GateFramer
Flexible Framing System
Framing

- Framing the stage in the BIW assembly process where the geometry of the shell of the car body is welded together.

- It is the critical stage in the production, as the integrity of the complete car body assembly is secured during this stage.

- This is normally performed in a “framing machine”
1996: ABB Preciflex
more than 30 in production

2000: ABB FlexFramer
more than 40 in production
GateFramer
A multiple car model framing machine
GateFramer Terminology

- Centre line of car transfer system
- Framing Robots
- Gate Sorter
- Storage unit for one gate
- Gate
- Gate Setter
Flexibility in your production

- **Accommodates up to 6 car models**
  - Reuse of capital investment
  - Allows easy introduction of new models

- **Fully random production**
  - Model change over does not affect on cycle time
  - Allows production to be adjusted to suit market demand
Modular Design

- New models can be added at any time without modification to the existing installation
- With / without welding robots
- Allows progressive investment as future models are launched
Simple, faster and safer
Programming and Control

- Controlled by the proven IRC5 controller
  - Fast startup: No additional trail-out of motion normally required with custom designed machines
  - Programmed like a robot: No additional training required

- Coordinated motion from robot controller removes complexity in the programming of interlocks between moving parts

- Complete machine acts as a “state machine” making it easier to diagnose errors, debug, add models and recover from unplanned stoppages.
Standardized and easy to maintain

- No or few maintenance
- Small number of spare parts
- Lifetime of 1 Million cycles +
- Qualified nearby support & services: mechanic, electric, welding
- Complete documentation for installation, maintenance and operation
GateFramer
Technical Features
# Performance & Accuracy

<table>
<thead>
<tr>
<th>Specifications</th>
<th>ABB GateFramer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strokes (mm)</td>
<td>3000 maxi</td>
</tr>
<tr>
<td>Repeatability (mm)</td>
<td>+/- 0.1</td>
</tr>
<tr>
<td>Max Tooling weight (Gate) (kg)</td>
<td>3000 kg</td>
</tr>
<tr>
<td>Max Speed (mm/s)</td>
<td>1.1 m/s for setters – 2.1 m/s for storages</td>
</tr>
<tr>
<td>Cycle time (sec)</td>
<td>18 seconds total gate change (in fully random mode)</td>
</tr>
<tr>
<td>Stiffness (daN/mm) / Flexibility (mm/daN)</td>
<td>S =1 00 daN/mm / F = 0.01 mm/daN</td>
</tr>
<tr>
<td>Max Static Force (daN) in Y</td>
<td>300 daN for each side</td>
</tr>
<tr>
<td>Lifetime</td>
<td>1 million + cycles</td>
</tr>
<tr>
<td>Flexibility (car models)</td>
<td>Up to 6</td>
</tr>
<tr>
<td>Dimensions (LxWxH) (mm)</td>
<td>18000 x 18270</td>
</tr>
<tr>
<td>Number of robots in the Framer</td>
<td>14</td>
</tr>
</tbody>
</table>

(1) Excluding tooling clamping and unclamping
# Performance & Accuracy

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<thead>
<tr>
<th>Specifications</th>
<th>ABB GateFramer</th>
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<tbody>
<tr>
<td>Mechanical protection</td>
<td>IP54</td>
</tr>
<tr>
<td>Electrical protection</td>
<td>IP65</td>
</tr>
<tr>
<td>Sensors</td>
<td>Motor resolvers + Cam sensors + Gate position error sensors + RFID (gate identification)</td>
</tr>
<tr>
<td>Linear Ball bearing</td>
<td>Free-lub Rollers</td>
</tr>
<tr>
<td>Electrical equipment</td>
<td>ABB IRC5 robot controller</td>
</tr>
</tbody>
</table>
The framer takes only 80% of the floor space of similar solutions.

The stations before and after the framer can still be used for re-spot stations.
Main Dimensions
Example of 4 models

The working height for the car body is low to the ground at only 1m. The result is the whole transfer line can be lower, saving cost in risers to raise up the robots on the re-spot stations.

The framer does not require a pit. This results in a direct saving in time and money during the design and construction phased.
Robots in Framer Platform

Integrated 4 robots inside the GateFramer

Possible to have 4 more robots mounted on tracks on the floor

Additional 6 shelf mounted robots on overhead platform

Total = 14 robots
Robots in Framer Platform

This allows for 77 spot welding points to be completed assuming 18 seconds of welding (50% reach 6 spots, and 50% reach 5 spots).
Key Benefits Summary

- Modular Design
- Flexibility
- Simply to use
- Easy maintenance
- Standardized Product
- IRC5 Controlled
Summary of Highlights

- **Performance:**
  - Geometrical accuracy and Stiffness
  - Lightweight and Flexibility

- **Commercial:**
  - Cost effective solutions with short delivery time:
    - Single point of supply for Framing Station & Robots
    - Delivery & support all over the world

- **Cost of ownership**
  - Little or no maintenance. Small number of spare parts
  - Lifetime of 1 million cycles +
  - Qualified support & services close by

- **Integration with ABB Products Portfolio**
  - Compatible with IRC5 robot controllers, reduced training of operators
  - Robots on same track as Gate carriers: better accessibility thru the gate, no need for additional track motions
Example
Example
Example
Reference List

- Ford CFMA - China – 4 Models
- BAIC - China– 4 Models
- FORD OTOSAN - Turkey – 2 Models
Multiple Models
1 Model – No robots
Multiple Models
1 Model – With Robots
Multiple Models
1 Model – With Robots & Maintence Storage
Multiple Models
2 Model – With Robots
Multiple Models
3 Model – With Robots & No Sorter
Multiple Models
3 Model – With Robots
Multiple Models
4 Model – With Robots
Multiple Models
5 Model – With Robots
Multiple Models
6 Model – With Robots
Multiple Models