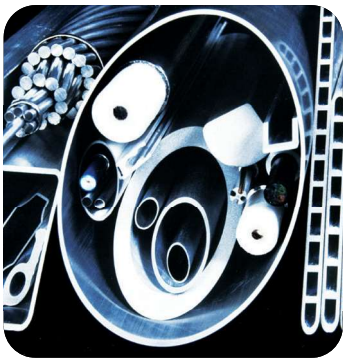
Conform™



Conklad™

SheathEx™

Coldweld™

BWE

www.bwe.co.uk

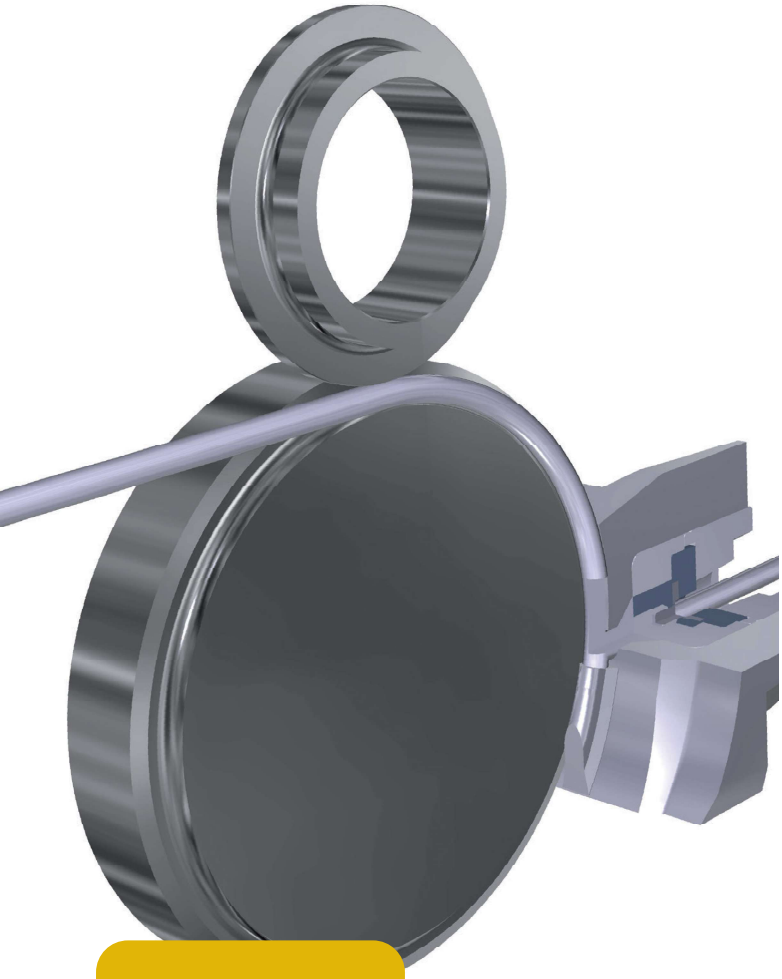
Introduction

BWE Ltd is a British engineering company specialising in continuous extrusion machines for many different applications and cold pressure welders for the cable and wire industry.

The Company has manufactured Cold Pressure Welding Machines at its Ashford factory since 1969. BWE Ltd and its American associated company, Koldweld LLC, are the world's longest established manufacturers of this equipment and have supplied more than 25,000 machines to the Wire & Cable Industry.

In 1976 the Company was awarded the first licence to develop, manufacture and supply Conform Continuous Extrusion Machines by the inventors, the United Kingdom Atomic Energy Authority. BWE has continued to invest in developing the process and has pioneered many new applications including thin-walled aluminium round and multi-port tube, aluminium clad steel wire and sheathing fibre-optic, CATV and power cables with aluminium.

BWE has a strong management team committed to providing a comprehensive service to customers from application development through pilot production, training, installation, commissioning and after-sales service.



Conform™

The use of a single revolving wheel as the driving force in an extrusion process enables the manufacture of products of unlimited length. In its simplest form the wheel has a single peripheral groove that accepts the feedstock and transfers the material to the die.

The diagram shows the configuration used for the production of most solid and hollow sections. A die chamber, carrying the appropriate die, is supported in a shoe. The die chamber incorporates an abutment that protrudes into the wheel groove. The force applied by the rotating wheel causes the feed material near the abutment to flow plastically into the die chamber and extrude through the die. Whilst the feedstock is usually in the form of rod, the process can also operate with material of any morphology provided that it can be fed into a suitably sized groove.

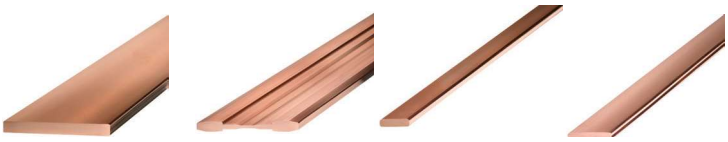
An Induction Heated Tooling System is available for applications which require a constant and direct heat source to the extrusion zone. The ability to rapidly pre-heat the chamber to the precise extrusion temperature prior to start-up reduces the stresses on tooling and allows more difficult products to be extruded.

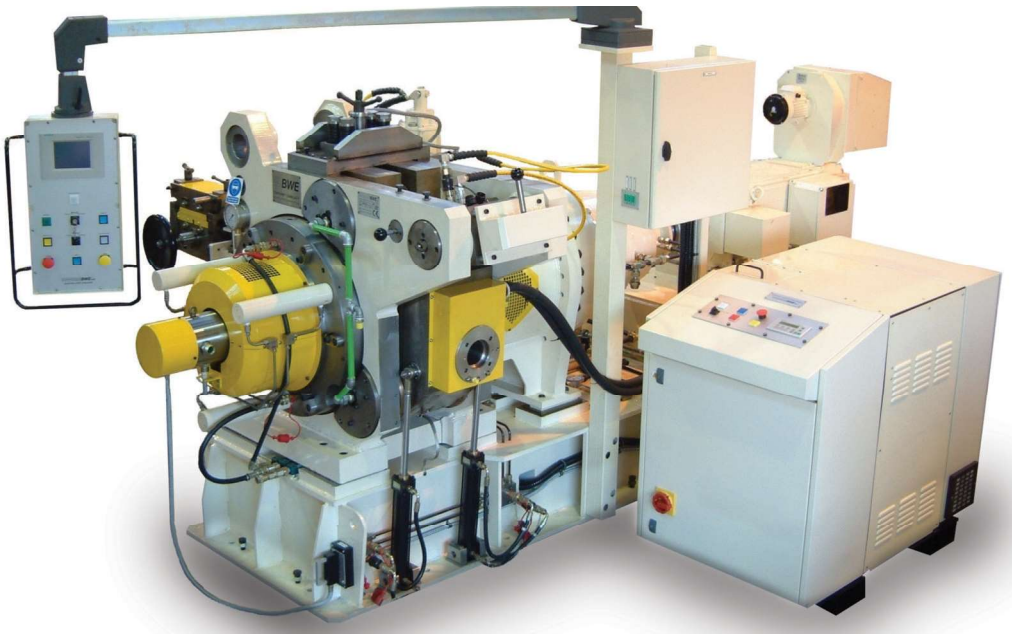
Conform Applications

The Conform process is used for a wide range of solid and hollow extrusions in non-ferrous metals such as aluminium alloys, copper alloys, zinc, calcium, lead and magnesium. Major applications include the following:

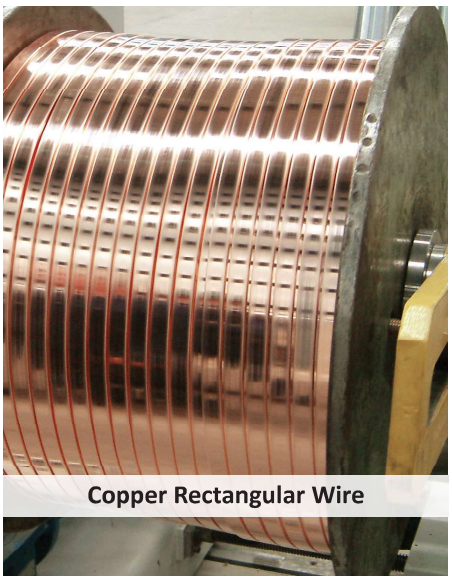
Aluminium:
- Round Tube
- MPE or PFC Tubes
- Solid Aluminium Conductor (SAC)
- Solid and Hollow Shapes

Copper:
- Rectangular Wire (Magnet Wire)
- Busbar
- Cable Sector
- Commutator Segment
- Shaped Conductors

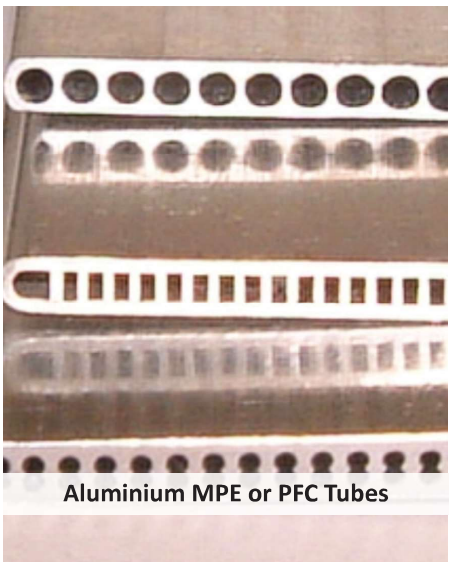




Typical Aluminium Products

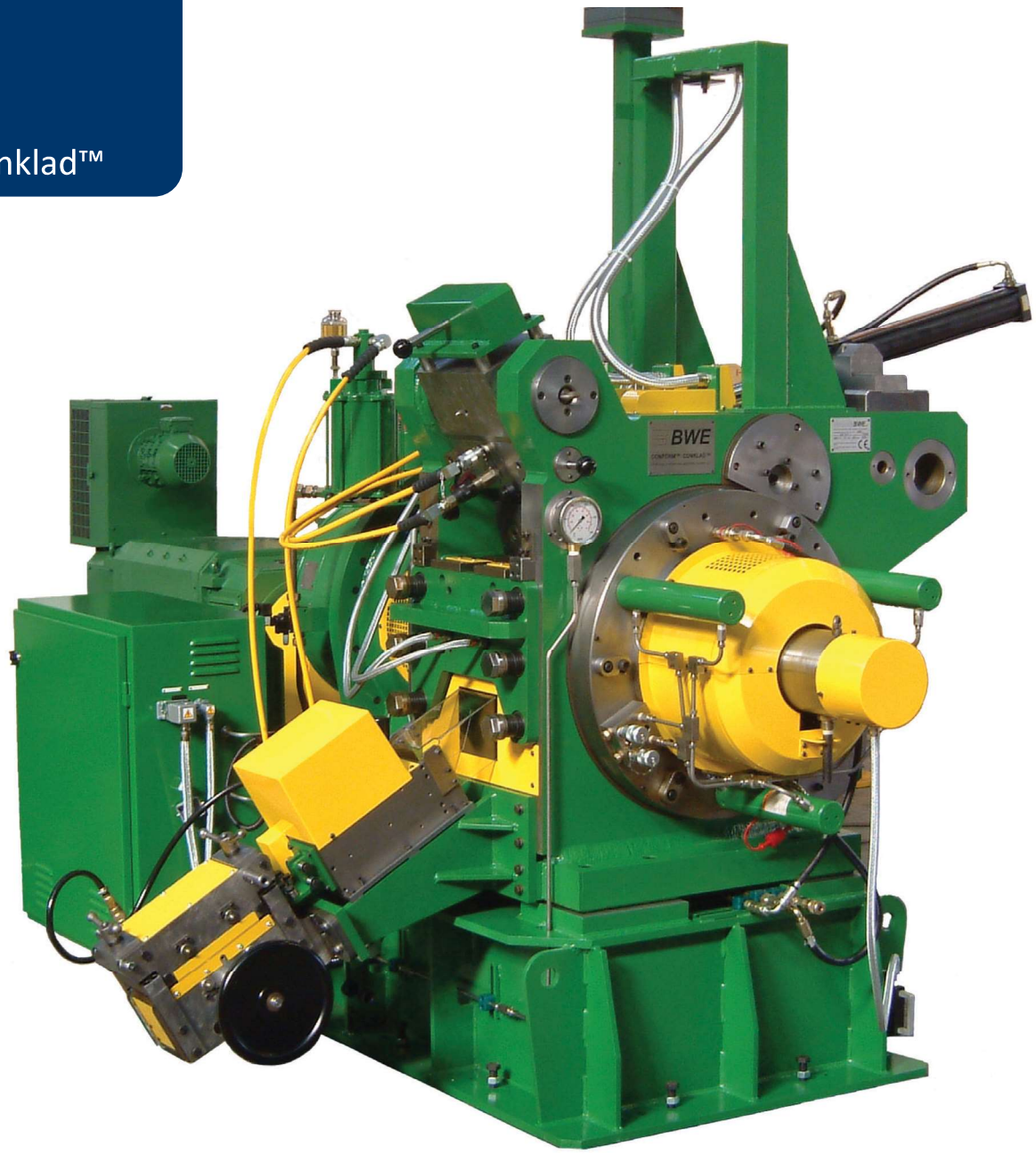


Copper Rectangular Wire



Aluminium MPE or PFC Tubes

Conklad™

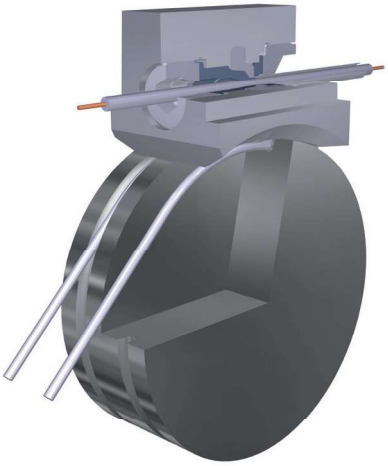


The geometry of the Conklad process is arranged so that a central core can be introduced inside the extrusion. Twin or Single feedstock rods are used to produce two flows of metal on either side of the chamber so that the pressure around the central core is balanced.

Direct Cladding involves bringing the extruded metal into direct contact with the core.

High Pressure Direct Cladding exposes the core to full extrusion pressure in order to create a metallurgical bond. In this mode the core is usually heated prior to entering the Conklad machine.

Low Pressure Direct Cladding is employed where the core material cannot withstand the extrusion pressure. The dies protect the core but allow extrusion directly onto the surface of the core.



Indirect Cladding or Sheathing is used where the core is very weak or temperature sensitive. In this modean oversized sheath is extruded and subsequently drawn down in-line to fit the core. The sheath is cooled immediately after extrusion to prevent damage to the core.

Conklad Applications

The Conklad process is used for the production of clad wires, tubes and sheathed cables.

Aluminium:	A.S. Wire OPGW CATV Cable Fibre Optic Cable Superconductors Aluminium Sheathed Composite Core
Zinc:	Umbilicals (sub-sea oil production)

AS Wire

OPGW

Fibre Optic Cable

CATV Cable

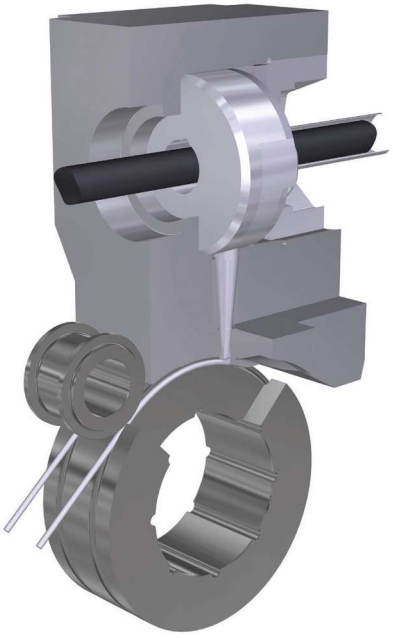
Umbilical

SheathEx™

The most recent success in continuous extrusion is BWE's patented, SheathEx process.

A Metallic Sheath is utilised in cables to prevent the ingress of moisture without diminishing the flexibility of the cable. Water penetration is detrimental to the integrity of insulation. The combination of moisture and high electrical stresses leads to the initiation of water tree growth, resulting in the premature failure of the cable.

A 'Seamless' Aluminium Sheath is very reliable, economical and its mechanical properties make it both lighter and stronger than Lead Sheath.



After forming, the Aluminium Sheath is normally corrugated inline to improve flexibility of the cable. In some applications a smooth type sheath is preferred.

A high efficiency induction heater ensures an even temperature distribution around the extrusion die, which gives accurate control of wall thickness and concentricity.

Caterpillar haulers are used to transport the cable through the line and the extruded sheath is corrugated to size before being wound onto large diameter drums.

SheathEx Applications

Sheathed High Voltage Cable with Helical Corrugation

High and Extra High Voltage Cable Sheathing – Helical or Annular Corrugation

Medium and High Voltage Cable Sheathing – Smooth Type

MACHINE MODEL	315	350	400	550
Conform Model	✓	✓	✓	✓
Maximum Die Circle Aluminium Hollow Profiles (mm)	50	70	80	90
Maximum Extrusion Width Aluminium Solid Profiles (mm)	55	80	160	260
Maximum Product Area Aluminium (mm2)	2000	5000	8500	13000
Annual Output Aluminium (tonnes)	2300	2800	3300	5700
Maximum Extrusion Width Copper (mm)	55	80	160	260
Maximum Product Area Copper (mm2)	400	600	2400	3200
Annual Output Copper (tonnes)	4000	6000	7600	12000
Conform Expansion Model			✓	✓
Maximum Die Circle - Aluminium (mm)			165	270

Note: Induction Heating is available for specific applications

MACHINE MODEL	315	350	400	550
Conklad Model	✓	✓	✓	✓
Maximum Clad Diameter (mm)	20	30	40	50
Maximum Sheathed Diameter (mm)	15	20	25	35

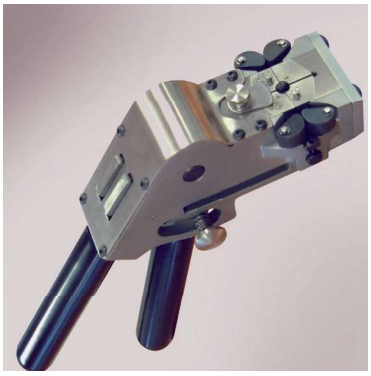
MACHINE MODEL			400	550
SheathEx Model			✓	✓
Maximum Sheathed Diameter (mm)			100	165

Coldweld™

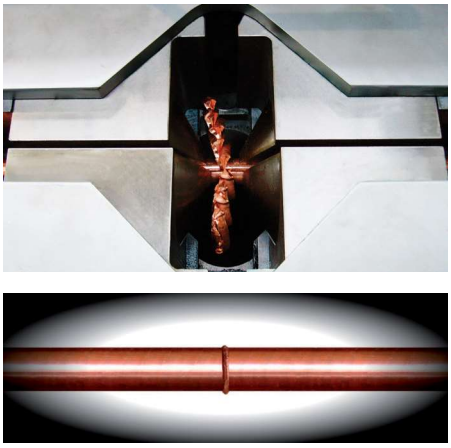
Cold Welding is a method for joining non-ferrous metals and their alloys without using heat, fillers or fluxes. Round wires, sections, dissimilar materials and materials of different sizes can all be welded with BWE's proven technology. A cold weld is generally stronger than the parent metal and has the same electrical characteristics. BWE have been supplying Cold Weld machines and dies to the industry since 1969.

Hand-Held Models

CW10
Copper 0.08 – 0.50mm
Aluminium 0.08 – 0.60mm

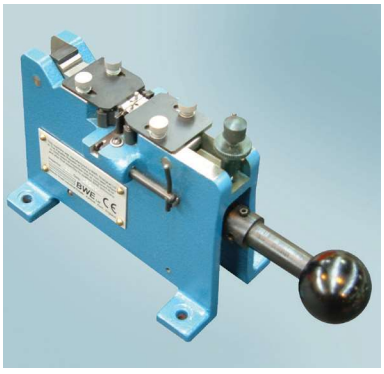


CW20
Copper 0.25 – 1.20mm
Aluminium 0.25 – 1.20mm



Cold Pressure Welding

Manual Models for Bench or Trolley Mounting



CW1E
Copper 0.08 – 0.60mm
Aluminium 0.08 – 0.60mm

CW2E
Copper 0.30 – 2.0mm
Aluminium 0.30 – 2.0mm

CW3E
Copper 1.0mm – 4.0mm
Aluminium 1.0mm – 5.5mm

Pneumatic Models

CW4E
Copper 1.0 – 5.0mm
Aluminium 1.0 – 6.35mm

CW4ER
Copper 2.0 – 5.75mm
Aluminium 2.0 – 6.50mm

Electrically Driven (AutoWeld) Models

CW5E
Copper 2.0 – 6.5mm
Aluminium 2.0 – 10.0mm

AW813
Copper 4.0 – 8.0mm
Aluminium 4.0 – 13.0mm

AW1320
Copper 6.0 – 13.0mm
Aluminium 6.0 – 20.0mm

Customer Support

BWE offers support to potential and existing customers by providing the following services:

Application Development and Pilot Production

A fully equipped Conform/Conklad line is available within a purpose built development workshop. The Ashford facility is used to develop new applications and improve tooling design. Product trials, process demonstrations and pilot productions are available to any new customer.

Technical Documentation

A comprehensive set of drawings, schematics, operator's manuals, test certificates and health and safety instructions are provided prior to installation and commissioning of the plant.

UK Training and Technical Support

Detailed training courses are available to all new BWE customers, providing the theory and practice of all aspects of the system. Training is normally scheduled for a period of one week during the testing and inspection of the customer's equipment at BWE's factory in Ashford. Ongoing technical support is provided before and after training, enabling the customer to become fully acquainted with the technology.

Installation, Commissioning and Training On-Site

The customer is normally responsible for preparing the site in conjunction with the technical documentation provided by BWE. Once the equipment is unpacked and positioned in accordance with the layout drawing, BWE's commissioning engineer will individually check all items and calibrate the system.

The engineer will run the line, extrude product and verify that the line is working correctly.

Towards the end of commissioning, the engineer will provide additional training on the safe operation and maintenance of the line.

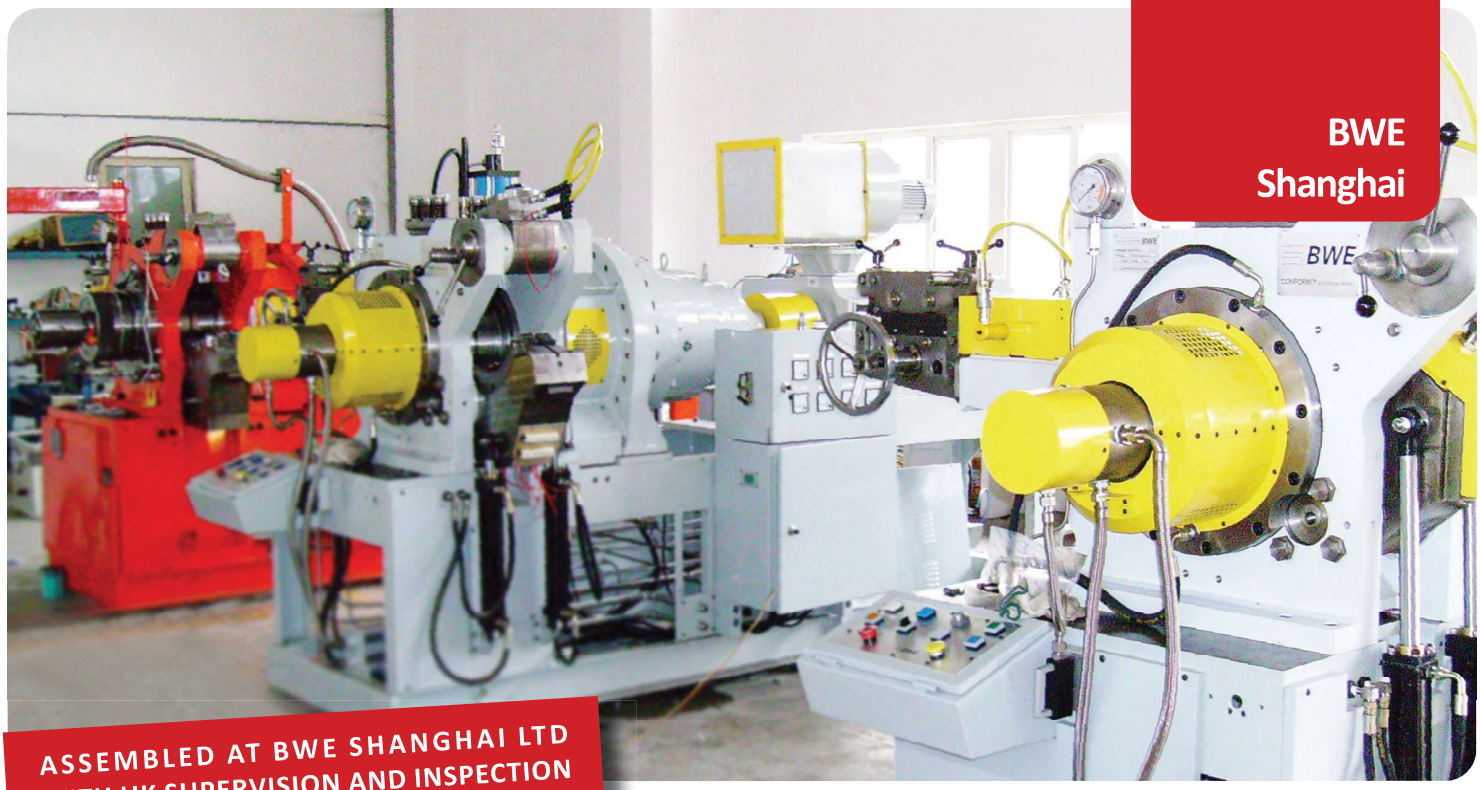
System Upgrades and Customer Refresher Courses

As BWE develop new systems and improve the technology, existing customers have the choice to upgrade their equipment and their 'know-how'.

Continuous Support, Service and Spares

BWE provide continuous support and service via telephone, fax and email. In the event that a problem cannot be rectified by these means, there is a team of specialist BWE engineers available to visit the customer and resolve any issue on site. A minimum recommended spares list is provided within 3 months of order placement, so that the customer may adjust the quantities and delete any items that are available locally.

BWE Shanghai



ASSEMBLED AT BWE SHANGHAI LTD WITH UK SUPERVISION AND INSPECTION

By switching manufacturing to our modern factory in Pu Dong, Shanghai, BWE's UK sales office is now able to offer continuous extrusion lines at a much reduced price. Production tooling is also manufactured in China and this has had a significant effect on the running costs for all Conform, Conklad and SheathEx machines.

Prices are significantly cheaper due to lower manufacturing costs but the machines are built to the same high standard. Assembled machines are fully inspected by a UK engineer and shipped to our UK factory. Once in the UK, the machine is fitted with a European Motor, Gearbox, Heat Exchangers and Hydraulic Pumps. Final Test, CE Certification, Quality Control, Commissioning, Training, Technical Support and After-Sales Service is carried out from the UK.

BWE's headquarters in Ashford, Kent continue to innovate, design and develop new machines for different applications. Conform, Conklad and SheathEx machines for specialist applications continue to be manufactured in the UK.

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BWE

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