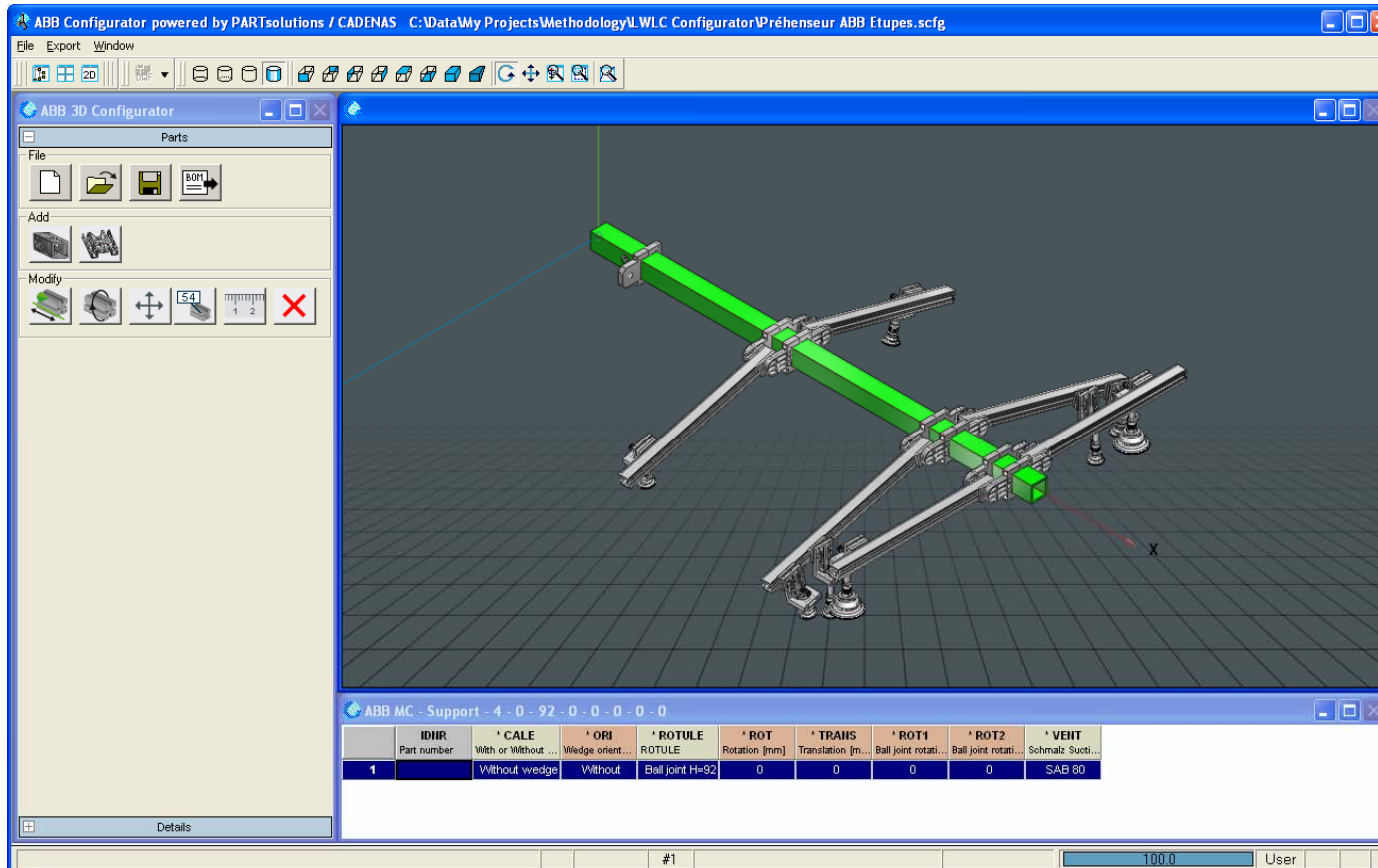
# The components library

- The designers now have access to a catalog of more than 400 components to create Body-In-White tooling
- The user starts the PARTsolutions interface from the design Environment (Catia V5) and select the required component which is then directly inserted into the current assembly



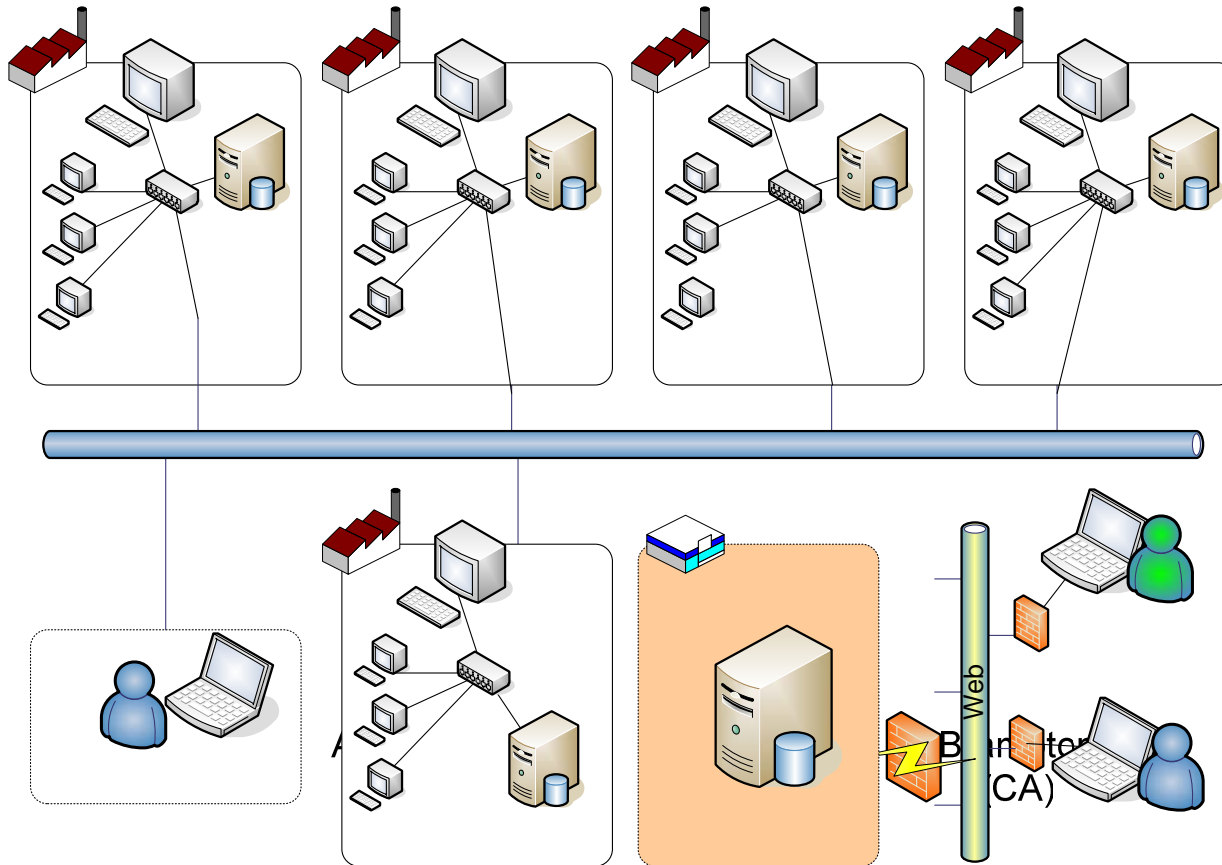
# The gripper configurator

- For the end-user, another great feature is the ability to create its own gripper from scratch, without the need for a CAD software
- The configurator guides the user thru the necessary operations, avoiding mistakes and checking parameters.
- The result of the work can be exported as a 3D file to be used in robot simulation platforms (RobCad, RobotStudio)



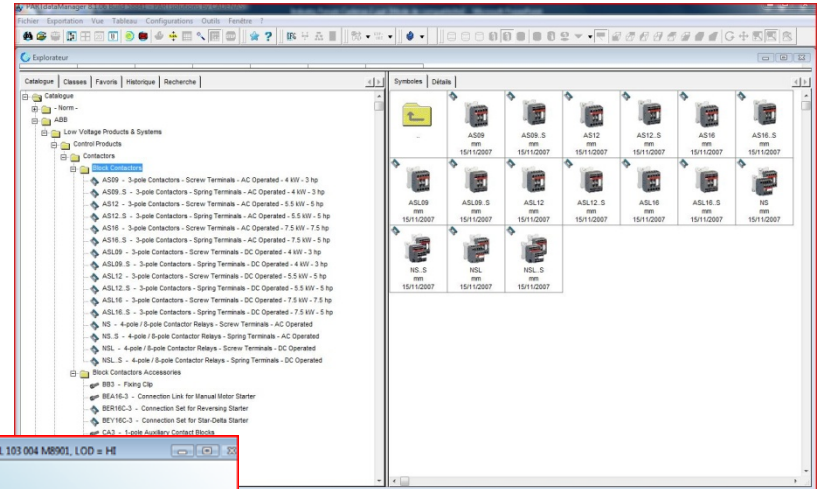
# Collaboration with Cadenas – Step 3

- Step 3 – Long term evolution – Q2-09
  - If the success of Step 2 is confirmed, we plan to deploy PARTsolutions in the main Lead Centers over the world.
  - France will remain the source database owner, automatic replications will keep the other servers up to date.
  - All other products will be introduced in the catalog



# Collaboration with Cadenas in other Divisions

- Many other ABB entities over the world are using Cadenas solutions
  - ABB Motors NA
  - ABB Powertrain NA
  - ABB Entelec EU
  - ABB Control Products
  - ABB Drives
  - ABB Low Voltage Products



BIAC	CCV	OC	PACK	WGT	PS	TD	ACC
Built-in aux. c...	Control coil v...	Type	Order code	Pack (Pieces)	Weight (kg)	Product Sheet	Technical data
16	1 N.C.	240	ASL09-30-015-89M	15BL 103 004 M8901	40	0.20	INFO PS INFO TD INFO ACC
17	1 N.O.	12	ASL09-30-105-80	15BL 103 004 R8010	1	0.28	INFO PS INFO TD INFO ACC
18	1 N.C.	12	ASL09-30-015-80	15BL 103 004 R8001	1	0.28	INFO PS INFO TD INFO ACC
19	1 N.O.	24	ASL09-30-105-81	15BL 103 004 R8110	1	0.28	INFO PS INFO TD INFO ACC
20	1 N.C.	24	ASL09-30-015-81	15BL 103 004 R8101	1	0.28	INFO PS INFO TD INFO ACC
21	1 N.O.	48	ASL09-30-105-83	15BL 103 004 R8310	1	0.28	INFO PS INFO TD INFO ACC
22	1 N.C.	48	ASL09-30-015-83	15BL 103 004 R8301	1	0.28	INFO PS INFO TD INFO ACC
23	1 N.O.	60	ASL09-30-105-84	15BL 103 004 R8410	1	0.28	INFO PS INFO TD INFO ACC
24	1 N.C.	60	ASL09-30-015-84	15BL 103 004 R8401	1	0.28	INFO PS INFO TD INFO ACC
25	1 N.O.	110	ASL09-30-105-86	15BL 103 004 R8610	1	0.28	INFO PS INFO TD INFO ACC
26	1 N.C.	110	ASL09-30-015-86	15BL 103 004 R8601	1	0.28	INFO PS INFO TD INFO ACC
27	1 N.O.	125	ASL09-30-105-87	15BL 103 004 R8710	1	0.28	INFO PS INFO TD INFO ACC
28	1 N.C.	125	ASL09-30-015-87	15BL 103 004 R8701	1	0.28	INFO PS INFO TD INFO ACC
29	1 N.O.	220	ASL09-30-105-88	15BL 103 004 R8810	1	0.28	INFO PS INFO TD INFO ACC
30	1 N.C.	220	ASL09-30-015-88	15BL 103 004 R8801	1	0.28	INFO PS INFO TD INFO ACC

Configur...

Indication(s) technique(s)

Représentation:



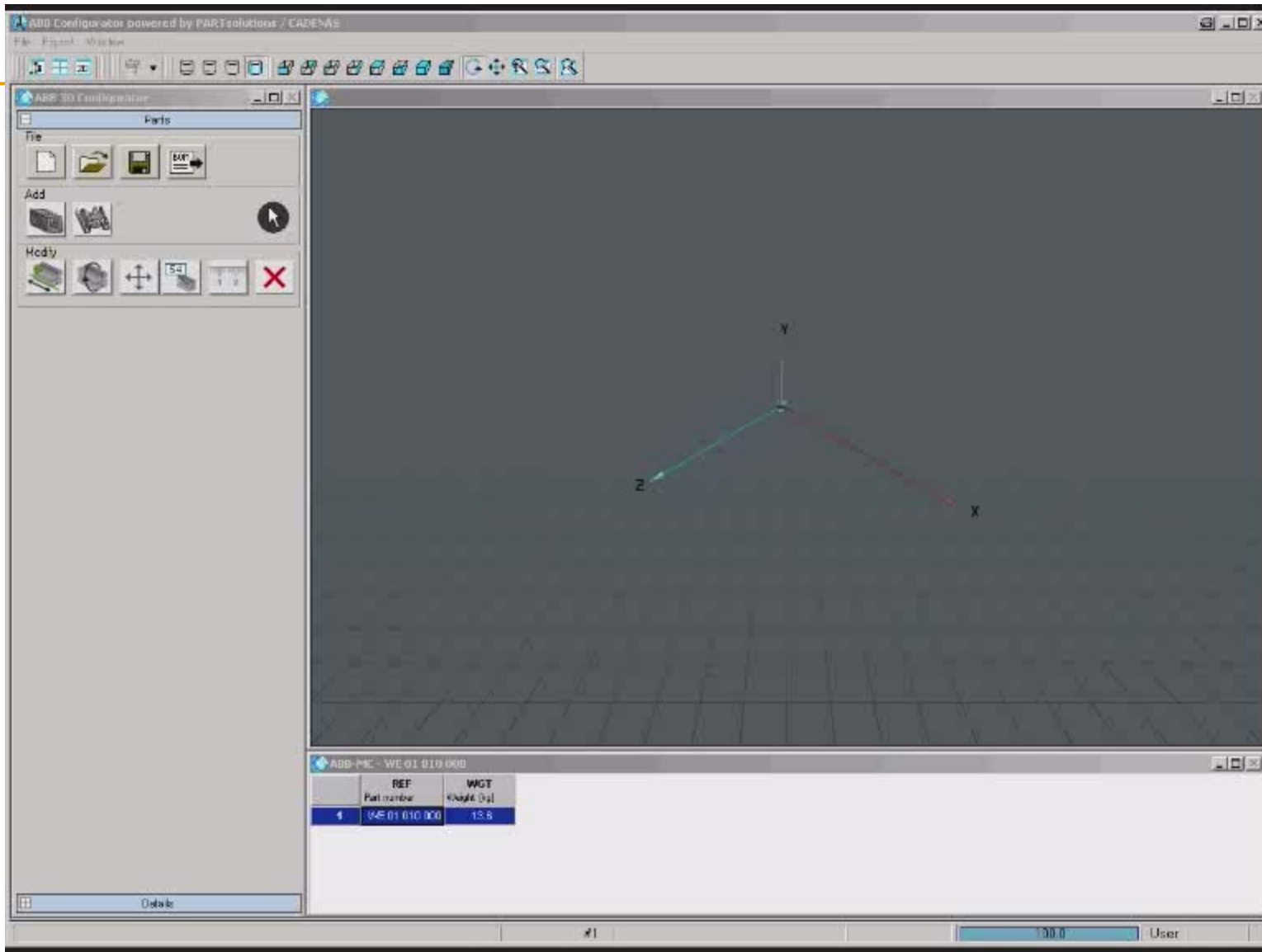


# Internet ABB 3D Portal

- With Internet ABB 3D portal, powered by Cadenas, any ABB employee can access the corporate catalogs with a simple internet connexion.

The screenshot shows the Internet ABB 3D Portal website. At the top, there is a browser window title "Internal ABB 3D Portal". The main header features the ABB logo on the left, navigation links for "Log in", "Create account", and "Feedback" in the center, and "PARTcommunity powered by CAD ENAB | PART SOLUTIONS" on the right. Below the header, there is a "Login" section with fields for "Username" and "Password", a "Remember my login" checkbox, and "Log in" and "Create account" buttons. A link for "Lost your password, please click here" is also present. The main content area is divided into several sections: "Welcome to ABB" with a brief introduction, "Our offerings" with a list of product categories, "Popular pages" with a list of links, and "ABB has supplied more than 15,000 generators and related components for wind power generation" with an image of a generator. There is also a "Search" box and an "In brief" section with news items. The footer contains "Provider information/Impressum © Copyright 2008 ABB. Privacy policy" and the ABB logo.





# Thanks !

ABB would like to thank  
CADENAS for this fruitful  
collaboration in making  
every day's life easier for ABB  
employees, as well as  
providing a great tool for  
customers.



**Thank you for your attention.**

**ABB**

**Power and productivity  
for a better world™**

**ABB**

The heart  
of Robotics

