Ola Svanström, ABB Robotics, November 2015

IRB 8700

Highest payload robot
Content

Introduction
- Targeted applications
- Key differentiators
- Technical data
- Summary
Introduction
Differentiated value proposition

- Lower Total Cost of Ownership (TCO)
  - Design focused on uptime and reliability
  - Reduced maintenance
- 25 % faster than any competitor in its size
Introduction
Fit in ABB product range

Reach up to 3.5 m

IRB 7600
150-500 kg
2.55-3.5 m

IRB 8700
550-800 kg
3.5-4.2 m
Introduction
IRB 8700
Introduction
Variants

**IRB 8700 550/4.2**
- Payload 550 kg
  - 620 kg with wrist down
  - 475 kg with LeanID
- Moment of inertia 725 kgm²
- Reach 4.2 m
- Additional arm load 50 kg

**IRB 8700 800/3.5**
- Payload 800 kg
  - 1000 kg with wrist down
  - 630 kg with LeanID
- Moment of inertia 725 kgm²
- Reach 3.5 m
- Additional arm load 50 kg
Overview With LeanID

IRB 8700 550/4.2
- Payload 475 kg
  - 660 kg with wrist down
- Moment of inertia 725 kgm²
- Reach 4.2 m
- Additional arm load 100 kg

IRB 8700 800/3.5
- Payload 630 kg
  - 930 kg with wrist down
- Moment of inertia 725 kgm²
- Reach 3.5 m
- Additional arm load 100 kg
# Introduction

## Lower TCO: Payloads standard and LeanID

<table>
<thead>
<tr>
<th></th>
<th>IRB 8700</th>
<th>IRB 8700 Lean ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payload range (kg)</td>
<td>550-800</td>
<td>475-630</td>
</tr>
<tr>
<td>Reach range (m)</td>
<td>3.50-4.20</td>
<td>3.50-4.20</td>
</tr>
<tr>
<td>Variants</td>
<td>550 kg / 4.20 m 800 kg / 3.50 m</td>
<td>475 kg / 4.20 m 630 kg / 3.50 m</td>
</tr>
</tbody>
</table>
Lowest TCO
Difference between variants: An arm extender
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Target application

- Introduction
- Targeted applications
- Key differentiators
- Technical data
- Summary
Target applications
Material Handling

- Tractor cabin moved between welding station by an IRB 8700
- Shortest cycle times a key feature in this application
Target applications
Materials Handling

- Large car body moved between transfer lines
- High uptime and running quality a key feature in highly automated expensive car lines
Content

Key differentiators

- Introduction
- Targeted applications
- Key differentiators
- Technical data
- Summary
Key differentiators

Lowest Total Cost of Ownership
- Outstanding reliability
- LeanID on both variants
- Long maintenance intervals and easy service
- Many components shared with IRB 6700 reduces # service procedures and # of spare parts

Faster
- By far the fastest high payload robot – 25% faster than competitors

Sustainable
- No use of hazardous materials - Used materials within environmental directives (RoHS 2002/95/EC and Reach No1907/2006 directives)
- Modern components from world class suppliers to secure availability of spare parts
Key differentiators
Lowest TCO: outstanding reliability

- Straight forward and uncomplicated design using world class components
  - One motor and gear per robot axis
  - Counter balancing only with mechanical springs and counterweight – no gas springs used
- LeanID for best dress pack endurance
- Foundry Plus 2 protection as standard
Key differentiators
Lowest TCO: uncomplicated and straightforward design

- One motor and one gear per robot axis
- Competitors use dual motors and/or gears for some axes on high payload robots
- IRB 8700
  - Has less components to fail
  - Gets shorter cycle times and higher accuracy
  - Less difficult to service
Key differentiators
Lowest TCO: most robust, no gas balancing cylinder

- No gas springs used – Very reliable counter weight and mechanical springs for counter balancing
- Gas springs (used by some competitors) can leak and may cause safety problems
Key differentiators
Lowest TCO: outstanding reliability

- New Axis Calibration
  => High accuracy and Easy to Use

- Improved sealing output shaft for gears axes 2.3 and 6

- Complete machining of all surfaces exposed for gearbox oil ax 1-3
  => reduced risk for oil contamination

- Improved upper sealing ring ax 1 with additional O-ring
  => reduces the risk of water getting inside the gear

- Improved sealing axis 5 support side

- Lean ID dresspack with controlled movements
  => less wear and damage of both dresspack and wrist

- Fully sealed gearbox / turning disc
  => No oil leakage

- Smooth wrist shape and surfaces with recessed screw heads
  => less wear of both dresspack and wrist
Key differentiators
Lowest TCO: LeanID, next generation dress packs

External dress pack
- Low cost
- Scalable - solutions for all robot variants available
- Short dress pack life time
- Does not support flexible production – small working range
- Bulky
- Difficult to simulate

Integrated dress pack
- High cost
- Not scalable in size – available for 2 robot variants
- Long dress pack life time
- Supports flexible production – working range improved
- Compact
- Easy to simulate
- Unique wrist design with unique spare parts and service procedures

LeanID dress pack
- Medium cost
- Scalable – available for all robot variants
- Long dress pack life time
- Supports flexible production – best working range
- Compact
- Easy to simulate
- Based on a standard robot => no new spare parts or service procedures
- Shortest time for changing upper arm dress pack

High uptime and flexible production
Key differentiators
Lowest TCO: LeanID, long lifetime dress pack solution

- Wrist bracket – possible to divide to easily get connectors through
- Axes 5 and 6 motions by free motion in wrist bracket
- Dress pack in fixed position along the upper arm
- Axis 4 motion by torsion in center of upper arm
- Upper arm dress pack warranty same as robot warranty
- Upper arm dress pack can be changed in 6 minutes
- Connectors between upper and lower arm dress pack
Key differentiators

Lowest TCO: LeanID, future dress pack for complete robot range

IRB 6650S
- 2 variants
- Introduction in 15.2

IRB 6700
- 8 variants

IRB 7600
- 3 variants
- Introduction in 16.1

IRB 8700
- 2 variants
Key differentiators
Lowest TCO: LeanID

Design based on trusted design
- No new spare parts
- No new maintenance procedures
- Easy to re-use the robot in any new application
Key differentiators
Lowest TCO: LeanID, flexible production by large working range

High dress pack uptime in flexible line concepts

- Many different parts can be produced - Large dress pack working range
- Easy to enter narrow spaces - Large dress pack working range enables “empty side” access
- Improved accessibility - More compact than traditional external dress packs
- Robot cycle to be tested off line - Accurate simulations by well-defined cable motions
- Lean ID on both all robot variants - Standard solution for any application in a line

<table>
<thead>
<tr>
<th>Axes 4&amp;6</th>
<th>Dress pack working range</th>
</tr>
</thead>
<tbody>
<tr>
<td>±300° ax 4 and ±220° ax 6 independent of each other</td>
<td></td>
</tr>
</tbody>
</table>

| Axis 5 | ±120° |
Key differentiators
Lowest TCO: Easy and accurate to simulate off line

- Dynamic 3D models
  - RobotStudio®, Delmia V5 Robotics, Process simulate, RobCAD
- Static 3D models
  - IGES, STEP, Parasolid, ACIS
- Layout models
  - DXF, DWG
- Both arm variants available in 4 versions
  - Std
  - MH3
  - LeanID SW
  - LeanID MH
Key differentiators
Lowest TCO: also better with traditional dress packs

Competitor wrist designs

- Dress pack gets stucked and breaks

ABB smooth wrist design saves dress pack life time

- Smooth wrist lengthens external dress pack life time far longer than competition’s
Key differentiators
Outstanding reliability

- Straight forward and uncomplicated design using world class components
  - One motor and gear per robot axis
  - Counter balancing only with mechanical springs and counterweight – no gas springs used
- LeanID for best dress pack endurance
- Foundry Plus 2 protection as standard
Key differentiator
Lowest TCO: outstanding reliability, focus on validation

Extensive validation
Key differentiators
Lowest TCO: low maintenance

As an average twice as long time between service

- Gear box oil change interval ax 1-3, 6: After 20000 h, quick connections on axes 1-3 to reduce time for draining/filling oil (ref 6000 h+24000 h)
- Gear box oil change interval ax 4-5: After 20000 h
- Battery change: After 4 years, 3 shift (ref at low alert after 2 years)
- Counter balancing cylinders: Lubrication after 4 years, 3 shift (ref 2.5 years)
- Gears life time: After 8 years & 3 shift in normal BIW operation an inspection/overhaul is needed
- Annual inspection: 20 min, Gear box oil levels, harnesses, labels, balancing device, mech. Stops
Key differentiators
Lowest TCO: lowest maintenance and easy change of spare parts

- Optimized service procedures
- Based on many design principles and components from IRB 6700
- Easy to use manuals
  - Few cross references makes it easier to read
  - Many illustrative pictures
  - Summaries added describing tools and parts needed and short routine description
Key differentiators
Lowest TCO: with Foundry Plus 2 prepared for harsh environments

- Support shaft with an added sealing disc
- IRB 6700 wrist concept regarding foundry protection
- Turning disc with Nickel-phosphorus coating
- Tailor made sealing to protect output gear shaft

<table>
<thead>
<tr>
<th>Paint</th>
<th>Screws</th>
<th>Protection plugs</th>
<th>Rust preventive</th>
<th>Flange sealing</th>
<th>Sealant (Sikaflex)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Foundry paint</td>
<td>- Motor cover</td>
<td>- Threaded holes</td>
<td>- Gears</td>
<td>- Motors</td>
<td>- At all minor gaps that will not be protected by paint</td>
</tr>
<tr>
<td></td>
<td>- Armhouse cover</td>
<td></td>
<td>&quot;Hidden surfaces&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Connection boxes</td>
<td></td>
<td>Cable hole axis 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- UL-bracket</td>
<td></td>
<td>Tubular shaft side</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All external plates in stainless steel
Key differentiators
Lowest TCO: easier and less service

- Easy and straightforward design without complex solutions
- All motors can be changed without dismounting any structural parts or need for oil drainage
- Gear change axes 2, 3 and 6 without dismounting any structural parts
- Good lifting possibilities on all heavy parts
- Quick coupling ax 1-4 for faster draining and filling of oil

- New Axis Calibration
  => High accuracy and Easy to Use
- Oil change ax 6 w/o need of dismounting the "frying pan" and dresspack
- Exchange of Lean ID upper arm dresspack below 15 minutes
- Sync track ax 5 relocated for better visibility when tool is mounted
- Exchange of motor ax 5 w/o need of dismounting wrist and draining oil
Key differentiator
Stronger…. 725 kgm$^2$ moment of inertia capability

Benefits
- The robot can handle heavy and wide parts
- Many Material Handling applications require high moments of inertia
  - Makes the robot faster

Why ABB is superior?
- Torque for acceleration is automatically adjusted depending on position and motion.
- Most competitors use a fixed acceleration ramp => motors and/or gear box torques too small => robot stops
  - Slower due to gravity
  - Limits moment of inertia
- Powerful wrist design

Competition
- KUKA Titan 375-500 kgm$^2$
- Motoman 90 kgm$^2$!!
- Fanuc 900iB 444 kgm$^2$
- Fanuc 2000iA 2195 kgm$^2$
Key differentiators
Sustainable: non hazardous materials used

- Complies with environmental directives RoHS 2002/95/EC and Reach No1907/2006 directives
Content
Technical data

- Introduction
- Targeted applications
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### Technical data

<table>
<thead>
<tr>
<th>Variant</th>
<th>IRB 8700 550/4.2</th>
<th>IRB 8700 800/3.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payload</td>
<td>550 kg</td>
<td>800 kg</td>
</tr>
<tr>
<td>Payload outlay</td>
<td>460 mm</td>
<td>460 mm</td>
</tr>
<tr>
<td>LeanID Payload</td>
<td>475 kg</td>
<td>630 kg</td>
</tr>
<tr>
<td>LeanID Outlay</td>
<td>460 mm</td>
<td>460 mm</td>
</tr>
<tr>
<td>Reach</td>
<td>4.2 m</td>
<td>3.5 m</td>
</tr>
<tr>
<td>Weight</td>
<td>4600 kg</td>
<td>4600 kg</td>
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<tr>
<td>Range ax 1</td>
<td>±170°</td>
<td>±170°</td>
</tr>
<tr>
<td>Range ax 2</td>
<td>+90°, -65°</td>
<td>+90°, -65°</td>
</tr>
<tr>
<td>Range ax 3</td>
<td>+132°, -30°</td>
<td>+132°, -30°</td>
</tr>
<tr>
<td>Range ax 4</td>
<td>±300°</td>
<td>±300°</td>
</tr>
<tr>
<td>Range ax 5</td>
<td>±130°</td>
<td>±130°</td>
</tr>
<tr>
<td>Range ax 6</td>
<td>±360°</td>
<td>±360°</td>
</tr>
<tr>
<td>Range ax 4 LeanID</td>
<td>±300°</td>
<td>±300°</td>
</tr>
<tr>
<td>Range ax 6 LeanID</td>
<td>±130°</td>
<td>±130°</td>
</tr>
<tr>
<td>Vel. ax 1</td>
<td>75 °/sec</td>
<td>75 °/sec</td>
</tr>
<tr>
<td>Vel. ax 2</td>
<td>60 °/sec</td>
<td>60 °/sec</td>
</tr>
<tr>
<td>Vel. ax 3</td>
<td>60 °/sec</td>
<td>60 °/sec</td>
</tr>
<tr>
<td>Vel. ax 4</td>
<td>85 °/sec</td>
<td>85 °/sec</td>
</tr>
<tr>
<td>Vel. ax 5</td>
<td>85 °/sec</td>
<td>85 °/sec</td>
</tr>
<tr>
<td>Vel. ax 6</td>
<td>115 °/sec</td>
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<tr>
<td>Standard protection</td>
<td>Foundry Plus2</td>
<td>Foundry Plus2</td>
</tr>
<tr>
<td>Foundry Plus 2 (option)</td>
<td>Std</td>
<td>Std</td>
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<tr>
<td>Foundry Prime (option)</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Clean Room (option)</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Dress Pack (option)</td>
<td>SW, MH to ax.6</td>
<td>MH to ax.5</td>
</tr>
<tr>
<td>LeanID Dress pack (option)</td>
<td>MH, SW MH, SW</td>
<td>MH, SW MH, SW</td>
</tr>
<tr>
<td>Moment of inertia ax 6</td>
<td>725 kg m²</td>
<td>725 kg m²</td>
</tr>
</tbody>
</table>
Technical data
Working range IRB 8700-800/3.5
Technical data
Working range IRB 8700-550/4.2
Summary

- Lower Total Cost of Ownership (TCO)
  - Design focused on uptime and reliability
  - Reduced maintenance
- 25% faster
  - ...than any competitor in its size
Power and productivity for a better world™