

Excellence in Hemming

Lines and equipment for automotive closure panels

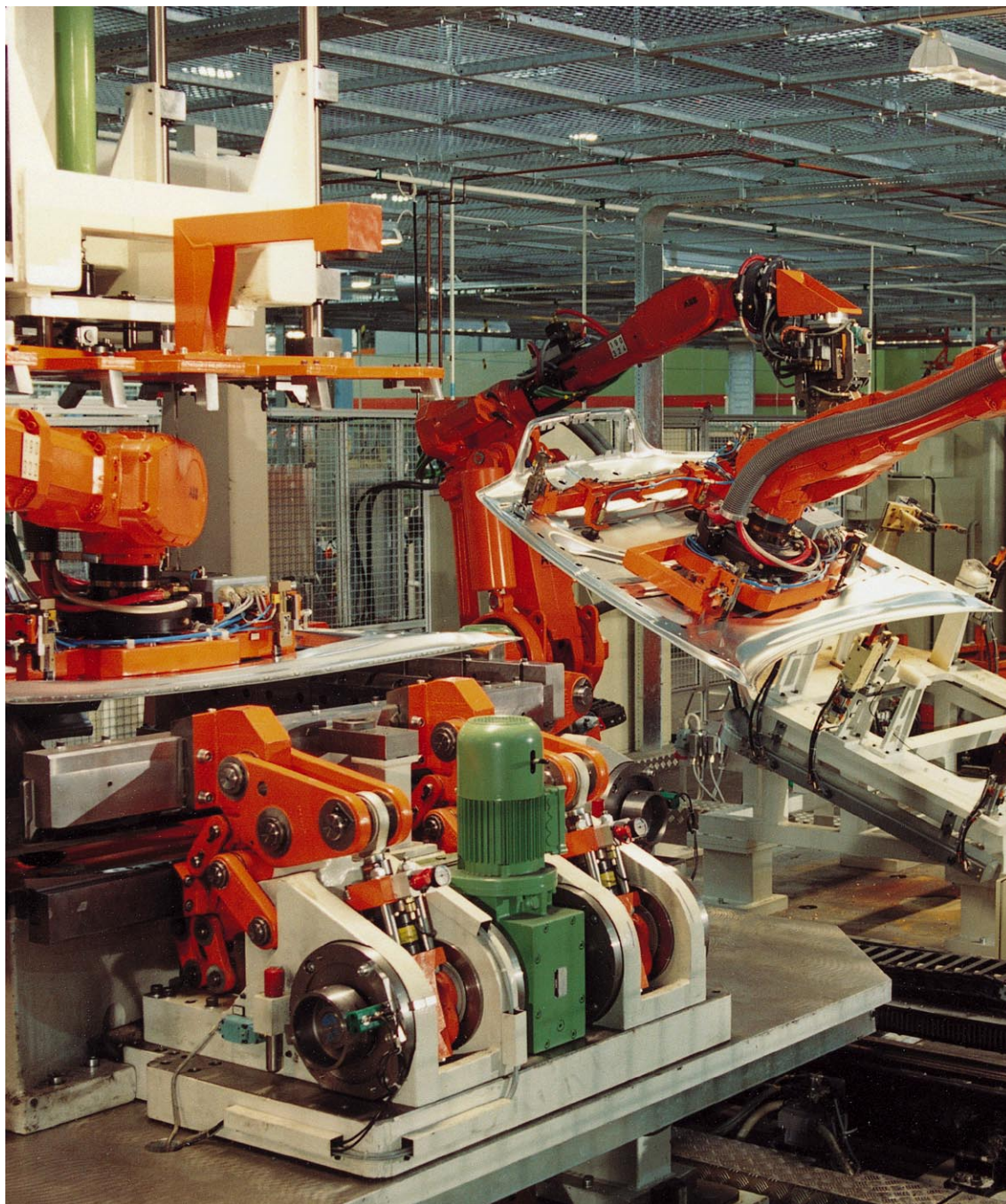


ABB Flexible Automation



Benefit from our experience

Competitive pressures in the automotive industry are continuously driving designers and engineers to produce higher quality products at lower cost and with shorter lead times.

The support

The need has never been greater for a supplier with proven solutions and the commitment to stay with you down the line from start to finish of a project.

The knowledge

ABB Flexible Automation's knowledge of and involvement in the automotive manufacturing process – from component design, through the press shop, to assembly – enables

us to advise you on the best solution for your hemming needs, and to provide system care to keep line availability high.

The experience

Today, more than 150 assembly lines world-wide are enjoying the benefits of quality build, productivity and dimensional precision that our hemming equipment brings to the production of doors, deck lids, hoods, sliding doors, lift gates and other parts.



Get it right from the start

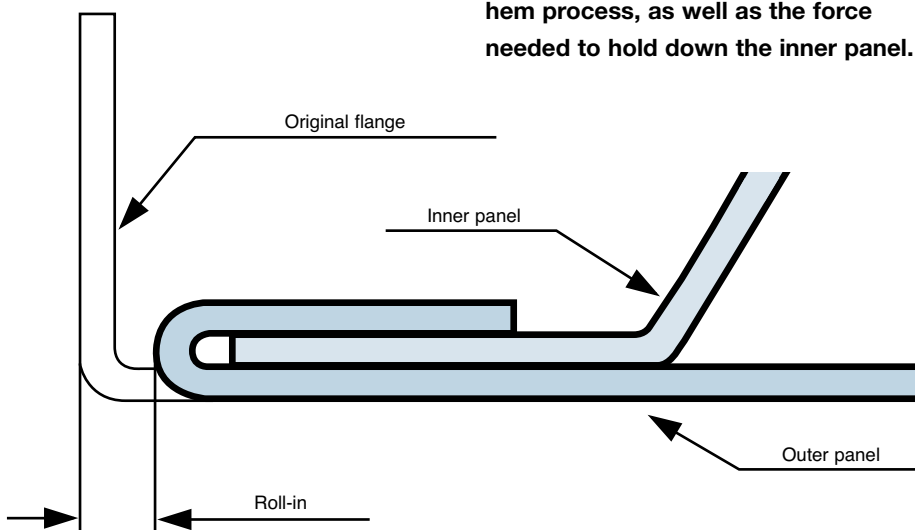
ABB Flexible Automation (in conjunction with Volvo Car Components) has developed a method, based on the Finite Element Method (FEM), to simulate flange behaviour during the hem process. Once a two dimensional FEM model of the part to be hemmed has been built up in the computer, the hemming steels can be made to strike the flange at different heights and different angles of attack to give a variation of roll-in. It is also possible to vary the flange angle after pre-hemming and predict the forces for pre-hemming and the hem process, as well as the force needed to hold down the inner panel.

Reduce project times

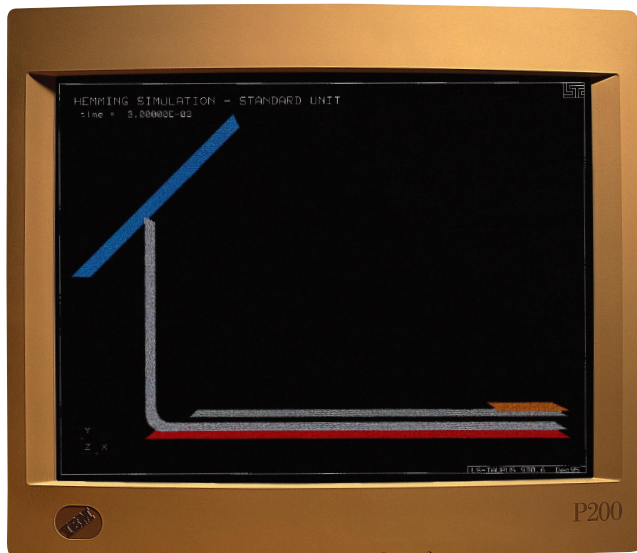
Instead of having to rely simply on experience and trial and error to take into account the change in size of the outer panel during the hemming operation, the simulation method gives you a precise answer.

Armed with the information from the simulation, designers and engineers can make correct allowances for the flange roll-in. There will be a minimum of fine adjustment of the hemming equipment and less risk of costly re-engineering of press dies.

It could knock weeks off your project time.

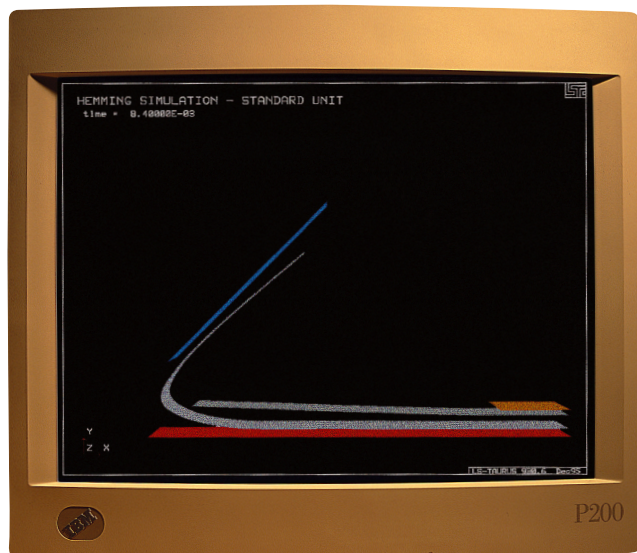


When hemming an outer and inner panel, the size of the outer panel must be able to be predicted to ensure a good part fit. With simulation, we can predict the roll-in accurately and thus save project costs and time.



1. Contact position

The pre-hemming steel is in contact with the flange. The height of the strike as well as the angle of attack can be varied during simulation to find the optimum position.



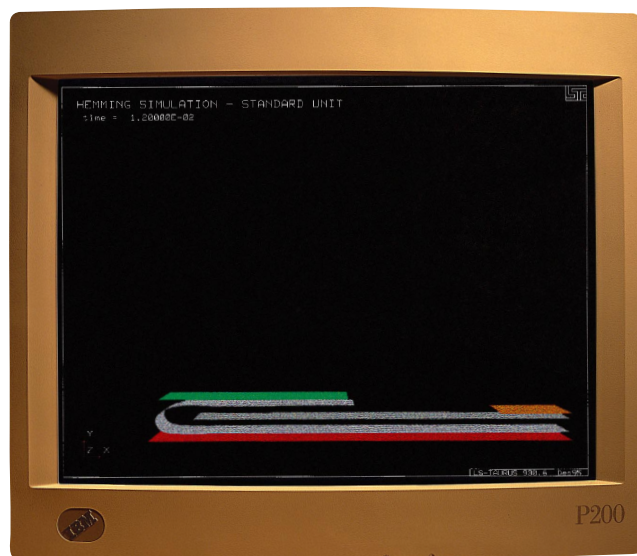
2. Pre-hem position

The pre-hemming steel bends the flange over to the desired degree. The angle can be varied



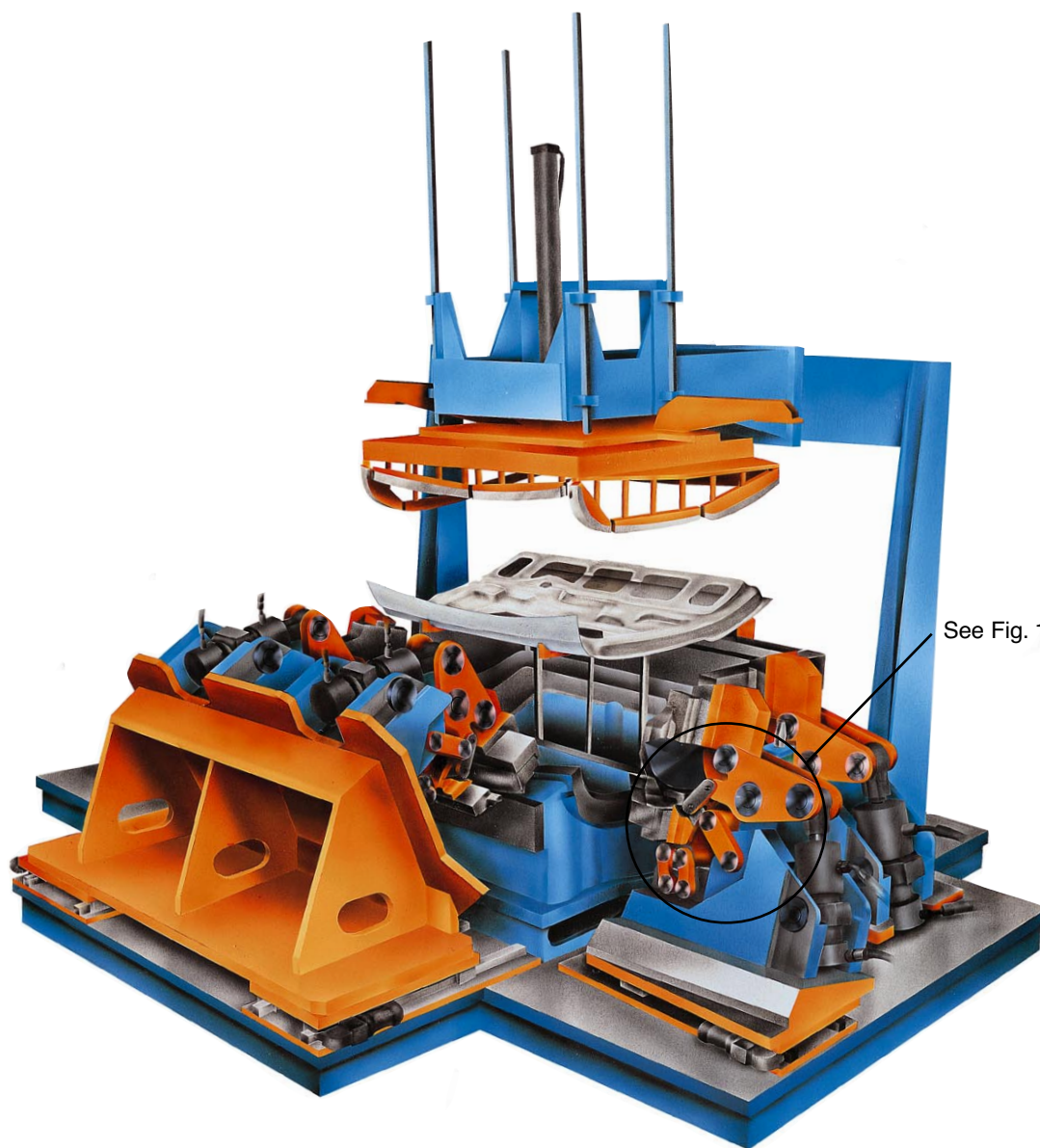
3. Final hem

The flattening steel then comes into play.....



4. to complete the hem.

Table-top hemm



See Fig. 1 (next page)

ABB Flexible Automation offers a choice of table top or hem die models.

A wide choice of standard components and customized options enables us to build a piece of equipment cost-effectively to your specific needs. We can also contract to supply complete, dedicated or flexible assembly lines comprising welding, bonding and curing stations, quality checking fixtures, material handling units and process control.

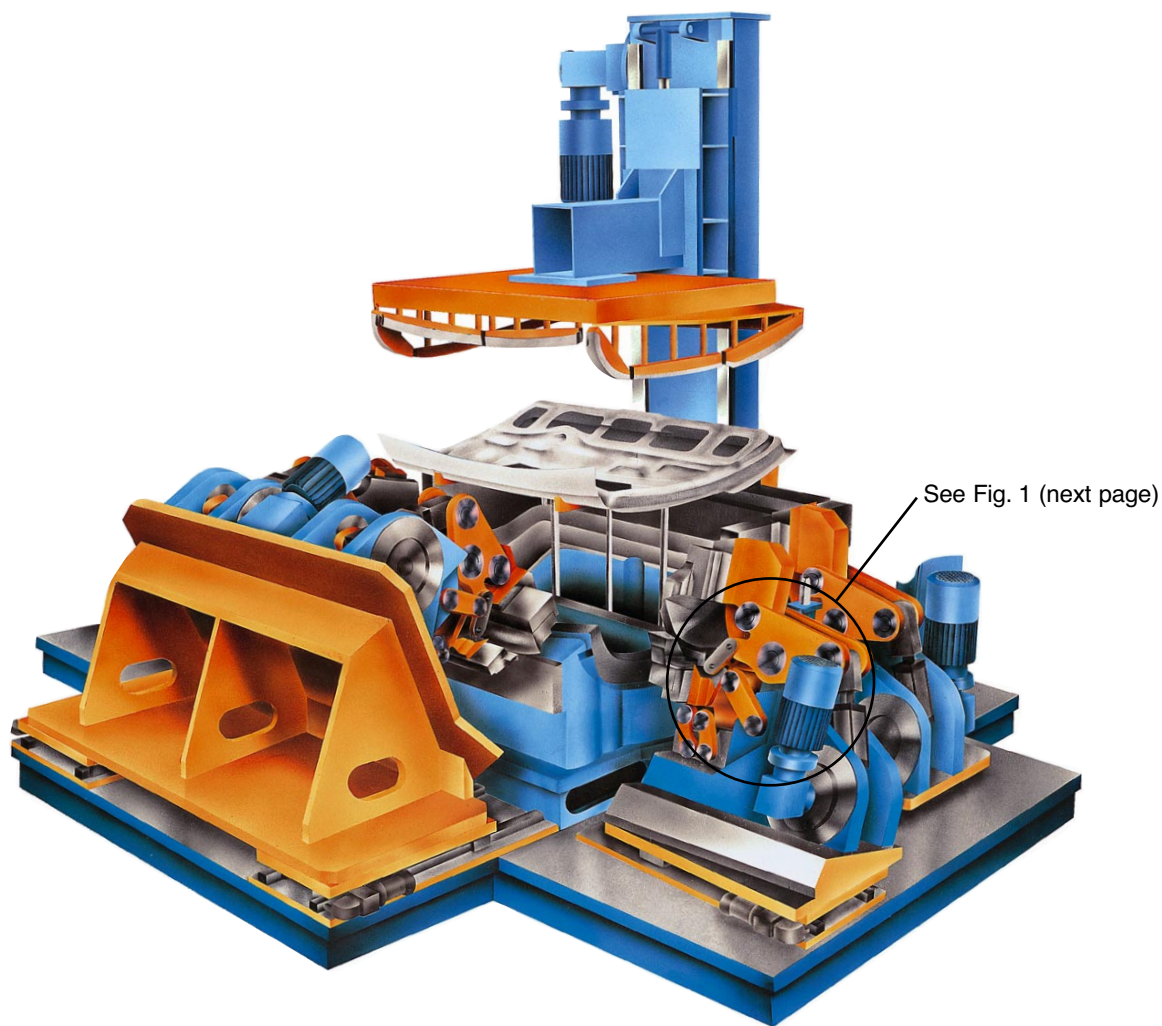
Table-top fixtures are suited to components with difficult recessed areas and with extreme tumble home and turn under. They can also be used on simpler parts. Using hydraulic or electrical drive and mechanical linkage transmission they provide the quality of results – and productivity – to improve your process.

- Pre-hemming, final hemming and corner hemming can be performed in a single station to save on space and

investment. (Window openings normally require two fixtures).

- The indexing unit brings the hemming unit to the optimal angle before hitting the flange. This helps prevent distortion and skid marks.
- Heavy duty build with long-life pivot pins, casings and link arms. Little wear on hemming steel.
- Table top equipment can be incorporated in a dedicated or flexible line. Where the line is used for more than

ning equipment



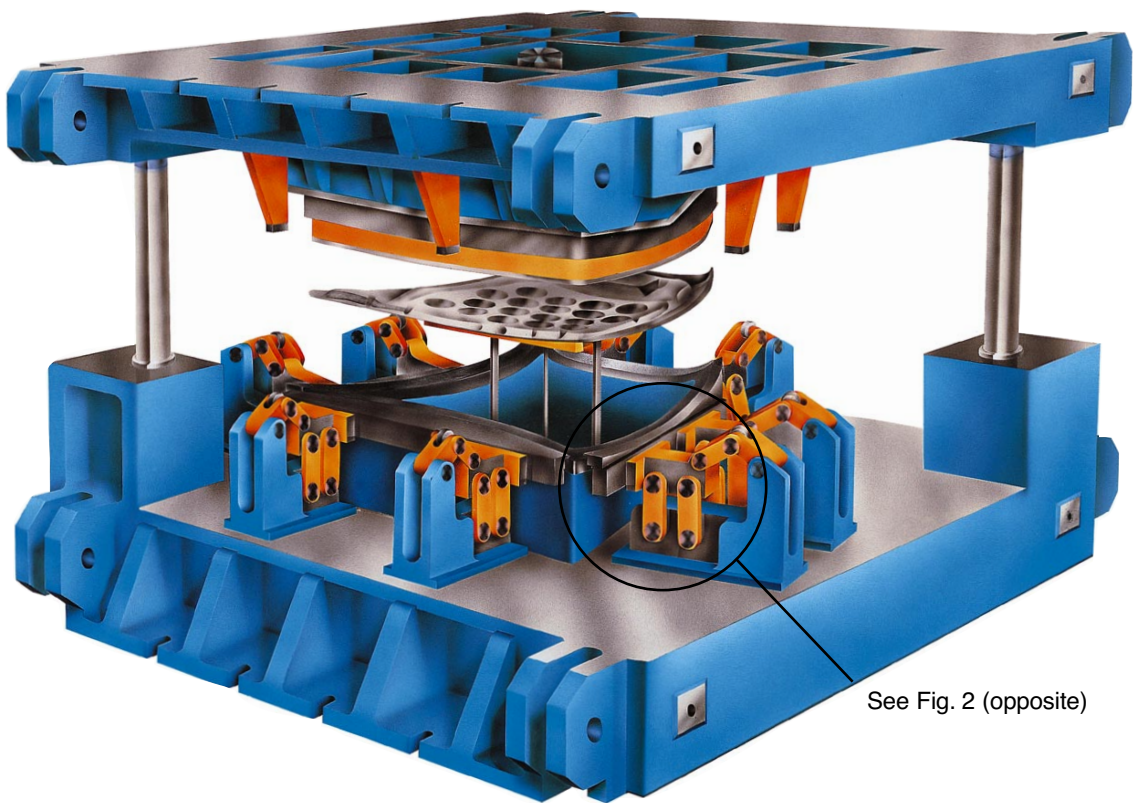
one part or for batch build, the units can be equipped with a carrier to move them easily in and out of the line.

- Individual control of drives enables work with recessed areas and reduces risk of skid marks, distortion, etc.
- Ability to cope with variations in standard flange angles.
- The equipment can be easily transferred to another part of the factory for spare parts manufacture.
- All assemblies and sub-assemblies readily

accessible for easy maintenance and service to contribute to minimum downtime.

- The quiet hydraulic or electrical drives help to keep the noise level low.

Hem die



See Fig. 2 (opposite)

The single-station press type hemmer features the same characteristics – robust design, precision, quality results and proven engineering expertise – that have made our table-top hemmer a household name in automotive assembly plants the world over.

The hem dies are well suited to the needs of flexible manufacturing. Rapid, automatic die changing equipment, incorporating a number of different die packages, provides the flexibility to run a number of parts through the press.

As with the table-top equipment, each phase of the press movement can be isolated when tuning in the dies and panels.

Hemming sequence

In both the table top and hem die equipment, the hemming is performed in two stages – pre-hemming to 45° and then flattening. (See Figs. 3 and 4 below.) Both actions take place in the same fixture.

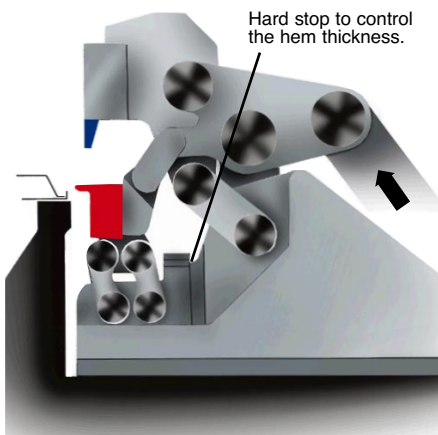


Fig. 1 The double-action hemming unit for table top equipment.

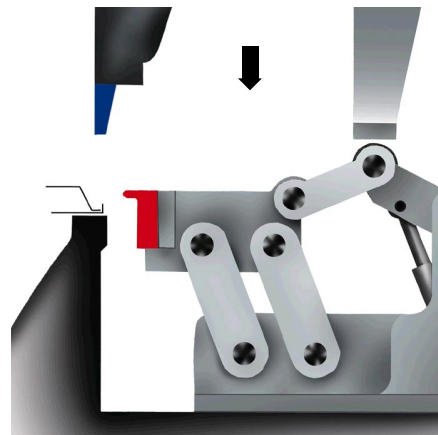


Fig. 2 The double-action hemming unit for hem die equipment.

Fig. 3.

Fig. 4.

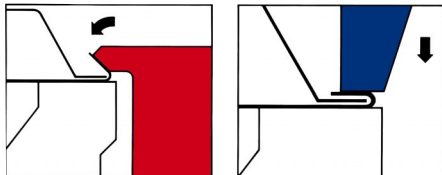


Fig. 3 The pre-hemming steel folds the hem-flange over into a pre-hem position (approx. 45°). The pre-hem carrier is driven by the internal linkage system in the hemming unit. There are three different approach angles (12, 30 and 46°) which are determined at design.

Fig. 4 Once the pre-hemming has been completed, the flattening tools are brought down to complete the hem.

Corner unit

The corner hemming tool is available in both linear and linkage design. It is used in all three types of equipment shown on the previous pages.

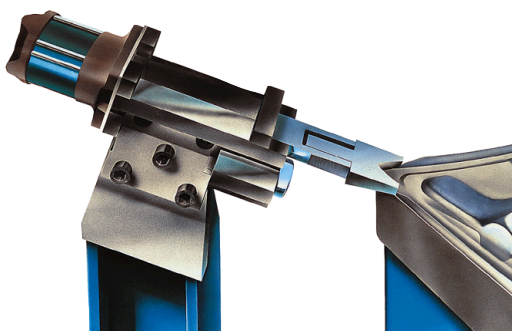


Fig. 5 Linear corner hemming tool.

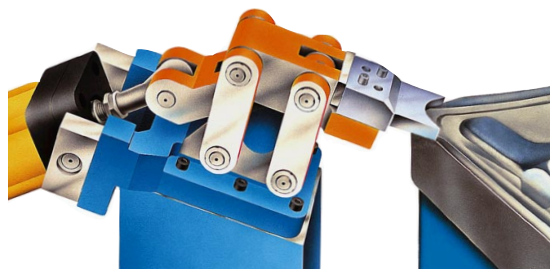
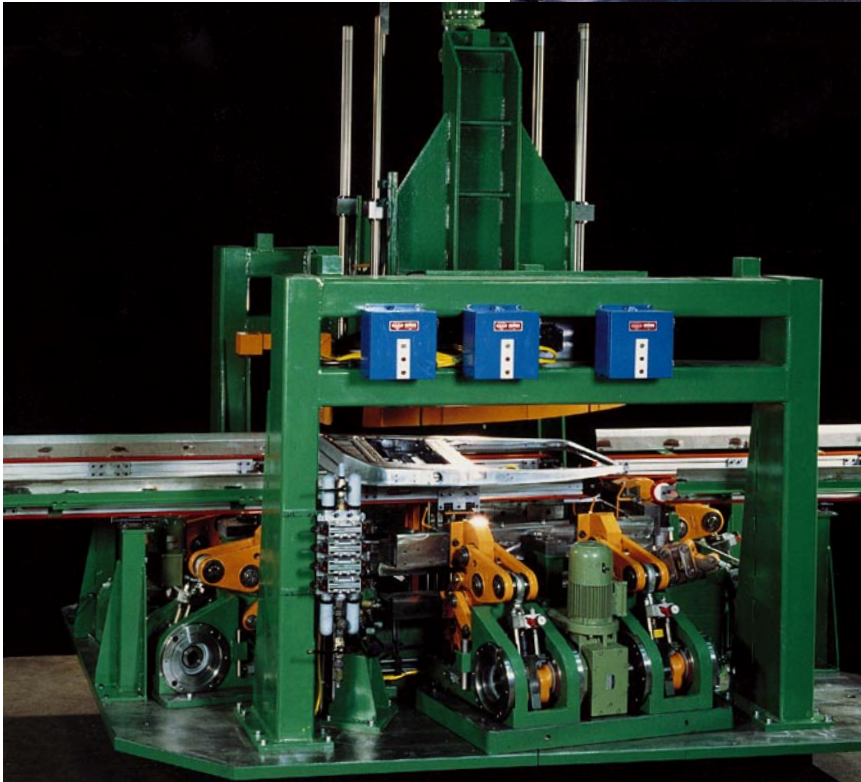
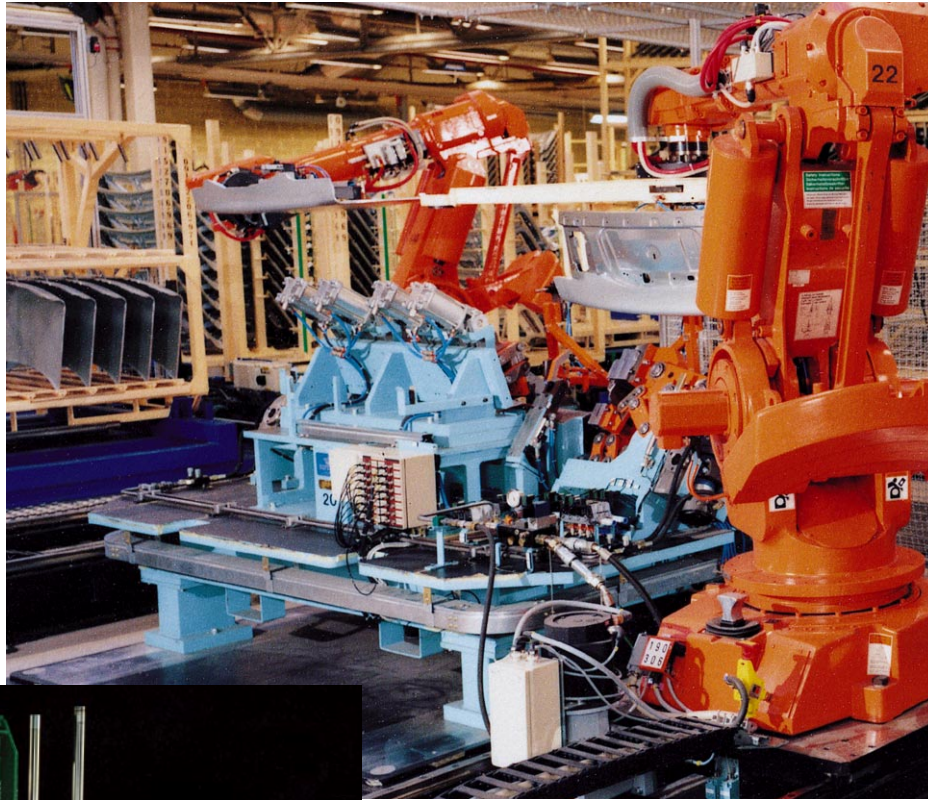
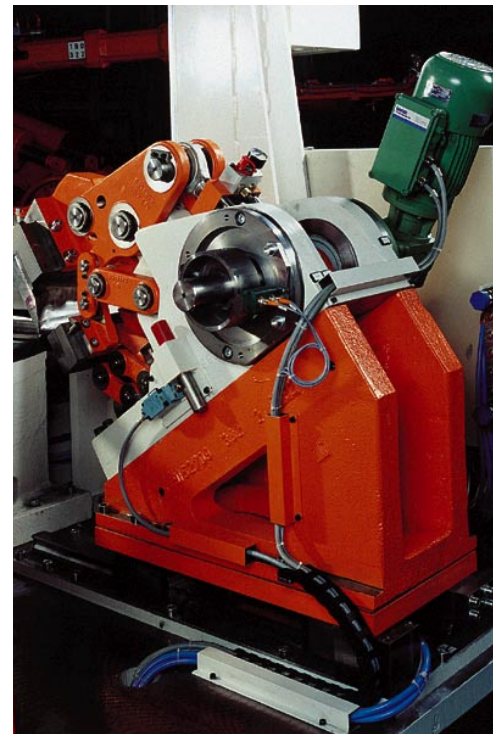


Fig. 6 Linkage corner hemming tool.

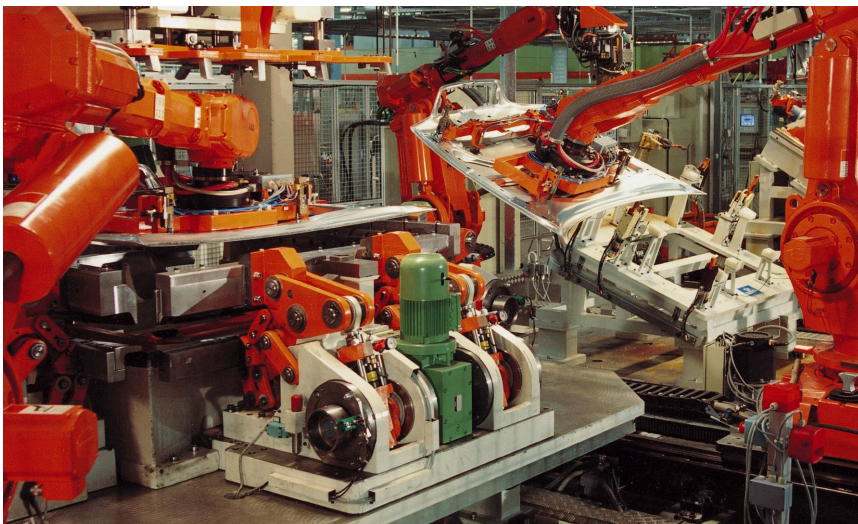
Closure lines and individual pieces of equipment have been supplied by ABB Flexible Automation to all the major car manufacturers in the world. We have won awards for our solutions, not only because they bring quality results but also because they are supported by the highest level of service pre- and after sale and by a commitment to finding the optimum cost solution. This page shows some of the solutions we have used.



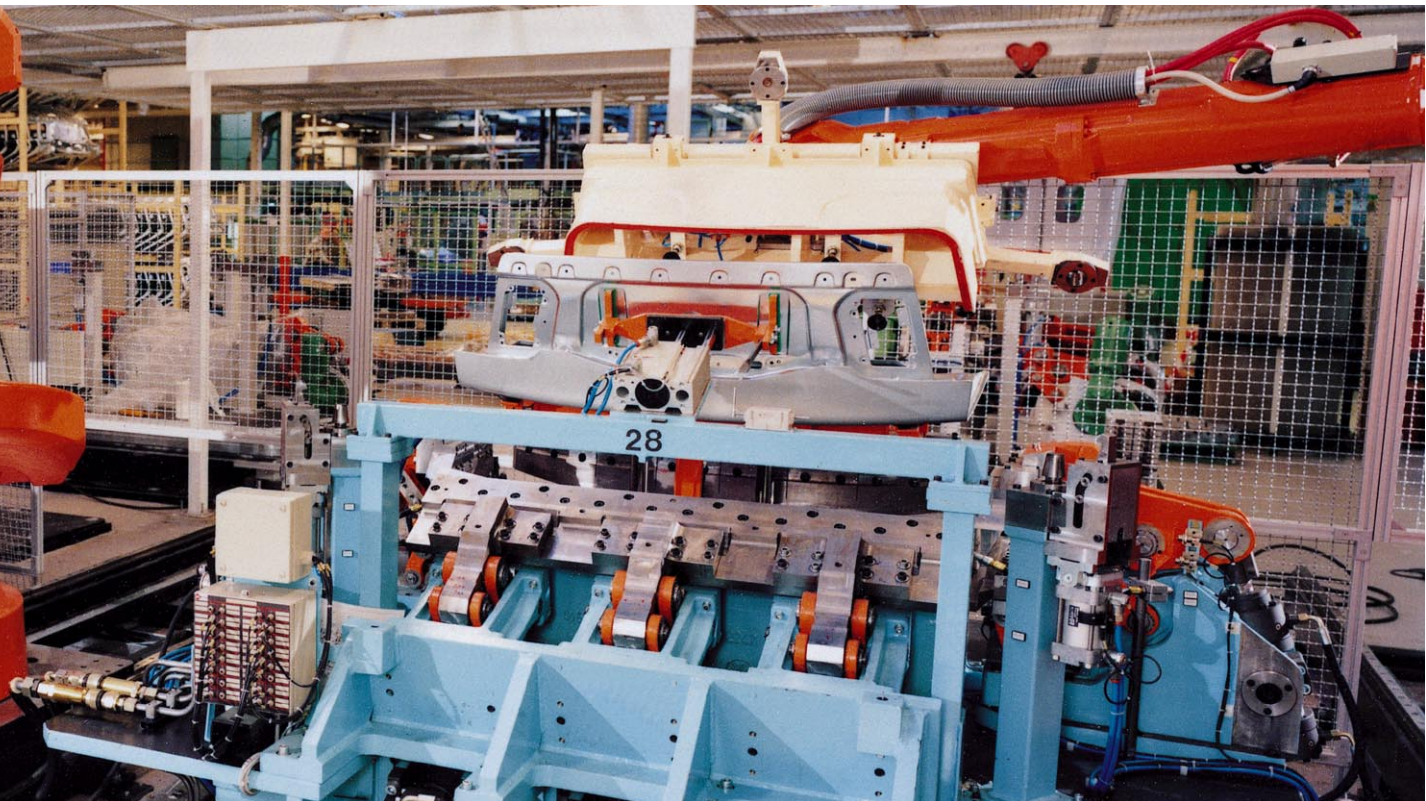
2.



4.



3.



1.

1. A closure line for a deck-lid where the robot is used not only to move the parts in and out of the fixture but also as a clamp to keep the parts in position during the hemming operation.

2. An electrically driven table-top hemming fixture with conveyor-belt feed.

3. Robots are here used to move the parts in and out of the fixture. The over head clamp is part of the fixture assembly.

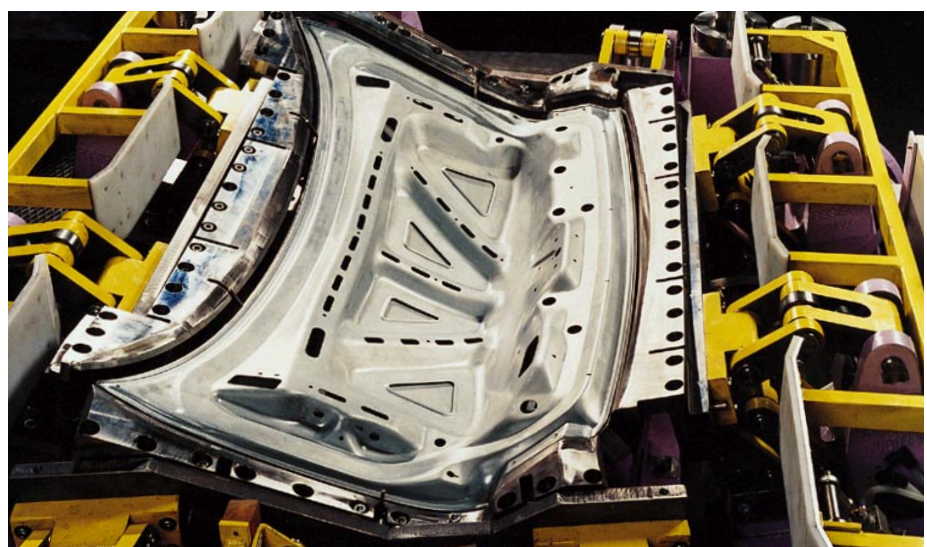
4. A single electric-hem unit for a hemmer. Each drive unit has its own electrical drive.

5. The pre-hem drive unit in the hem die.

6. Lower tooling in a hem die for a deck lid.



5.



6.

ABB Flexible Automation can significantly improve your manufacturing process through a comprehensive range of products, systems, and service solutions.



ABB Flexible Automation Centers and Contact Offices

Argentina Asea Brown Boveri S.A. Buenos Aires +54-1-229-5500 **Australia** ABB Industrial Systems Pty. Ltd. Lilydale +61-3-9735-7222 **Austria** ABB Industrie GmbH Wien +43-1-60109-3894 **Benelux** Asea Brown Boveri S.A.-N.V. Zaventem +32-2-718-6311 **Brazil** Asea Brown Boveri Ltda. Osasco-Sao Paulo +55-11-704-9111 **Canada** Asea Brown Boveri Inc. Burlington +1-905-681-0565 **China** ABB Xiamen Industrial Automation Engineering Co Ltd. Shanghai +86-21-6485-5648 **Czech Republic** Asea Brown Boveri s.r.o Praha +420-2-2283-2111 **Denmark** ABB Energi & Industri A/S Odense +45-66-14-7008 **Finland** ABB Service OY Helsinki +358-10-222-088 **France** ABB Flexible Automation s.n.c. Saint Ouen l'Aumône +33-1-3440-2525 **Germany** ABB Flexible Automation GmbH Friedberg +49-6031-850 **Hungary** Asea Brown Boveri Ltd. Budapest +36-1-270-1555 **India** Asea Brown Boveri Ltd. Calcutta +91-33-470-1811 Bangalore +91-80-839-5181 **Italy** ABB Robotica S.p.A. Milano +39-2-458-731 **Japan** ABB Industry K.K. Tokyo +81-3-5563-8601 Kobe +81-78-991-4507 **Korea** Asea Brown Boveri Ltd. Seoul +82-2-528-3070 **Malaysia** ABB Industrial and Building Systems Sdn Bhd Kuala Lumpur +60-3-972-1888 **Mexico** ABB Sistemas S.A. de C.V. México +52-5-328-1400 **Norway** ABB Flexible Automation A/S Bryne +47-51-489-000 **Poland** ABB Zamtech Ltd Warszawa +48-22-60-80-773 **Portugal** ABB Electrica Lda. Amadora +351-1-416-9200 **South Africa** ABB Flexible Automation Boksburg East +27-11-914-3500 **Spain** ABB Flexible Automation S.A. Sant Quirze del Vallés +34-3-728-8700 **Sweden** ABB Flexible Automation AB Västerås +46-21-344-500 **Switzerland** ABB Flexible Automation AG Zürich +41-1-435-6555 **Taiwan** Asea Brown Boveri Ltd. Taipei County +886-2-2577-6090 **Thailand** ABB Industry Ltd. Bangkok +66-2-249-8069/8070 **Turkey** ABB Elektrik Sanayi A.S. Istanbul +90-216-365-29-00 **United Kingdom** ABB Flexible Automation Ltd. Milton Keynes +44-1908-350-300 **USA** ABB Flexible Automation Inc. New Berlin +1-414-785-3400 Auburn Hills +1-810-391-9000.

ABB Body-in-White AB
Box 310
SE-293 24 Olofström, Sweden
Telephone: +46-454 966 00
Telefax: +46-454 966 01

ABB Body-in-White S.A.
14, rue Denis Papin
F-95250 Beauchamp, France
Telephone: +33-1 30 40 47 00
Telefax: +33-1 30 40 47 01

ABB Flexible Automation S.A.
Poligono Industrial S.O.
E-08192 Sant Quirze del Vallès
(Barcelona) Spain
Mail: P.O. Box 3138, Suc. 3
E-08205 Sabadell (Barcelona)
Telephone: +34-93 728 8700
Telefax: +34-93 728 8682

ABB Body-in-White Ltd.
1 ABB Court
Brampton, Ontario, L6T 5S6 Canada
Telephone: +1-905 460 3000
Telefax: +1-905 460 3001

ABB Body-in-White Inc.
1250 Brown Road
Auburn Hills, Michigan 48326, USA
Telephone: +1-248 393 4600
Telefax: +1-248 393 4800