

Special Purpose Machinery  
for **Prototype Manufacture**  
and **Discrete Volume**  
**Production**

**Dualform**  
The Instant Tooling Concept

# Press Manufacture

We offer over 180 years of experience in the manufacture of special purpose mechanical and hydraulic presses for metalforming applications around the world.



Joseph Rhodes Limited is one of Europe's leading manufacturers of CNC metalforming machinery and a specialist in the bespoke design of mechanical and hydraulic presses.

A major part of the Company's portfolio is an extensive range of DUALFORM Double Action Hydraulic Presses, - "The Press that casts its own Tools".

The Dualform Process enables the manufacturer to make significant savings both in production and in tooling costs. From the creation of matched top and bottom dies to the production of finished components, the Dualform process provides the manufacturer with total production flexibility and a dramatically reduced time-to-market for new products and designs.

Operating from an 8-acre site in Wakefield, England, with over 15,000 sq. metres (162,000 square feet) of factory space under crange, the Company's extensive fabrication, machining and fitting departments ensure that all aspects of machine build are controlled to Joseph Rhodes quality (ISO9001), environmental (ISO14001) and European (CE) Accreditations.

Joseph Rhodes design and manufacturing facilities enable the Company to offer a total service from initial concept through to site installation and commissioning. All major research and development work for the Dualform range is conducted in-house and is supported by a well equipped Computer Aided Design Department covering mechanical, electrical, hydraulic and software engineering disciplines.

**Main (left):** Aerial photograph of the Company's Wakefield site.

**Top:** Machining Facility.

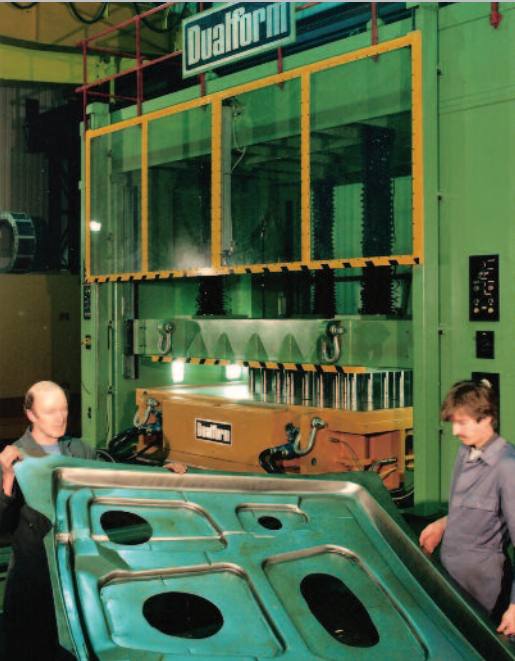
**Bottom (left):** Fabrication Facility.

**Bottom (right):** Technical Design Department.



# Prototype Engineering

Minimal tooling costs and quick tool manufacture ensures that Dualform is an extremely cost effective method of prototype engineering and low volume production.



**Main (right):** Top and bottom tools manufactured in the Dualform Press ready for pressing vehicle panels.

**Above:** Prototype vehicle panel produced on a Dualform Press.

## THE DUALFORM PROCESS

Dualform is a patented process incorporating a special Double Acting Hydraulic Press. This process enables the simultaneous manufacture of matched top and bottom dies within the press, which in turn are used for the manufacture of the pressings.

The tools are cast using a unique, low melting point alloy called 'Jewelite', housed in a special bath situated within the press tool space. After use, the tools are melted down again in situ and new tools cast. The process can be completed in approximately 3 hours on the smallest presses and under 24 hours on the larger Dualform models. The operation can easily be repeated for each new (or repeat) batch of pressed components.

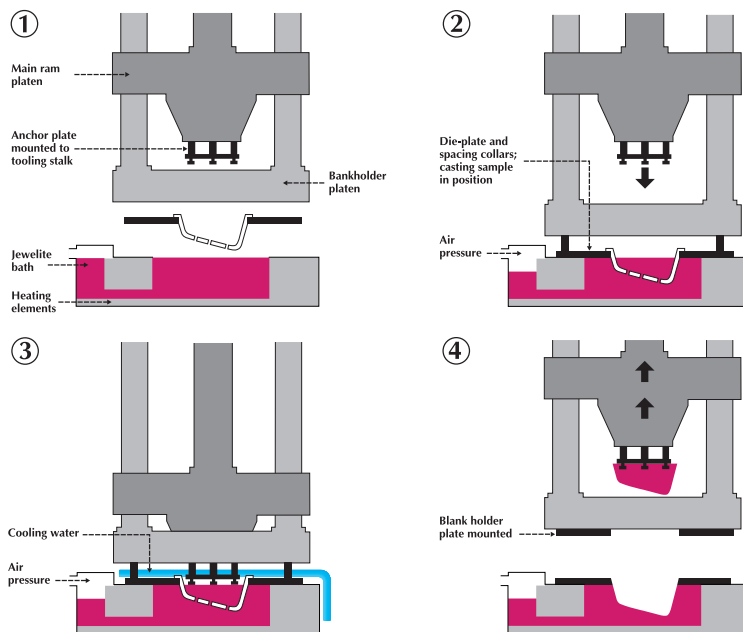
A casting sample is used to create the new tools, from which a panel is formed using the Dualform Process. The new panel is then trimmed and finished using conventional trimming/blanking methods and is then ready for the final production operations such as painting and assembly.

With the Dualform bath removed, the larger Dualform hydraulic presses can be used with conventional hard tooling in either double action or single action mode of operation.

This unique technology is employed extensively in the automotive, aerospace, white goods and sub-contracting industries, for prototypes and low volume panel pressings. **With more than 250 Dualform presses currently in use worldwide the machine is now well established in Industry.**

# Prototype Pressing

The Dualform Process ensures that a manufacturer is only ever four short stages away from the production of a new set of tools, which can then be melted down and recast into a new design within hours.



**Main (left):** The diagram offers a simplified illustration of how tools are cast in four short stages.

**Above:** A new set of tools and pressed door panel.

## DUALFORM - INSTANT TOOLING

The press tools are made in four simple stages.

Stage 1:

- A Casting Sample is prepared and pre-drilled.
- The Jewelrite alloy has a melting temperature of 140°C
- The anchor plate is mounted on the main inner slide, with tee-bolts on the underside.

Stage 2

- The die plate and Casting Sample are placed in position over the bath of molten alloy. The sample fills with alloy through the small pre-drilled holes.
- The main inner slide is lowered until the underside of the anchor plate is just below the top surface of the die plate and locked into position.

Stage 3:

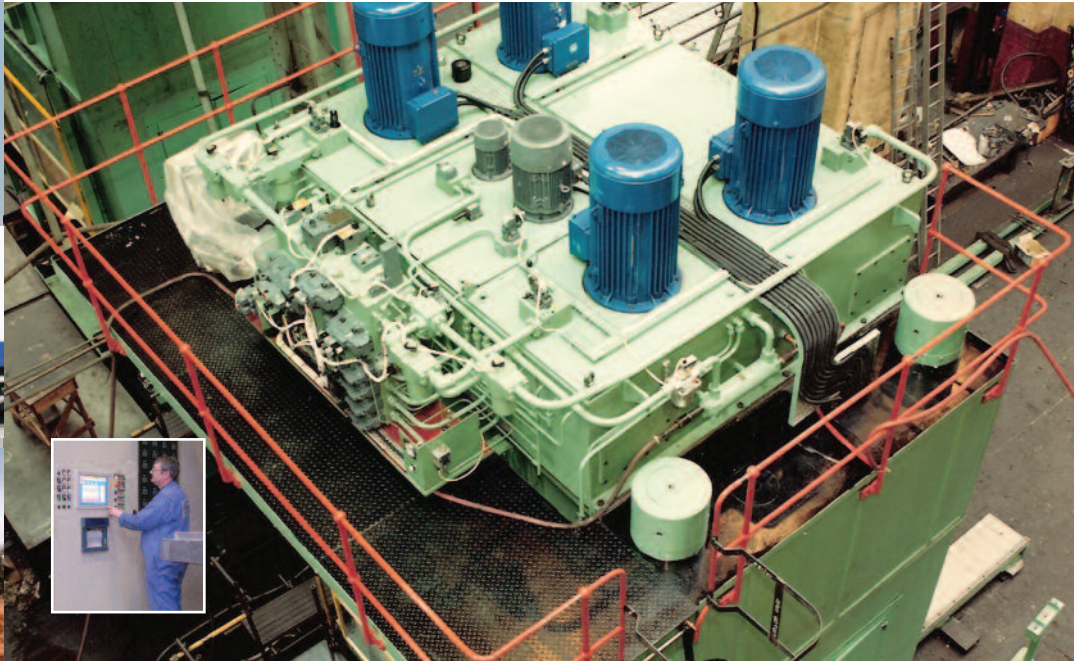
- The alloy in the bath is raised to the desired level by applying air-pressure to the auxiliary feeder tank.
- Cooling water is run across the surface of the bath until the alloy has solidified.

Stage 4:

- When solid, the main inner slide is raised, taking with it the alloy which has filled the sample. This alloy becomes the top die.
- The casting sample is removed, exposing the alloy bottom die beneath.
- The tools are fettled smooth and the blankholder plate is fitted to the outer slide.
- Presswork begins as with normal double action press tools. On completion of the run of pressings the plates are removed, the punch lowered into the die and the tools melted down ready for the subsequent component.

# Discrete Volume Production

Utilised extensively in the aerospace and automotive industries, Dualform allows the cost effective manufacture of R&D components and assemblies for customer and process validation prior to volume production.



**Main (right):** The Hydraulic System for a Model 9 Dualform Press.

**Main (right inset):** Dualform Control System

**Above:** The Dualform press is commonly used to produce prototype components for the aerospace and automotive industries.

#### Application Examples:

**Above (top):** New Military Aircraft.

**Above (middle):** Heavy Goods Vehicles.

**Above (bottom):** Off-Road SUV Vehicles.

## THE DUALFORM HYDRAULIC SYSTEM

The press hydraulics entail purpose-built press modules, complete with proportional control technology. Designed specifically for the Dualform press range, all valves are mounted onto or inserted into the manifold and provide all logic control elements.

The proportional hydraulics, which introduce the precision and flexibility of electronic control, now provide easier setting up for the end-user, while the purpose-built modular press manifolds ensure reliability and ease of maintenance.

## BENEFITS OF THE DUALFORM PROCESS

- Efficiently produces deep drawn components at a fraction of the cost of conventional tooling.
- The ability to simultaneously produce matched pairs of press tools and be in production within 16 hours (3-4 hours on smaller machines, subject to availability of a Casting Sample).
- The ability to easily modify the pre cast tools by fettling and so improve the resultant pressing. This is particularly beneficial when manufacturing prototype pressings.
- Continuous runs of several hundred components are achievable at low cost.
- Existing 'Jewelrite' tools are melted down and new tools cast, this process recycles the alloy and eliminates the need for tool storage.
- The ability to easily produce curved profile pressings.
- Used in conjunction with the Casting Rig, the Press can be kept in a continuous production mode.
- Avoids expensive hard tooling which can quickly become obsolete.
- Larger Dualform Presses can be quickly modified to accept suitable hard tooling if required, therefore giving total production flexibility.
- Capable of replacing hard tooling that may have become damaged or destroyed.

# A Complete Press Range

The extensive range of Dualform presses provides customers with the benefit of a press that suits their exact requirements.



## DUALFORM MODEL 5E & 5R

The smallest models of the Dualform range. Both models are ideally suited for the production of radiator header tanks for the automotive industry, but are used throughout a variety of industrial sectors. The Model 5E has a tool capacity of 735mm x 200mm x 125mm deep and a pressing load of 67 Tonnes, while the Model 5R has a capacity of 750mm x 200mm x 130mm deep and a pressing load of 75 Tonnes. All tonnages quoted are combined pressing loads (main slide pressure plus blankholder pressure).

## DUALFORM MODEL 6 & 6R

Dualform models 6 and 6R have been developed to produce larger radiator pressings for the commercial and civil engineering market as well as other domestic applications. The Model 6 range is suitable for general pressings up to 610mm x 535mm x 150mm deep, while the Model 6R has a maximum pressing capacity of 950mm x 250mm x 165mm deep. Both models have a pressing load of 125 Tonnes.

## DUALFORM MODEL 7DP

This dual-purpose model includes the means for rapid removal of the bath of alloy and the insertion of conventional tools. It includes hydraulically lifted roller bearings mounted within the bedplate and hinged arms on the front of the press to facilitate the change of tooling. The model 7DP has a tool capacity of 760mm x 610mm x 205mm and a pressing load of 250 Tonnes, and is most commonly used in the Automotive and Aerospace industries as well as in the manufacture of white and brown goods.

**Main (left):** Dualform Model 5R.

**Top:** Dualform Model 5E.

**Bottom (left):** Dualform Model 6.

**Bottom (right):** Dualform Model 7DP.

## Machine Specification

Dimensions		
	5E	5R
Maximum Main Slide Pressure (tonnes)	50	50
Maximum Blankholder Slide Pressure (tonnes)	17	25
Maximum Punch Size (L to R x F to B) (mm)	735x200	750x200
Maximum Blank Size (L to R x F to B) (mm)	965x455	1030x490
Maximum Draw Depth (mm)	125	130
Height of Press (mm)	2290	2710
Width of Press (mm) Right to Left	1680	2000
Depth of Press (mm) Front to Back	840	950
Net Weight of Press (kg) approx	4000	6750
Electrical Supply	←	
Control Circuit (volt)	←	

# Press Customisation

At Joseph Rhodes we pride ourselves on supplying a completely customised metalforming solution to meet any customer need. Our team of highly trained and experienced design and electrical engineers work closely with our customers to ensure that exact specifications are adhered to.



**Main (right):** Two Dualform Model 9 Presses.

**Top (left):** Dualform Model 8 with Jewelite Bath Removed.

**Top (right):** Dualform Model 8.

**Bottom:** Dualform Casting Rig.

## DUALFORM MODEL 8/4.2 & 8/5.3

Both models are designed for the manufacture of small to medium sized motor vehicle panel pressings. With the bath of Jewelite alloy removed, the presses can be used with conventional steel tooling as a single or double action press. The Model 8/4.2 has a tool capacity of 1500mm x 1100mm x 300mm deep and a pressing load of 600 Tonnes, while the Model 8/5.3 has a capacity of 1800mm x 1250mm x 350mm deep and a pressing load of 800 Tonnes.

## DUALFORM MODEL 9/7.5-5

The Model 9/7.5-5 is the largest in the range with a tool capacity of 2100mm x 1600mm x 400mm draw, a hydraulic working pressure of 280kg/cm<sup>2</sup> and a pressing load of 1250 tonnes. They are computer numerically controlled, enabling the input, editing and storage of processing data for independent stroke/pressure control of all five rams, thereby ensuring precise repeatability. Often used for the manufacture of large motor vehicle panel pressings, the model 9/7.5-5 can also be used as a single or double action machine with conventional hard steel tooling.

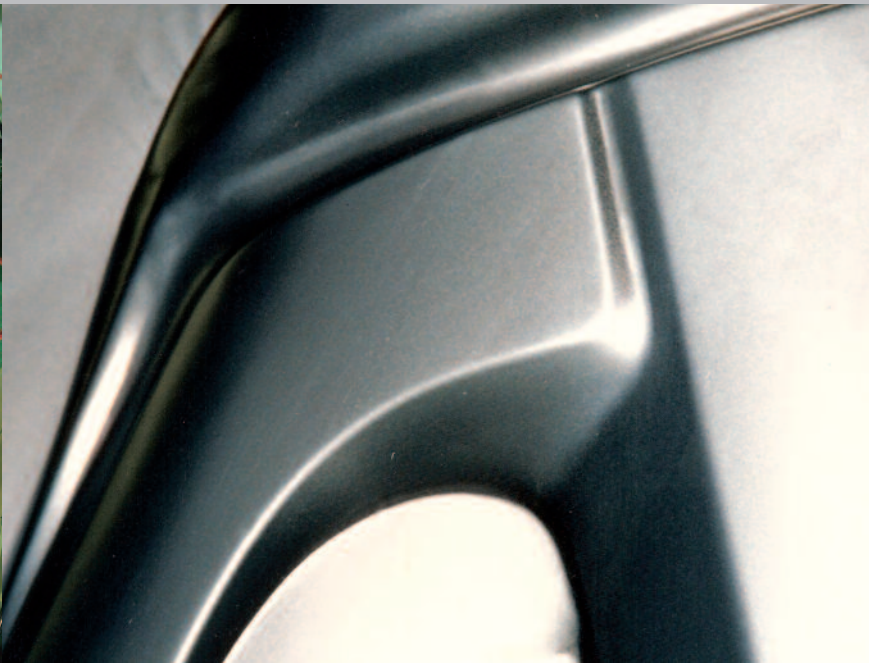
## DUALFORM CASTING RIGS - ANCILLARY EQUIPMENT

Should continuous utilisation of the Dualform system be required then a Dualform Casting Rig and Bath Transporter System can be supplied. These units, together with a second bath of Jewelite Alloy allow tools to be cast in Bath No 2 within the Casting Rig whilst pressings are being produced using Bath No 1 within the Dualform Press. When the press operations are complete the bath is returned to the rig for melting and recycling of the tools. The rig and bath are equipped with all the necessary means for melting, cooling and pressurising the alloy, as well as for cleaning and preparing the tools in safety. A comprehensive set of tool-casting ancillary equipment is also included.

The casting rig enables existing users of Dualform presses to virtually double the productivity of their machines. By operating two baths of alloy, tools are cast in one bath in the Casting Rig, while pressings are made simultaneously on previously cast tools contained in a second bath, located in the press. To complete the process a bath transporter system assists in conveying the baths from the press to the casting rig.

### Dualform Model

6	6R	7DP	8/4.2	8/5.3	9/7.5-5
75	75	125	400	500	750
50	50	125	200	300	500
610x535	950x250	760x610	1500x1100	1800x1250	2100x1600
915x840	1330x590	1170x1015	2650x2000	2900x2135	3050x2530
150	165	205	300	350	400
2700	3350	4270	7000	8065	9550
2010	2600	2590	4100	5600	6080
1145	1150	2440	3800	4100	4600
10900	13000	25450	62000	97000	160000
400 volt/3-phase/50hz (or to suit local supply) →					
→ 110 volts					



# Dualform

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