Magnetic Pulse and Electro-hydraulic processes for Forming, Welding, Crimping & Expansion
About Bmax

Bmax is a leading provider of advanced metal processing solutions. Offering includes industrial-grade systems for electromagnetic pulse processes - Forming, Welding, Crimping & Expansion.

Bmax is based in Toulouse, France and boasts a new 3000m² state-of-the-art facility. Bmax is a multi-national company heavily invested in research and development for the advancement of ultra high speed processes and simulation technology.

Bmax's hand-picked team of the world's best engineers and scientists have over 100 man-years combined hands-on experience in this field.

Bmax uses best in breed simulation techniques available to provide clients with a fully integrated manufacturing solution from the very first contact to on-site training and continuous after sales service.
Bmax’s core technology is based on the discharge of stored electrical energy in an ultra short interval. The concentration of energy, allows the generation of intense magnetic fields or shockwaves.

This instant energy burst can then be converted into mechanical or electromagnetic power and applied to various applications producing results in Forming, Welding, Crimping and Expansion that cannot be met using traditional techniques.
Applications

Forming (MPF/EMF)
of complicated shapes

Magnetic Pulse Welding (MPW)
of dissimilar metals

Magnetic Pulse Crimping

High strength levels
Advantages

On top of enabling better products, Bmax offers additional advantages:

**Stable core technology**
- High Repeatability and Cost Efficiency due to generic stability of Bmax’s core technology.

**Higher production rate**
- Process time is extremely short
- Handling is the bottleneck

**Better yield**
- Process stability eliminates failures and re-work

**Lower cost of ownership**
- Lower energy consumption
- Smaller footprint
- Lower cost of quality

**Green and clean**
- No Heat
- No Smoke
- No Sparks
- No Oil
- No Detergents
Proven Technology

Bmax’s systems are installed at production sites world-wide

REAL USAGE RETURNS
- Industrial grade equipment with track record in plants

REAL EFFICIENCY
- Close to 0% failure rate in the field
- Low cost maintenance with very little down-time

MATURED SIMULATION TOOLS
- Bmax uses powerful predictive numerical simulation to design tooling and processes.
MP Forming Methods

Direct Electromagnetic Forming

High speed forming by an electromagnetic field.
- Up to 600 cm²
- Multiple steps
- 2D & 3D

Non-direct Electromagnetic Forming

Forming by high speed punch using an agent elastic material.
- Up to 300 cm²
- Up to 3 steps
- 2D & 3D

Electro-Hydro Forming

Forming by shockwave in water by electro discharge.
- Up to a few m²
- Multiple steps
- 2D & 3D
MP Forming Advantages

- Use one sided die (Optional - none metallic die)
- Can be combined with any other forming technology
- Achieve higher formability than traditional methods
- Can produce Sharp corners and Fine details
- No Spring-Back and good material distribution
Direct MP Forming
Direct MP Forming examples:
Non-Direct MP Forming
Non-Direct MP Forming examples:
Electro-HydroForming (EHF)
HydroForming examples:
MP Welding

Magnetic Pulse Welding is a Solid State Cold Welding
Generated by high speed collision between two metals at room temperature

Sub second weld time.
Cycle time depends only on feeding.

Dissimilar metals.
Eg: Aluminum to Stainless steel

High performance joining, using less material

Different shapes
Tubular elements up to Ø125mm or sheet metal.

No heat affected zone
MP Welding

- Acceleration by Electromagnetic power.
- Extremely high speeds - up to 600m/s (over 1mm)
MP Welding

- Principles taken from Explosive Welding
- At these speeds, the metal enters a Viscoplasticity phase
  which allows atomic level bonding to occur.
MP Welding

Quality of interface

MP welding provides high quality and cleaner interface

High performance

In testing, the mother material will surrender prior to the weld area

Burst testing

Torque testing

MPW

MIG Welding

Aluminum pressure vessel

Aluminum to Steel welding in a driveshaft
Wide Range of Combinations
Benefits in the production line

Conventional Welding
- Degreasing
- Feeding
- Welding 15 to 45 sec'
- Cleaning
- Straightening
- Heat Treatment
- Testing
- 85-90% Yield
- Rework 2% to 15%

Magnetic Pulse Welding (MPW)
- Feeding
- Welding 0.1 sec'
- No Cleaning
- No Straightening
- No Heat Treatment
- Testing
- 99.7% to 100% Yield

Yield
- 2% to 15%
- 99.7% to 100%
Using the principles of MP Forming, Bmax can shrink or expand elements enabling new design with extreme mechanical properties.

Mechanical joining
Eliminating the need for adhesives, riveting and welding

Wide range of assemblies
Metal to Polymer, Composite, Ceramic and Cast metal

Higher conductivity
Heat-shock resistant
Zero clearness and maximum contact area
Crimping
Expansion