

ELECTROMAGNETIC FORMING

Electromagnetic forming:

Electromagnetic forming (EMF) is one of the high speed forming methods in which pulsed magnetic field apply Lorentz force to the workpiece to form that. This is a contactless forming method suitable for high electrical conductive materials. However this method can be used for other metals by using high conductive drivers. The method is very fast and accurate and also is not affected by temperature and tools. Electromagnetic forming also named magnetic pulse forming uses a strong unstable magnetic field for shaping of parts.

Advantages:

- High yield forming process
- High capability of process automation
- Technological flexibility over process
- The simplicity of the process equipment
- The absence of the medium (transfer) during the forming process
- The possibility of achieving high pressure during forming process
- Advanced production and ease of equipment maintenance
- Possibility of improving material's properties by forming
- High capability for forming difficult accessible areas
- No need for lubricating

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Application:

Due to high flexibility of the method it can be applied for shaping of metallic parts in different industries such as aerospace, automotive, home appliance, packaging and etc. some of them are as below:

- Forming of sheet metals (compression, expansion, sheet forming)
- Joining and assembly (metal / metal, metal / ceramic, metal / polymer and metal / composite)
- Cutting
- Powder compaction

Models and technical characteristics:

Based on client's requirement special EMF system could be design and manufacture. However, up to now systems with different technical characteristics (below table) has been produced.

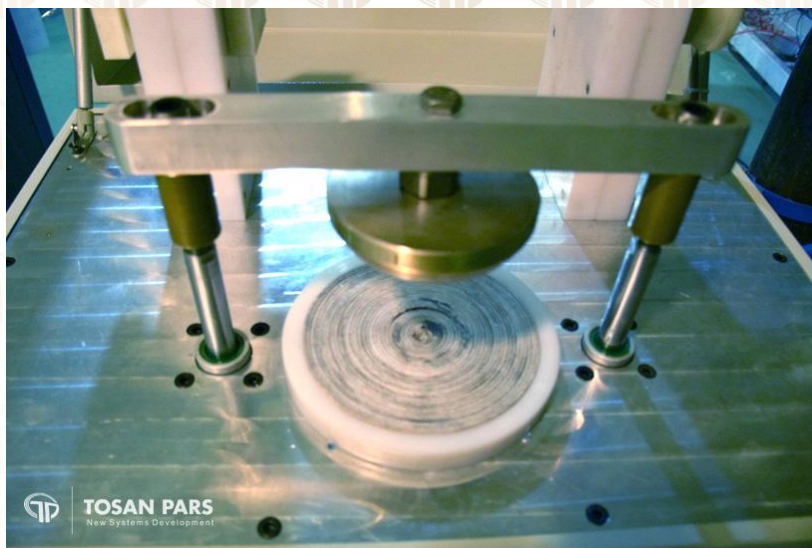
No	Forming type [⊙]	Forming Energy	Voltage	Ampere	Frequency	Forming rate
1	E	2 kJ	8 kV	30-40 kA	100 kHz	12 Part/ Min
2	E - C	8 kJ	8 kV	70-80 kA	100 kHz	12 Part/ Min
3	E - C	8 kJ	8 kV	70-80 kA	100 kHz	12 Part/ Min
4	E - C - S	20 kJ	15 kV	130-150 kA	100 kHz	12 Part/ Min
5	S	4 kJ	8 kV	50-60 kA	100 kHz	12 Part/ Min
6	E - C - S	8 kJ	8 kV	70-80 kA	100 kHz	12 Part/ Min
7	E - C - S	8 kJ	8 kV	70-80 kA	100 kHz	12 Part/ Min

⊙ E= Expansion, C= Compression, S= Sheet forming



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System picture:



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Shaped parts by electromagnetic forming:

Expansion of
Cu ring



Expansion of Al
cylinder



Compression of Al
cylinder

