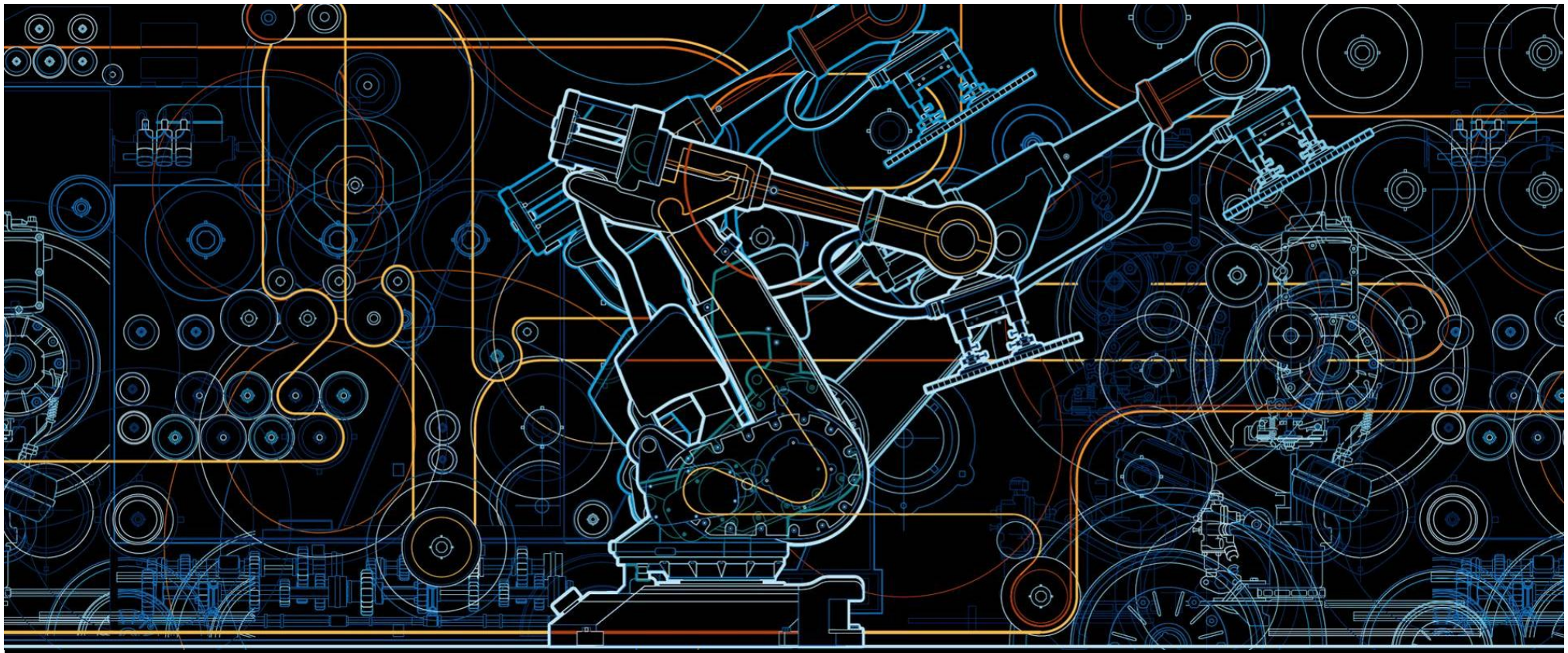

ABB Robotics, Massimo Calvetto, 19th of June – Mainz

ABB Robotics - Customer Day 2013

How to paint your products with easy-to-use, cost effective and flexible solutions?

Agenda

- Main topics in this presentation
  - ABB in paint: Location and Paint time-line
  - ABB Paint product overview
    - Differences with Industrial Robot
  - Main components in a Paint robot system
    - Controller, motions, IPS and Brush concept
  - Manipulator models: where we use our robot
    - Some application areas
  - Option, accessories and software
  - Paint Atomizers
  - Conclusion

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ABB Robotics Paint
Passion for painting

- ABB Robotics Paint - Norway
  - Responsible for the development of coating robot systems

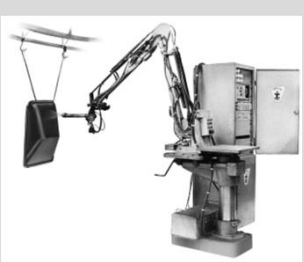
- ABB Robotics Paint - China
  - Responsible for the manufacturing of coating robot systems

- ABB Atomizer Supply Unit - Japan
  - Responsible for the development and manufacturing of rotary atomizers

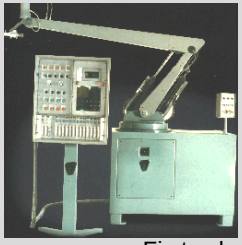
1969 - 2013
More than 12000 ABB paint robots - and counting...

A constantly evolution in paint…

1964 - 67


Number 1

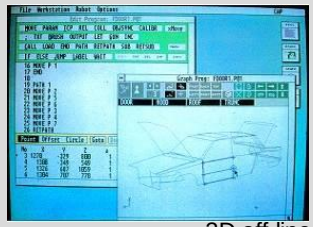
1969


First sale

1985


TRACS system

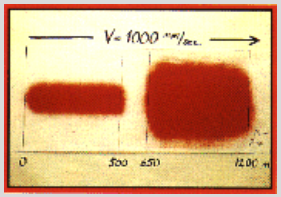
1985


3D off-line

1988


Electrical - C5

1989


IPS

1997


S4

2000


Process arm

2006


New exterior concept

2008


Small painter

2010


Process integration


IRB52 Process int.

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Overview of current products
Paint robots, accessories, components, software


IRB 5500


IRB 5400-22


IRB 580


Rail systems


IRB 5400-12


IRB 52


IRC5P

Powered by IPS™

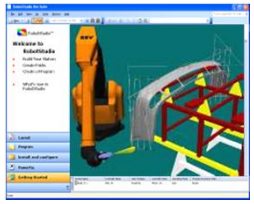

FlexPaint Pendant

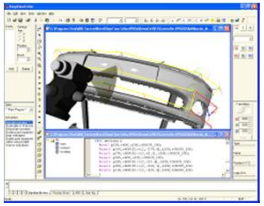
RobView 5


IRB 5330


IRB 5310


IRB 5350

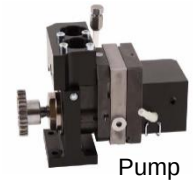

RobotStudio
Paint

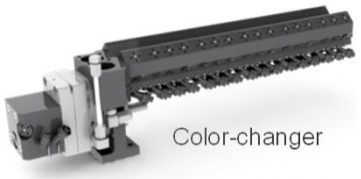

ShopFloor Editor/
3D Program Editor


RB1000


EXT


CBS


Pump


Color-changer


RB031PC


RB625


Air control


2K mixer


IRB 5320

What is a Paint Robot
- compared to an Industrial robot

An ABB Paint robot is based upon the solutions and experience from our ABB Industrial robot, adding some unique features for coating applications

- **Motion characteristics** specially tuned for painting
  - Less accuracy (not so important for paint) but “smooth” movement
  - Pose repeatability Paint Robot 0,15-0,30 mm (Industrial 0,01-0,19 mm)

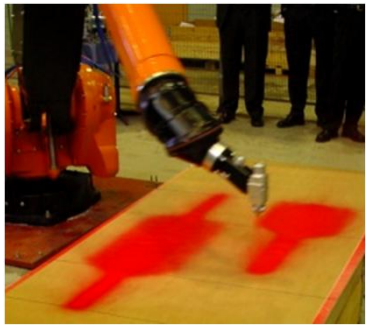
- **Paint PC tools and TPU dedicated** for the Painting process
  - RobotWare Paint software and PC tools, RobView5, RobotStudio with Painting PowerPac, ShopFloor Editor
  - TPU- Paint teach pendant

- **Explosion proof design**

What is a Paint Robot
- compared to an Industrial robot

- **Dedicated Painting wrist**, straight design hollow wrist for limited wear of process hosing

- **Real Integrated Process Control**
  - **Process equipment integrated** into the manipulator and the control system – result in state of the art accuracy between motion and process.
  - **Combined motion** performance **and paint process** performance into a total Paint solution



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IRC5P paint robot system
Quality painting made easy

IRC5P Paint robot controller

- A real paint robot controller, built on the same platform as IRC5 Industrial robot controller
- One size cabinet, prepared for adding paint related functions and interfaces

FlexPaint Pendant

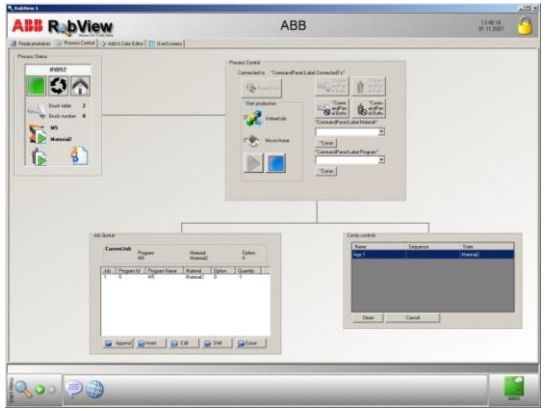
- Easy and safe paint robot operation
- Ex certified
- IPS and paint process screens

RobView 5

- Paint cell supervision and operation
- Basic version included
- Customized user screens, program visulizer, command screens,

IRC5P
Perfect paint combination

From the office



On the field

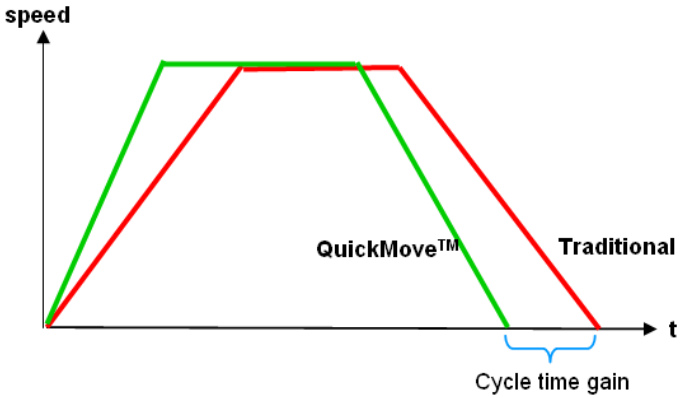
RobView

- Manage the paint installation with one or more robots
- Process visualization
- Operation and supervision
- IPS parameter editing

FlexPaint Pendant

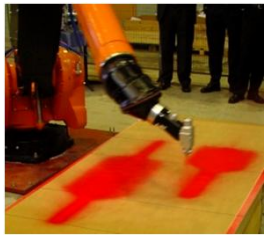
- Test and calibrate the paint process equipment
- Jog and program the robot
- Test the program

IRC5P paint robot system
ABB's superior motion control



- TrueMove™
  - Ensures that the motion path followed by the robot is the same as the programmed path – regardless of the robot speed
- QuickMove™
  - Minimizes cycle time by maximizing acceleration at every moment
- Result:
  - Shorter programming time
  - Shorter cycle time
  - Superior result

ABB's motion control and ABB's process control
A winning combination



- To achieve perfect results, **process and motion must be perfectly synchronized**
  - IRC5P, with its superior motion control and IPS technology, result in an unmatched, milliseconds accuracy and repeatability for all process control signals
- Customer benefits
  - Precise trigger position
  - Perfect fluid flow control
  - Significant paint savings
  - Optimized cycle time

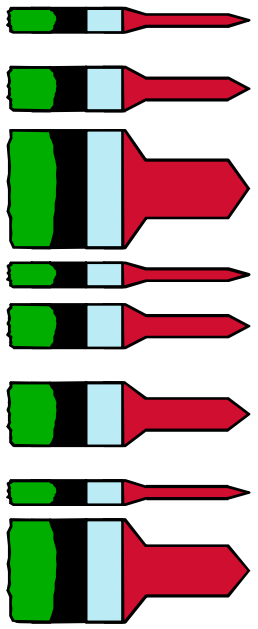
IPS
Full flexibility in paint parameters

Powered by

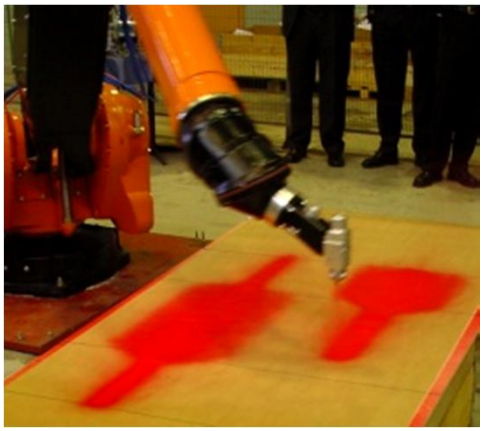
The brush table

A collection of pre-defined brushes, ready to select and use in the paint program

Brush 1:	Paint flow	Atomizing	Shape air	High voltage
Brush 2:	Paint flow	Atomizing	Shape air	High voltage
Brush 3:	Paint flow	Atomizing	Shape air	High voltage
Brush 4:	Paint flow	Atomizing	Shape air	High voltage
Brush 5:	Paint flow	Atomizing	Shape air	High voltage
Brush 6:	Paint flow	Atomizing	Shape air	High voltage
Brush 7:	Paint flow	Atomizing	Shape air	High voltage
Brush 8:	Paint flow	Atomizing	Shape air	High voltage
Brush 9:	Paint flow	Atomizing	Shape air	High voltage

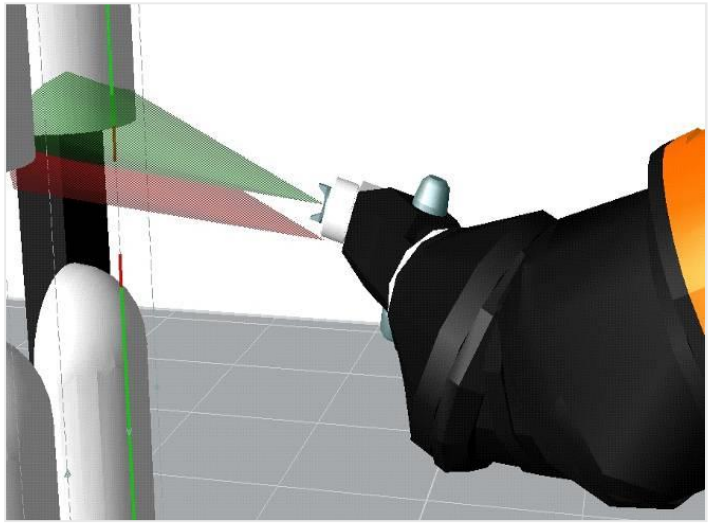


- Simplified paint programming
- Paint savings



IPS
Paint saving example

Conditions:
Speed: 1000 mm/sec
Flow: 1000 ml/min
Racks: 46 pr. hour
Parts pr.rack: 4
Shifts: 2

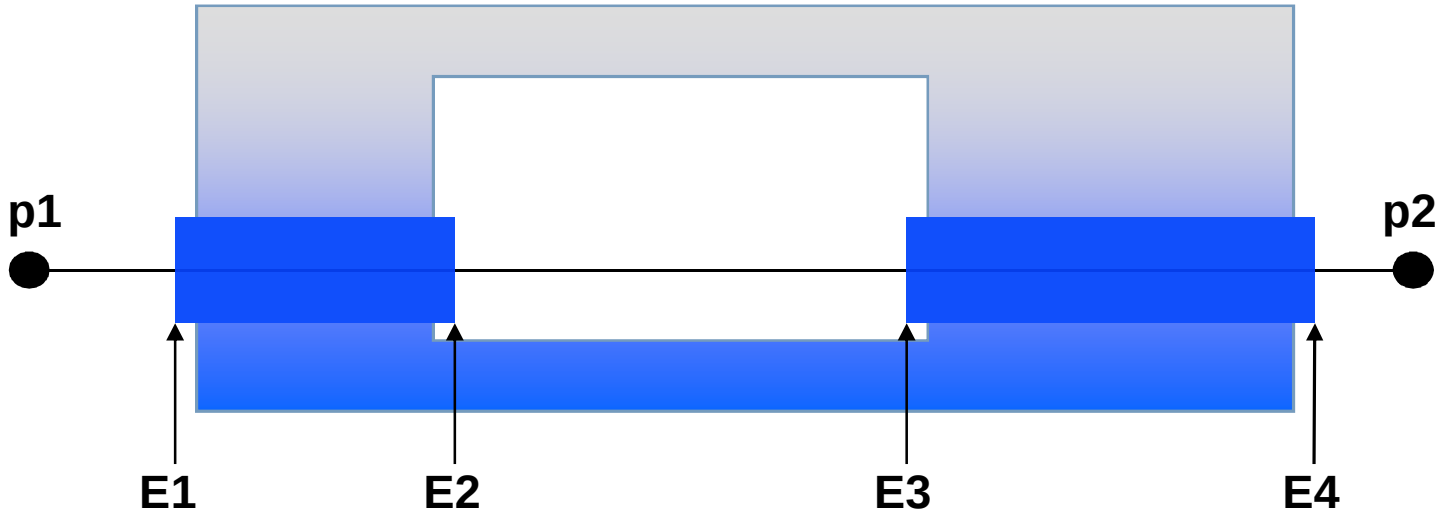


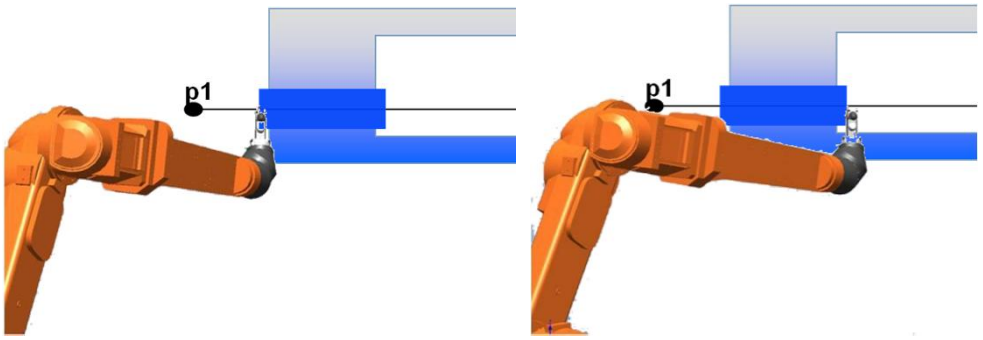
- Minimizing overspray
  - Small adjustments
    - big achievements (Paint saving)
  - Solution: Gun/brush trigger adjustments

- Example from an existing installation:
  - An adjustment of 2 cm for the gun triggering points of a typical paint program can save you 14 liters per day for one robot only
  - 14 liters x 7 € = 98 €
    x 260 days ~ 25,000 € / year

IPS
Flexible programming

Up to 10 paint events
between two points





- Easy and fast program optimization
  - Paint events are not attached to programmed robot positions
  - Paint events are moved and edited independently
  - Paint savings - fast!

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ABB Painting Robots
Where do we use them

Small products

IRB 52
A compact painting specialist

Main applications

Medium to small parts painting

Consumer electronics painting

Metal parts painting

General industry painting

Reach: 1.45 m
Wrist load: 7 kg

"Powered by IPS"

Main benefits

- Compact design
  - Small, space saving - large work envelope, two versions:
    (reach: 1,2m – 1,45m)
  - Smaller spray booths - environment friendly
  - Cost effective
- Flexible
  - Versatile mounting; Floor, inverted, wall and tilted
- Integrated
  - Integrated process system (IPS)
  - Paint savings
- Ease of use with IRC5P

IRB 52
Where used – Application example

Metal parts

White goods

- Cooking top horizontal

High accuracy to reach the thin layer

Painting in mould

Automotive sub suppliers

- Head rests

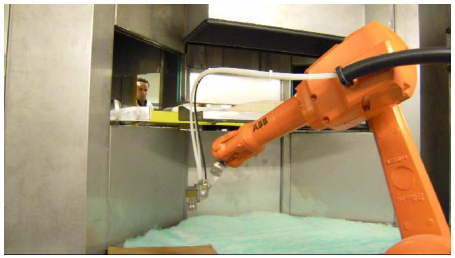
Flexibility to access in narrow space

Plastic component

Automotive sub suppliers

- Auto Light

Precise Process Control to reach the quality required



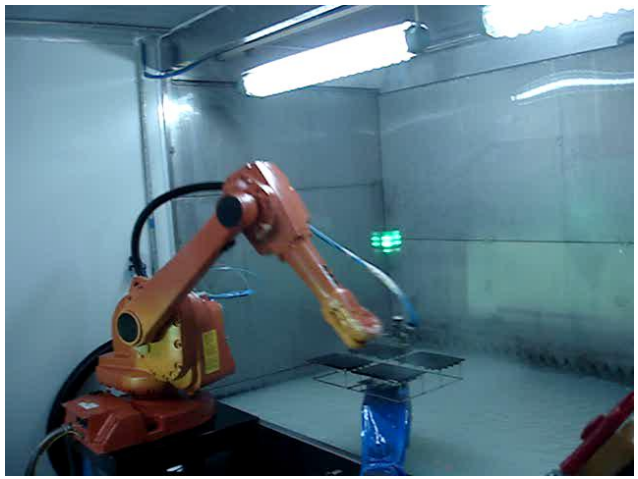
IRB 52
Where used – Application example

Plastic components

3C

- Lap top

Speed and accuracy to high productivity



Metal parts

Powder application

- Cocking oven

Flexibility: ready for different application

IRB 52
Where used – Application example

IRB 52 with Tracking

Flexibility for different solution

IRB 52 – wall mounted

IRB 5320
Work piece positioner for Paint

Flexible solution when:

- Not enough space available
- Flexible production
- Different batches

IRB 5320 Workpiece positioner
Simplifies the painting process

Main applications

Medium to small parts painting

Consumer electronics painting

Metal parts painting

Plastic parts painting

General industry painting

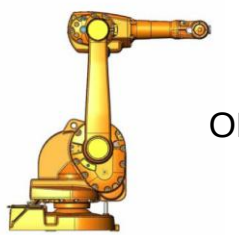
Pay load: 2x25 kg

- Main benefits
  - Cost effective
  - Precision
    - High accuracy
    - High repeatability
  - Flexible
    - Versatile mounting
      - Floor, inverted, wall and tilted
    - Easy integration
    - Higher productivity, loading and unloading during painting
  - Integrated
    - Full integration with ABB paint robots
  - Ease of use with IRC5P
    - Running from the same program as paint robot

IRB 5320 standard delivery scope

IRC5P

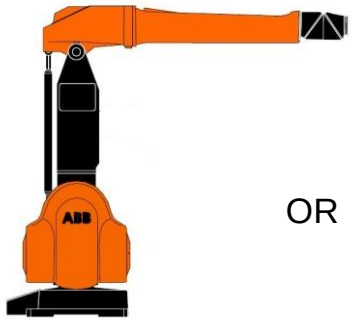
With drive kit for external axes



IRB 52

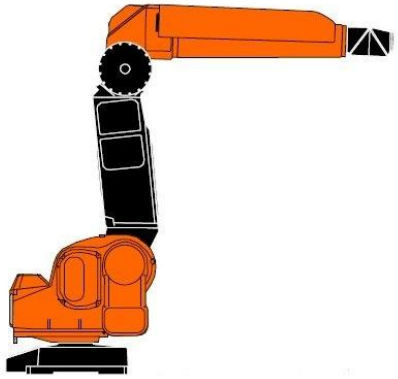
OR

6 axes paint robot



IRB 580

OR



IRB 5400

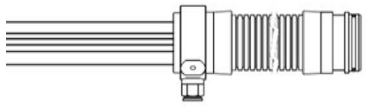
AND

IRB 5320 3 axes:
1500mm arm
2000mm arm

OR

IRB 5320 1 axis

AND



IRB 5320 main cable:
7m cables + 3m purged hose
15m cables + 3m purged hose
30m cables + 3m purged hose

General Painting Line Overview
IRB 5320 Turn Table – Application example

IRB 52 + IRB5320

Metal parts

- Chairs

Less space used

High flexibility

IRB 580 + IRB5320

Plastic component

- Automotive sub suppliers

Medium and big size products

IRB 580
Top model functions - compact design

Main applications

Plastics parts painting

Electronics painting

Automotive parts painting

General industry painting

Reach: 2.6 m
Wrist load: 10 kg

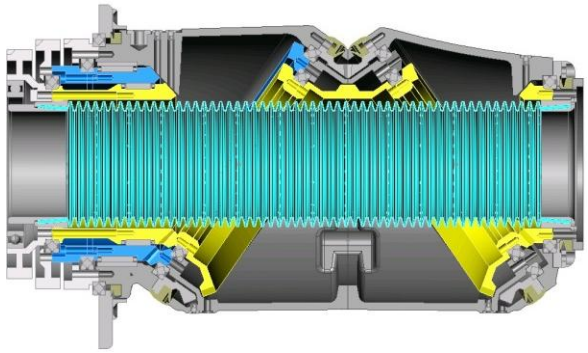
"Powered by IPS"

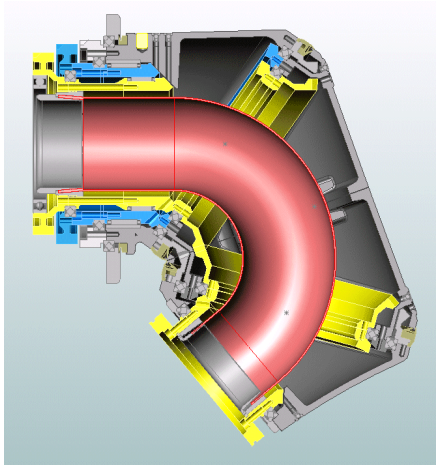
Main benefits

- Cost effective and compact
- Hollow wrist precision painting
- Two horizontal arm lengths
  - 1220mm and 1620mm
  - 1620mm available with paint inlet – application on upper arm
- Available on rail
- Spring counter balanced main axes for reduced energy consumption

IRB 580
Compact design for enhanced performances

The HollowWrist





IRB 580
Where used – Application example

Metal parts

White goods

- Bath tubs

High production volume and process control

Metal parts

White goods component

- Baking pans

Accuracy on paint process control

IRB 580
Where used – Application example

Plastic Parts

Automotive subsuppliers: moulding painting

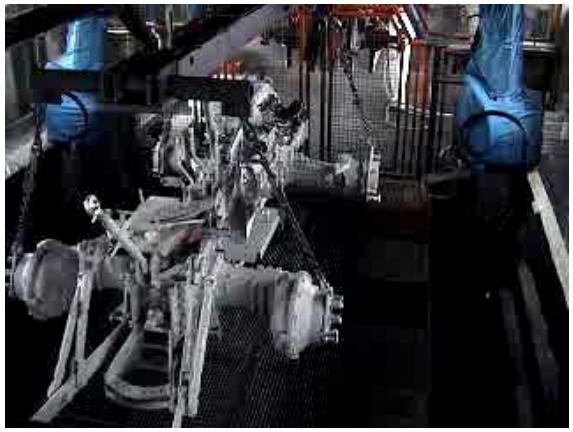
- Interior plastic part – stop & go (video)
- Exterior plastic parts – moving line (video)

High quality and paint saving with the Process Control

Metal

Agricultural Equipment

- Tractor body with rail



Flexibility: increase working area thanks to the rail

IRB 580
Where used – Application example

Metal parts

3 wheels machine

- Chassis

Moving line and process control to reach narrow area

Metal parts

Powder application

- Fork lift

Working area to clean after spraying

IRB 5400
Slim arm for tight and narrow areas

Main applications

Automotive interior painting

Bumper painting

Large parts painting
- Agricultural
- Yellow goods
- Wood
- Metal frames

Reach: 3.1 m
Wrist load: 25 kg

"Powered by IPS"

- Main benefits
  - Slim
  - Powerful
  - Large work envelope
  - Paint inlet option
- Available also with Process Integration

EU GI Paint Event
IRB 5400 – Application example

Metal parts

Agricultural Machines

- Metal frames

Flexibility and Process control

Wood

- Doors and Window frames
  - Doors

Working area and hollowrist performance

EU GI Paint Event
IRB 5400 – Application example

Metal parts

Construction machines

- Metal frames - powder application

Moving line

Metal parts

Construction machines

- Chassis – liquid application

Flexibility and Process control

IRB 5500 FlexPainter
Process integration highlights

Customers and markets

Automotive

Auto parts (Tier 1)

Plastics and GI

Large parts painting
- Agricultural
- Yellow goods
- Wood
- Metal frames

Customers requiring low material waste, fast color change and the flexibility provided by IRB 5500

A complete new approach

- High acceleration and painting speed
- Large working envelope
- Wall mounted - no rail
- Designed for high flow atomizer
- 6 axis

- Process integration for IRB 5500 includes:
  - Integrated Color change valves (M-PAC)
  - Integrated gear pump control (2 motor)
  - Integrated atomizer control (3ch air)
  - Integrated pilot valves for process control
  - Integrated and standardized hose guiding

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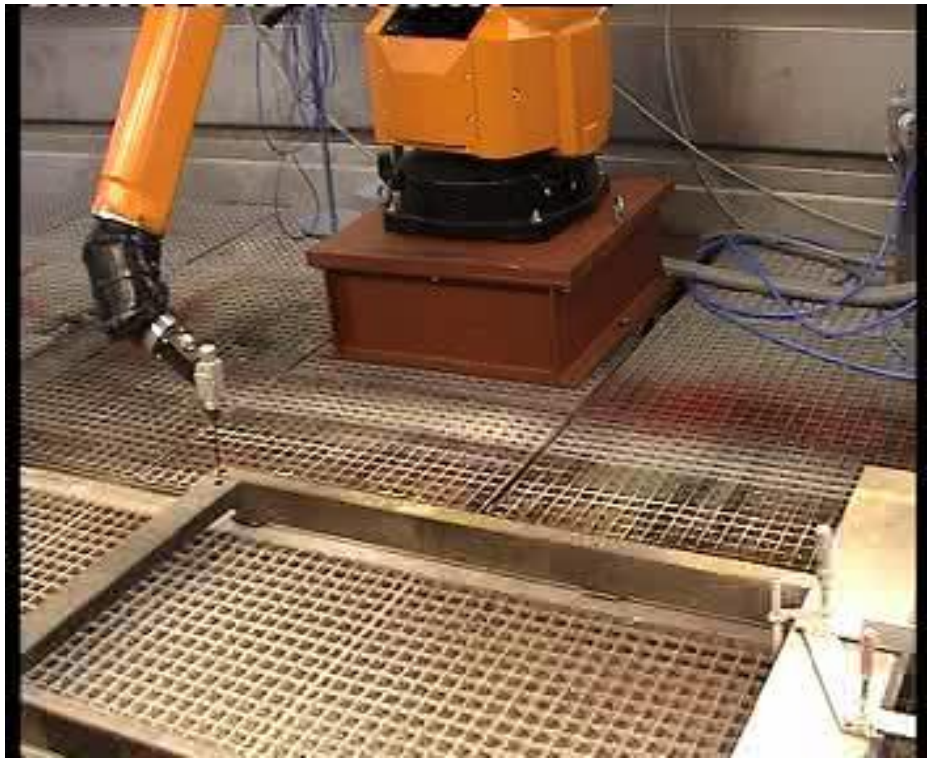
Option, Accessories and Software

Moving line: easy with Conveyor Tracking

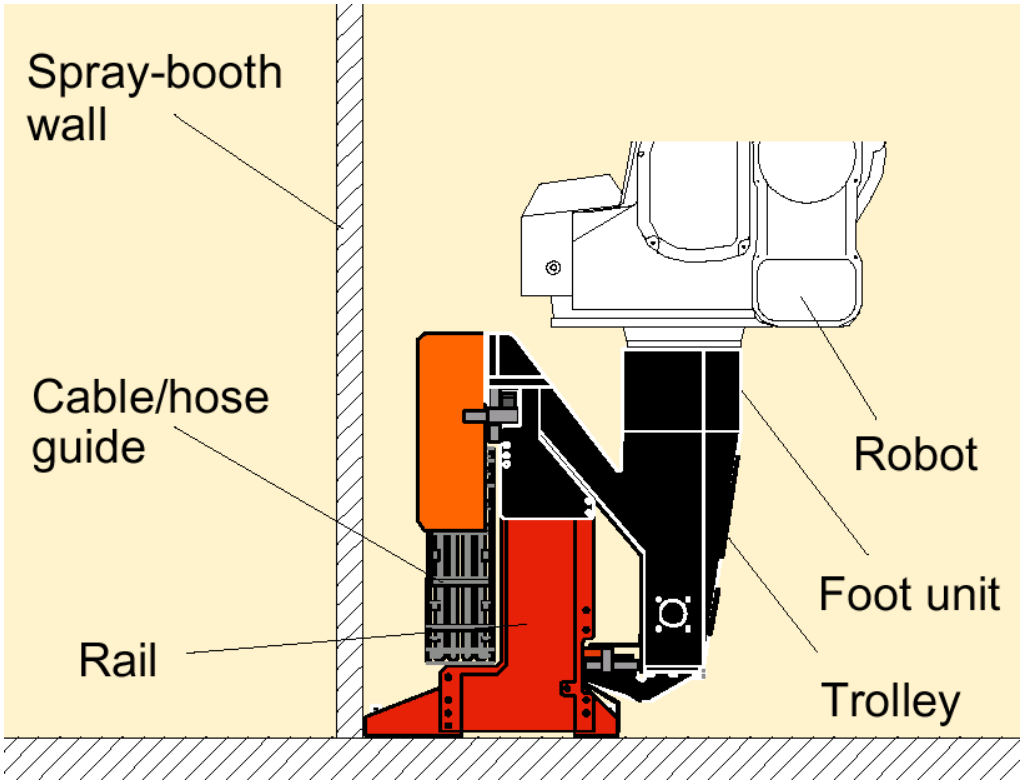
Conveyor tracking is a position synchronization feature in which the system's coordinate follows the object on a conveyor line.

Jobs will then be executed synchronized with the position of the object, independent of conveyor speed, including conveyor stop and reverse motion.



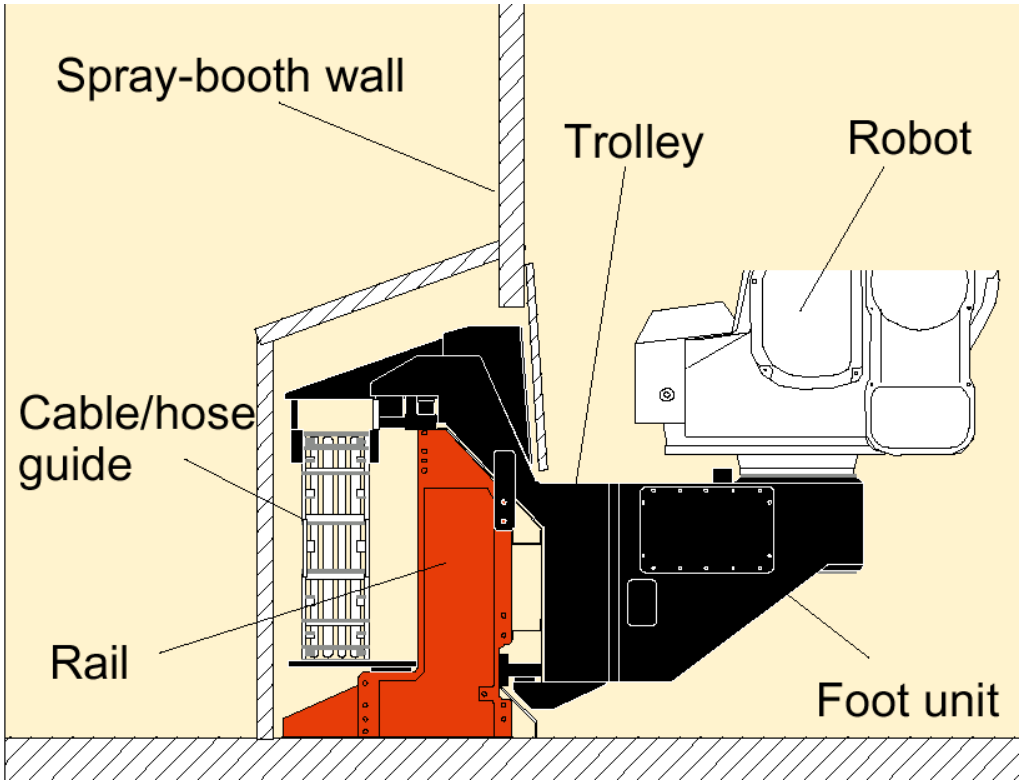
IRB 5400
7 ° axis rail

IN - BOOTH



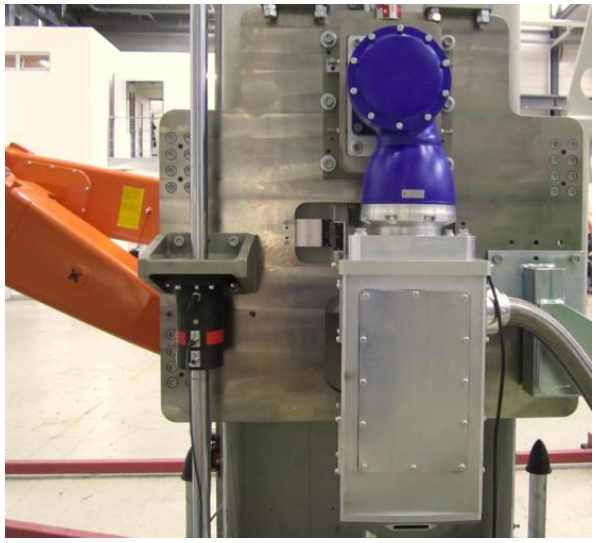
IRB 5400-14

CLEAN WALL



IRB 5400-13

Paint news
External axis kit for Paint

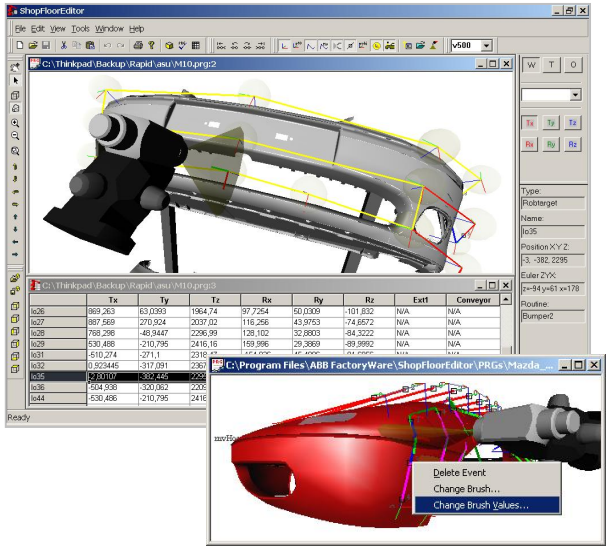


- Paint External axis kit
  - Designed to be used in combination with ABB Paint robots, mainly IRB 5500, in combination with third part rail solutions (track motion)
- Servo unit
  - The ABB servo unit includes a purged chamber (ExP) combined with purged cable and purge air controller (including sensor)
  - The IRC5P robot controller is prepared for this second purging system, the added drive units and electronics for brake release and temperature supervision
  - Basic design can cover 3 external axes (servo units) in series

SOFTWARE

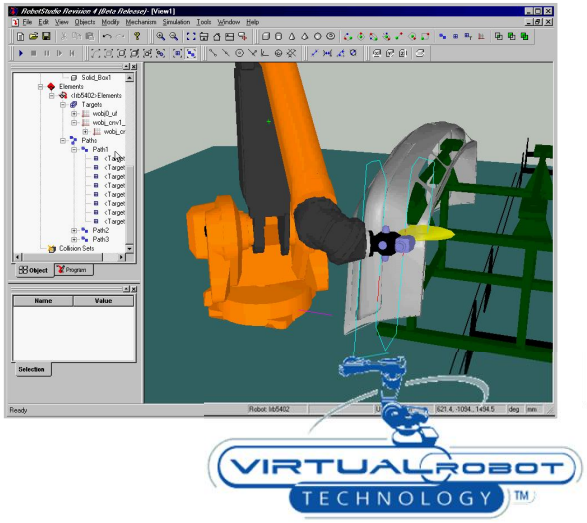
- Editing off-line programs
- Robot control and monitoring

ShopFloor Editor



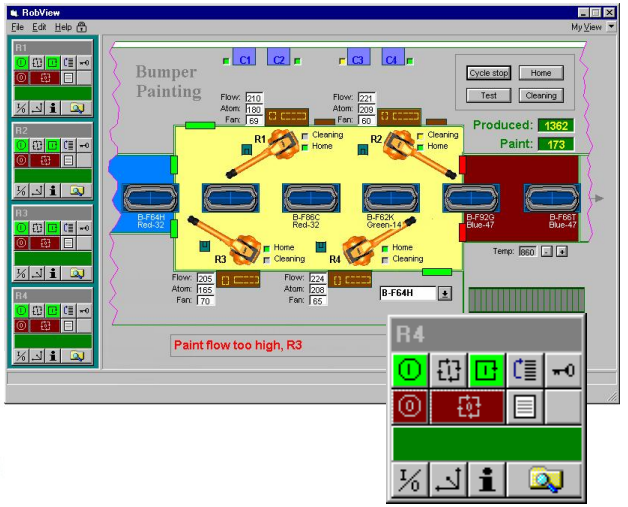
Process optimization
Graphics Editing
Paint Savings

RobotStudio Paint



Robot simulation
Path optimization tools

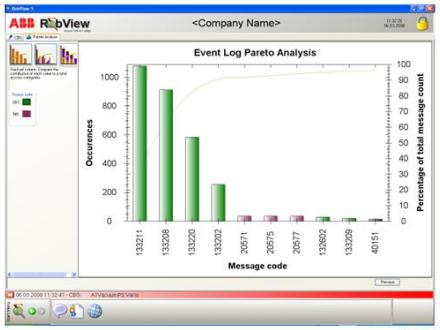
RobView



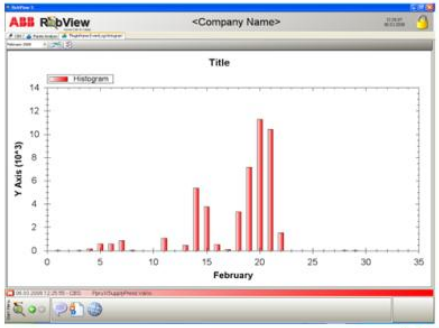
Fast & Easy
robot monitoring

ABB PC tools
RobView 5 – functionalities

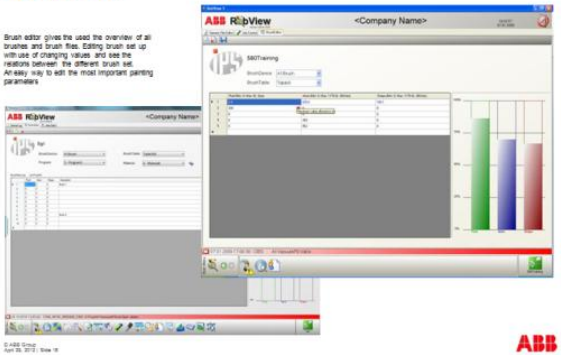
RobView 5
Pareto analysis



RobView 5
Histogram



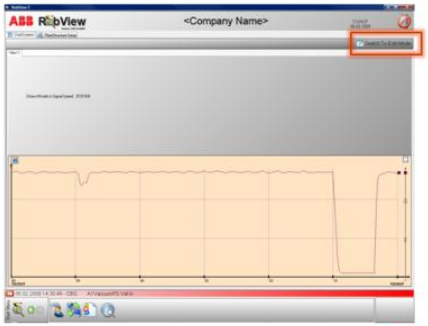
RobView 5
Brush editor



RobView 5
Command screen

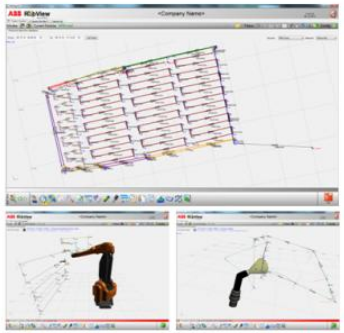
RobView 5
Robot overview

RobView 5
User screens – Conveyor speed overview



RobView 5
Signal analyzer

RobView 5
Program visualization



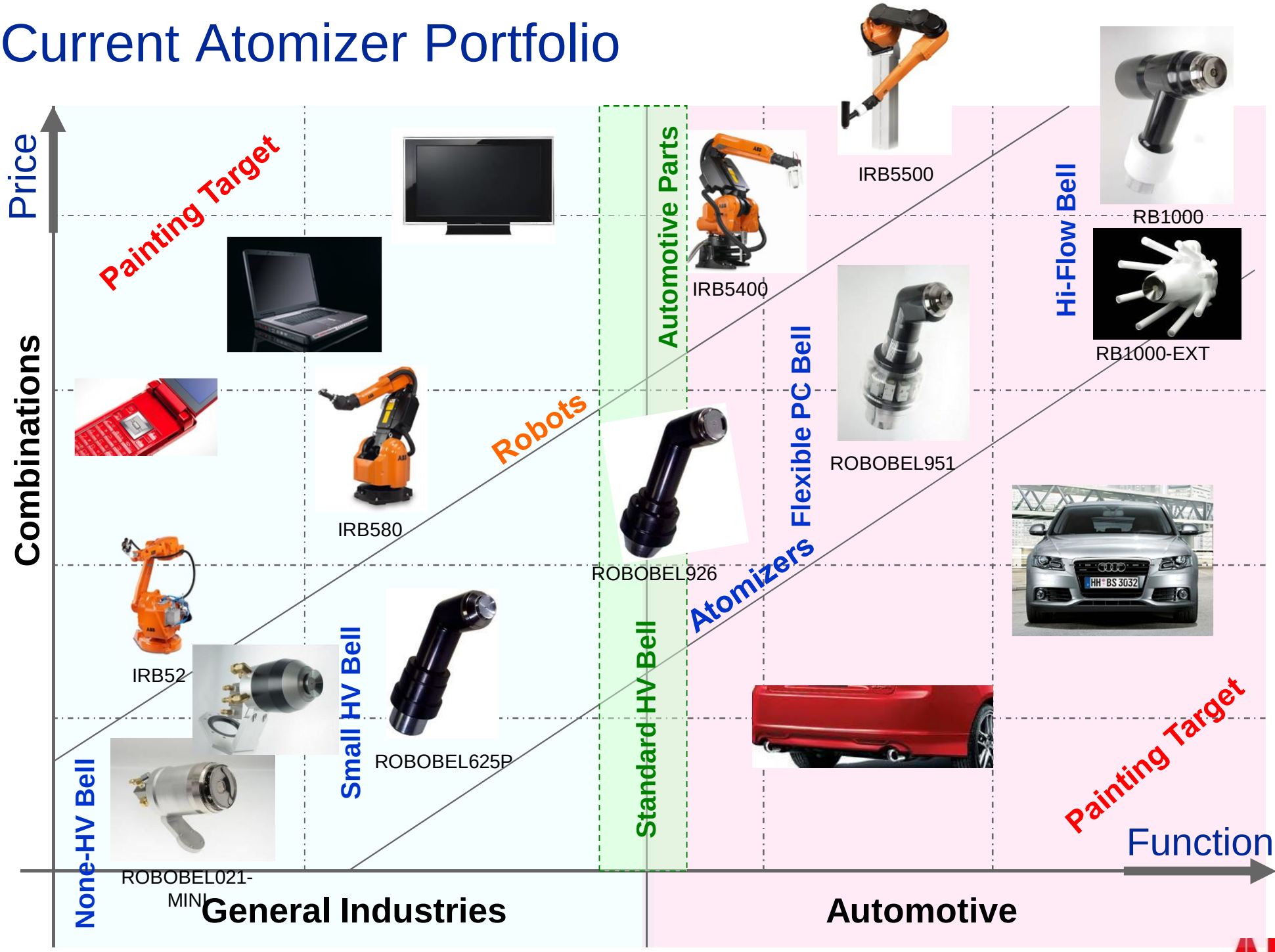
RobView 5
Production control

Agenda

- Main topics in this presentation
  - ABB in paint: Location and Paint time-line
  - ABB Paint product overview
    - Differences with Industrial Robot
  - Main components in a Paint robot system
    - Controller, motions, IPS and Brush concept
  - Manipulator models: where we use our robot
    - Some application areas
  - Option, accessories and software
  - Paint Atomizers
  - Conclusion

Paint Atomizers

Current Atomizer Portfolio

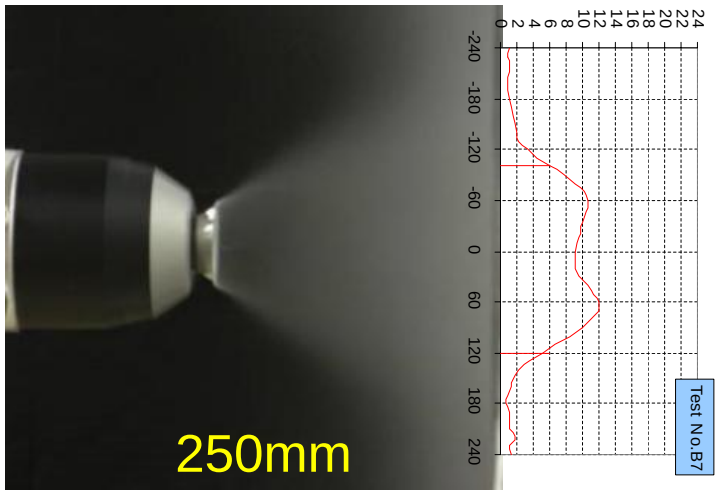


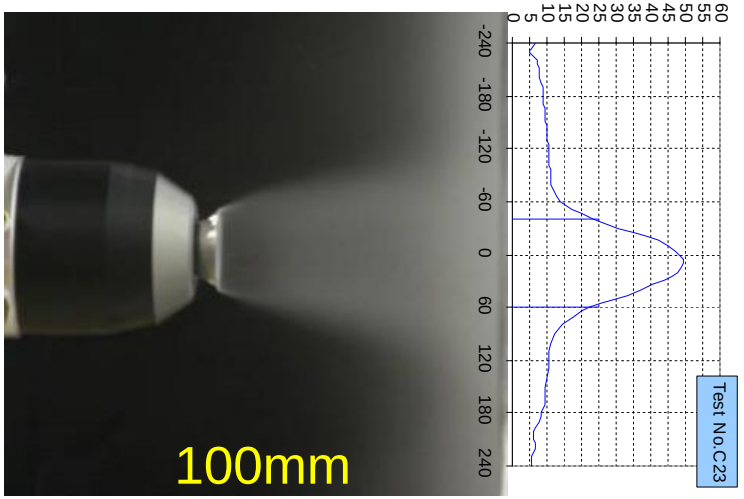
ROBOBEL Series Bell Atomizers
Compact & Simple Solution

- ROBOBEL021-MINI
  - High transfer efficiency (40 to 60%)
  - Apply primer, base and clear paint, both Waterborne and Solventborne
  - None HV applied
  - Same air motor performance as ROBOBEL926
  - Selectable bell cup size, φ15/30/50/70
  - Very simple structures, consist only 5 parts
  - Automotive WB interior, bumper conductive primer, plastic & metal parts painting

ROBOBEL Series Bell Atomizers
New Compact & Simple Solution

- ROBOBEL031-PC
  - Paint savings by pattern control function
  - Excellent atomizing performance
  - High transfer efficiency
  - Compact and compatible with RB021
  - Suitable for IRB 52, 580 and 5500
  - For water borne and solvent borne paint
  - No high voltage
  - Circle spray pattern for easy programming
  - Same air motor technology as the renowned ROBOBEL926 atomizer





ROBOBEL021-MINI
Combination with Robot

IRB 540

IRB 580/5400

(Hollow Wrist)

IRB 52

Conclusions

Painting for ABB means:

- Wide range of dedicated robots
- Global presence
- Knowledge of the process
  - Reduce production direct costs and Raw material saving
  - Predict immediately return of investment

Conclusions

For any questions,

requests,

support for potential opportunities:

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Conclusions

Thank you !

Power and productivity
for a better world™