



# MACHINERY RESTORATION AND REPAIR





# FOLLOWING A DISASTER INCIDENT YOU NEED A FAST RESPONSE



We are specialists in restoration of machines following disaster incidents caused by fire, water or other contamination incidents, or damage occurring during transportation. From initial stabilisation measures to full restoration work, involving disassembly, decontamination, replacement of damaged components, re-assembly, re-alignment, commissioning and hand-over, we take care of all aspects of the project using our own qualified and experienced personnel.

## Preventing Total Loss

Following a disaster incident, a machine's condition may deteriorate quickly, due to corrosion caused by exposure to fire, water or other contaminants. Without immediate protection measures, the machine may lose significant economic value within the days immediately following the incident. Effective stabilisation measures will reduce the rate of deterioration considerably, allowing time for you to understand your options and determine the most appropriate course of action, in order to reinstate your production capability. Provided that restoration work is commenced quickly, machines



can normally be returned to full production, without loss of pre-incident accuracy, reliability or lifespan.

## 24-Hour Response

BELFOR provides a 24-hour response to client inquiries and incidents around the world. Our Technical Advisers are available to provide immediate advice, on-site assessments and to implement stabilisation measures and restoration work at all times.

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## RESTORING MACHINES PRECISION GUARANTEED



For over 30 years BELFOR has specialised in machinery restoration following unexpected disaster incidents, establishing ourselves as the world leader in this field. Our broad range of technical knowledge and practical experience, which has been gained through a multitude of different restoration and repair projects, ensures that we can deliver a full range of services, including:

### Critical stabilisation measures:

Minimisation of damage by securing, preserving, drying and pre-cleaning precision machines following disaster incidents.

### Machine restoration:

- Disassembly into component parts at site.
- Restoration of individual components.
- Replacement of damaged / worn components.
- Re-assembly.
- Re-alignment (laser measuring technology).
- Commissioning and handover.
- Reconditioning machines to relevant industry standards.

### CNC controller and switchgear:

- Restoration and repair of CNC controller and electrical switchgear.
- Replacement of damaged components.
- Design of new updated control systems.

### Spare parts manufacture:

- Production of otherwise unavailable spare parts using our in-house machine tools and expertise.

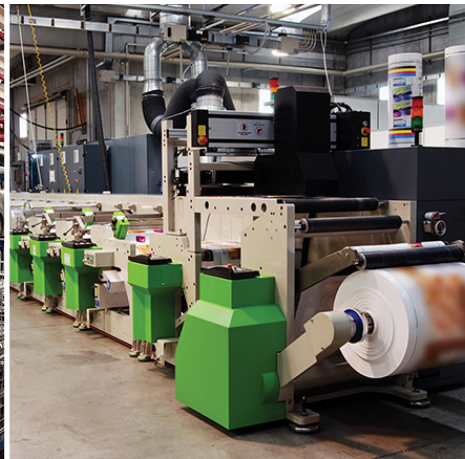
### Our special expertise:

- Project management of the complete reinstatement of all precision machines following disaster incidents.
- Focus on reduction of business interruption through our flexible approach and wide range of technical solutions.





# RESTORATION OF ANY MACHINE IN ANY INDUSTRY



We have always been ready to take up a new challenge and therefore our knowledge and experience has grown over the years. The range of machines which can be restored or repaired by BELFOR is only constrained by the severity of the damage. Machines restored or repaired by BELFOR include: machine tools, printing machines, precision and high speed manufacturing machines for the high technology industries, steel rolling mill equipment, and many others.

## Experience in most industry sectors

Our knowledge and experience has grown over the course of more than 30 years working with damaged machines from many different industry sectors.

Machines restored and repaired by BELFOR include:

- Assembly and handling robots
- Building materials machines
- Cleaning systems
- Compressors and vacuum pumps
- Conveying systems
- Cranes
- Electric motors and generators
- Engines
- Fluid pumps
- Food processing and packaging machines
- Foundry machinery
- Heating and ventilating equipment
- Iron and steel rolling mill equipment

- Laundry and dry-cleaning machines
- Locomotives
- Marine equipment
- Mining machinery
- Paper manufacturing and conversion machinery
- Powertrain systems
- Precision machine tools
- Printing machines
- Plastic moulding and extrusion machines
- Shoe and leather industry machines
- Textile machinery
- Thermal process and waste engineering
- Welding and compressed gas machines
- Wood working machines

## Co-operation with machine manufacturers

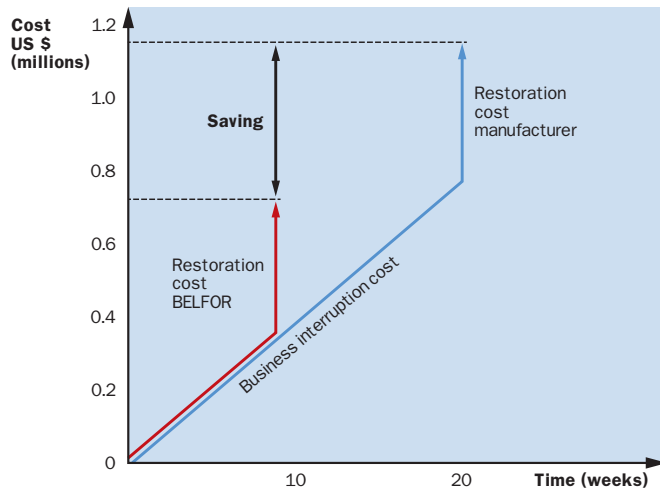
In many instances, machine manufacturers do not have the broad range of resources available to effect restoration of precision machines following disaster incidents. By contrast, this is the specific area of expertise of BELFOR. We are fully equipped and prepared to restore machines affected by fire, flood and other incidents. We will provide the complete service, or where the services of the machine manufacturer are available, join with them to assist our clients in the most efficient manner. In special cases, meeting the broad range of technical requirements can only be achieved in co-operation with the machine manufacturer.

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# SAVING YOU TIME AND MONEY

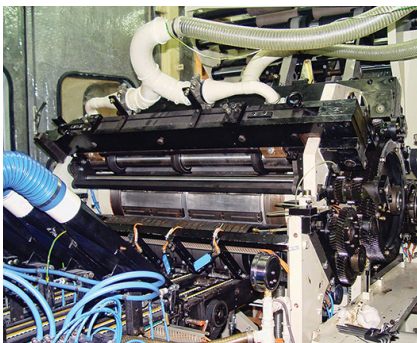
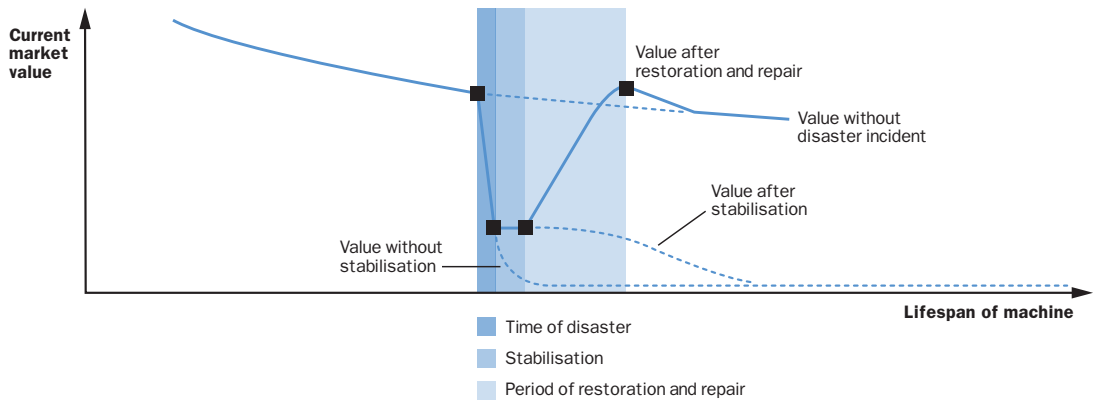


## COST SAVING FROM DISASTER CAUSED BY FIRE IN A PLASTIC PROCESSING MACHINE:

Restoration + repair: US \$383,000  
 Restoration time by BELFOR: 9 weeks (actual)  
 Restoration time by manufacturer: 20 weeks (estimated)  
 Business interruption cost: US \$38,250 / week

### Saving compared with repair performed by manufacturer:

US \$1,148,000 – US \$727,250 = **US \$420,750**



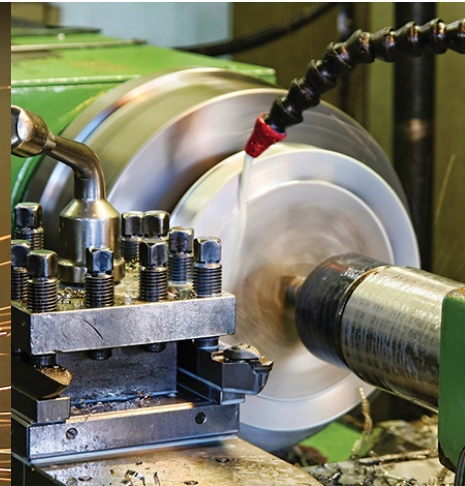
## Responding quickly – this saves time and business interruption costs

You can rely on BELFOR to keep to scheduled delivery times, while maintaining the agreed quality of work.

- We are fast to implement stabilisation measures – ensures that damage is minimised and provides time for our clients to evaluate their options.
- We are flexible – fast interim solutions often allow further time to consider available options.
- We deliver precision with a warranty – safeguarding the quality of work produced by your machine tools.
- Our service delivery is transparent – you will not experience any unexpected problems.
- We find the most appropriate solutions – bringing you back to business more quickly.



# REPAIR WORK



## REPAIR TECHNIQUES

- Gluing techniques
- Hard chrome plating (an application for highly stressed parts)
- Plating-up by plasma process
- Coating with Teflon or Ture Cite
- Modern welding processes (building-up welding)
- Classical cutting shaping processes (turning, milling, grinding, scraping)
- Modernisation of individual components and systems

### After Wear and Tear or Machine Failure

BELFOR possesses a wide range of knowledge and skills in the field of repair technology, due to our extensive experience gained in the after disaster restoration of a wide range of machine tools over many years.

### Spare Parts Production

When replacement parts cannot be immediately procured, or are urgently required to complete the repair, we can manufacture these parts, as we have the machine tools to carry out turning, milling, grinding, drilling, welding, trimming and measuring, and the expertise to carry out this work.



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# REFURBISHMENT OF USED MACHINE TOOLS

## General Overhaul of Machine Tools

The overhaul of used machine tools is a regular project undertaken by BELFOR. A general overhaul, for example, also involves a demanding geometrical overhaul, to reinstate the required degree of precision to the moving axes. We will replace worn parts with new parts if they are readily available. Frequently we have to reproduce parts if the original parts cannot be procured, or if their delivery times are extremely long. We use certified measuring tools and laser interferometers to ensure that machines operate to the required parameters after work has been carried out.

## Modernising Machines

Older machines are often highly valued, due to their robust structure and simple operation. These heavy-duty machines, due to their high rigidity and low propensity to vibration, become more valuable as they age. Such attributes often makes restoration and modernisation of these machines economically viable.

Modernisation measures can also improve the path feed rate, positioning accuracy, smoothness of running, safety and operator control.

In some business sectors, maintaining a machine's attractive visual appearance is also important, for example in the case of dental technology. New chrome plating and fresh paintwork are often requested, to ensure the appropriate visual image.

The accuracy of a machine, compared to 30 years ago when it was new, can also be improved, by overhaul and modernisation, which often includes the replacement of the CNC controller, the operator control panel, the electrical switchgear, the aerosol lubrication system, and the pneumatic system.

## Modernising CNC Control Systems

The principal reasons for considering a retrofit usually are:

- Problems obtaining spare parts and associated failure costs.
- Increased safety risks and hazards if non-standard components are used.
- A requirement to extend a machine's functions.

In most cases the precision machine specialists at BELFOR can assist – from retrofitting a new CNC control system and switchgear to new drive technology and measuring systems.

## BELFOR Facilities

BELFOR has sufficient space in our facilities, to overhaul most types of precision machines.



BELFOR 3,500 m<sup>2</sup> facility in Germany equipped with gantry cranes for safe handling of machines and components.



BELFOR 900 m<sup>2</sup> facility in Taiwan equipped with gantry cranes and machine shop.





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