Electroforming Technology

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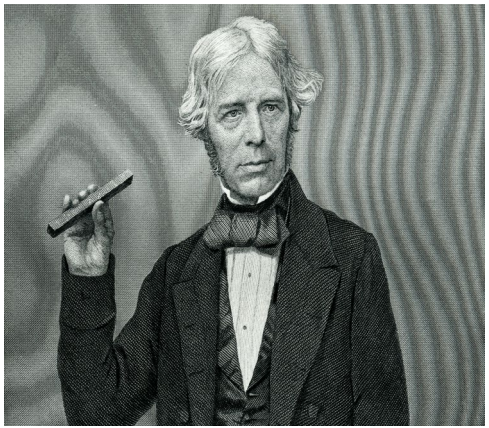
What is electroforming?

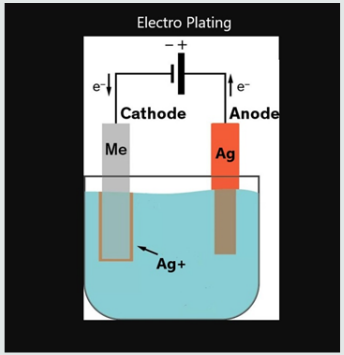
- Electroforming Technology arises from **Electrolysis**
- **Faraday law**…..1. “The mass of a substance deposited at any electrode is directly proportional to the amount of current passed.” &
- 2. “The mass of a substance deposited at any electrode on passing a certain amount of current is directly proportional to its chemical equivalent weight.”



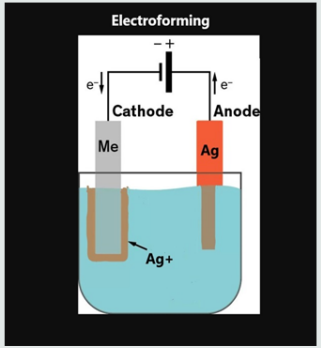
Michael Faraday

- By using Faraday law one can do Electroplating and Electroforming.

Electroplating



Electroforming



- In Electroplating thickness ranges from 0.10 - 10 microns
- In Electroforming thickness ranges from 150 - 600 microns

(Me refers mandrel)

- Electroplating is a topcoat for attaining surface strength or decorative colors and can deposit thickness ranges from 0.10 – 10 micron only.
- Whereas Electroforming is a far far superior process used to manufacture Jewellery parts with high precision.
- We shall deposit multi layers of metal or alloy over the Mandrel (core)
- Mandrels can be made by casting with low melting alloy which can be directly used in electroforming.
- Wax Mandrel also can be used by making the surface conductive with special ink.
- We can deposit higher thickness of gold or silver ranging 150 – 600 microns.

Mandrel Picture (metallic)

Mandrel Picture (non metal)

Process Flow of Electroforming

- Jigging
- Cleaning Process :
  1. Ultrasonic cleaning
  2. Electrolytic Cleaning
  3. Acid Dip Cleaning
- Forming Process:
  1. Pre-plating Process
  2. Electroforming Process
- Mandrel Removing or Emptying process

Jigging

- Polished mandrils are fixed over SS sticks to form a Jig.

- Jigs are highly conductive and hold many mandrels, which are taken to further process.

Cleaning Process :

1.Ultrasonic cleaning :

Using soap cleaning solution with Ultrasonic Vibration is used to remove dust,dirt, fingerprint over the surface of mandrel.

2. Electrolytic Cleaning (Cathodic) :

Using suitable alkaline solution as electrolytic cleaning media, Jewellery parts (Mandrel) are connected to cathode and applying current, electrolysis of water takes place and evolves Hydrogen gas as bubbles and cleans the surface from scales, corrosion & oil etc.,

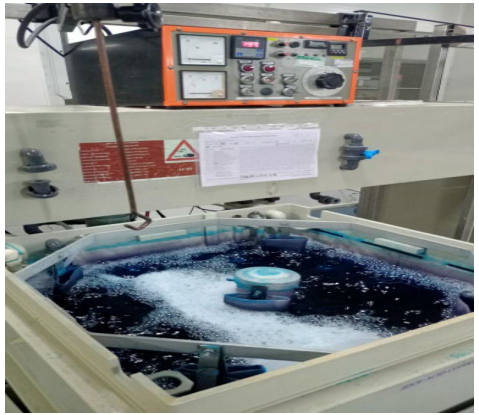
$$4H_2O + 4e^- \longrightarrow 4OH + 2H_2$$

3. Acid Dip

Acid dip neutralises alkaline nature of electro cleaned Mandrels and further activates the surface for good adhesion of gold or silver.

Pre Forming Process

- Pre-Forming process is important for metal mandrel to make the surface bright, level and smooth.
- Normal Pre Forming is done by Strike Bath.



Electroforming Process:

- A unique feature of the electroforming process is that the gold alloy grows over Mandrel atom by atom and this process imparts absolute accuracy and high aspect ratio.
- In Electroforming thickness ranges from 150 micron to 600 Micron.
- The solution or bath contains the required gold & alloy metal in the form of Salts.
- The process continues until the required thickness is achieved by maintaining optimum level of bath contents & operating parameters.
- Operating the bath is not easy but needs continuous maintenance while forming.
- Maintenance of chemical parameter is essential to control purity, rejections and surface quality.
- Of course EFM machine must be high level of accuracy with micro processor control.

Silver Electroforming

Gold Electroforming

Mandrel Removing or Emptying process :-

- Mandrel removing process is done by Two Steps

1. Using High precision Mechanical machines.
2. Chemical Treatment.

Types of Electroforming in Emerald

Gold

- 18Kt Gold Electroforming
  1. Yellow Gold Jewellery
  2. Pink Gold Jewellery
- 22Kt Gold Electroforming
  1. Yellow Gold Jewellery
- 24Kt Gold Electroforming
  1. Idols Forming 99.99
  2. Feather light Idol 99.90
  3. Jewellery 99.90 (New)
- 14kt Electroforming (New)
- 10kt Electroforming (New)

Silver

- We produce following products……..
  1. Idol
  2. Mural
  3. Garland
  4. Diya
  5. Gift Items
  6. Jewellery (New)
- Purity is always 99.90

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Gold Electroforming - Products

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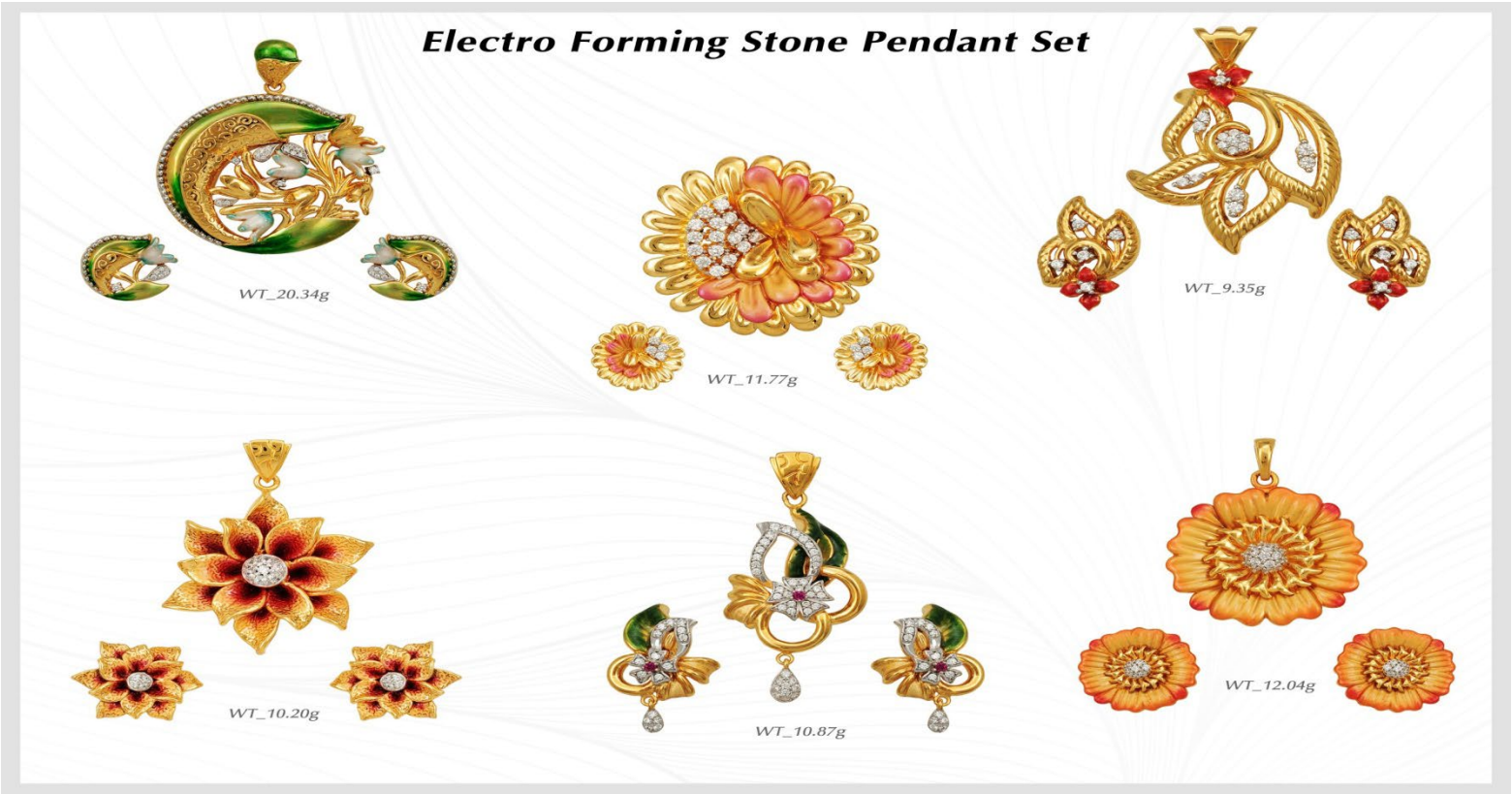
Electro Forming Stone Rings
WT_6.87g
WT_2.63g
WT_3.25g
WT_4.89g
WT_3.67g
WT_6.33g
WT_4.28g
WT_3.90g
WT_3.94g
WT_4.42g
WT_5.26g
WT_3.04g
WT_4.22g


Electro Forming Plain Rings
WT_2.65g
WT_3.52g
WT_3.08g
WT_2.81g
WT_4.35g
WT_4.03g
WT_2.75g
WT_5.72g
WT_7.76g
WT_3.94g
WT_3.07g
WT_4.97g
WT_3.63g


Electro Forming Plain Pendant Set
WT_7.93g
WT_9.18g
WT_11.21g
WT_8.23g
WT_8.95g
WT_14.26g


Electro Forming Stone Pendant Set
WT_20.34g
WT_11.77g
WT_9.35g
WT_10.20g
WT_10.87g
WT_12.04g


Electro Forming Stone Charms
WT_8.30g
WT_5.84g
WT_3.80g
WT_2.04g
WT_5.42g
WT_1.74g
WT_7.22g
WT_3.72g
WT_5.74g
WT_4.86g


Electro Forming Plain Charms
WT_4.76g
WT_3.47g
WT_3.77g
WT_4.39g
WT_3.23g
WT_6.59g
WT_2.82g
WT_5.28g
WT_3.94g
WT_4.14g


Electro Forming Stone Bangle
WT_20.62g
WT_12.64g
WT_24.58g
WT_23.26g
WT_16.80g
WT_46.34g
WT_40.00g
WT_11.04g


Electro Forming Plain Bangle
WT_17.68g
WT_29.85g
WT_14.48g
WT_23.89g
WT_13.72g
WT_34.62g
WT_7.89g
WT_12.78g


Electro Forming Stone Halfset
WT_5.78g
WT_19.40g
WT_8.02g
WT_19.43g
WT_5.63g
WT_17.51g


Electro Forming Stone Chainset
WT_23.90g
WT_7.00g
WT_16.40g
WT_4.80g
WT_14.90g
WT_4.10g


Electro Forming Plain Chainset
WT_16.50g
WT_12.63g
WT_14.02g
WT_11.00g
WT_8.07g
WT_9.40g


Electro Forming Plain Neck Chains
WT_26.77g
WT_17.32g
WT_14.91g

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Electro Forming Gold Idol

WT_28.85g

WT_14.25g

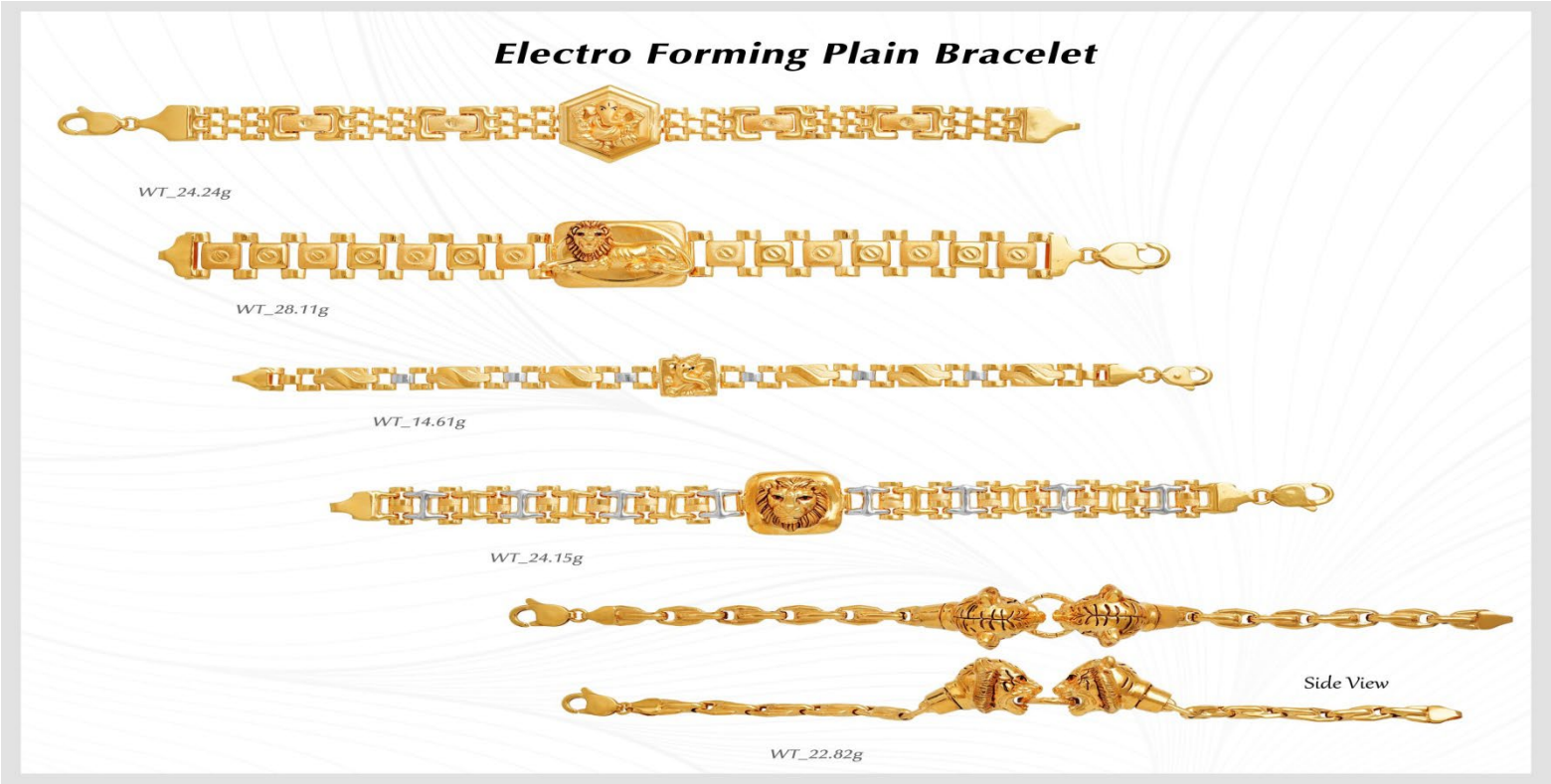
WT_37.90g

WT_23.29g

WT_49.23g

EMERALD

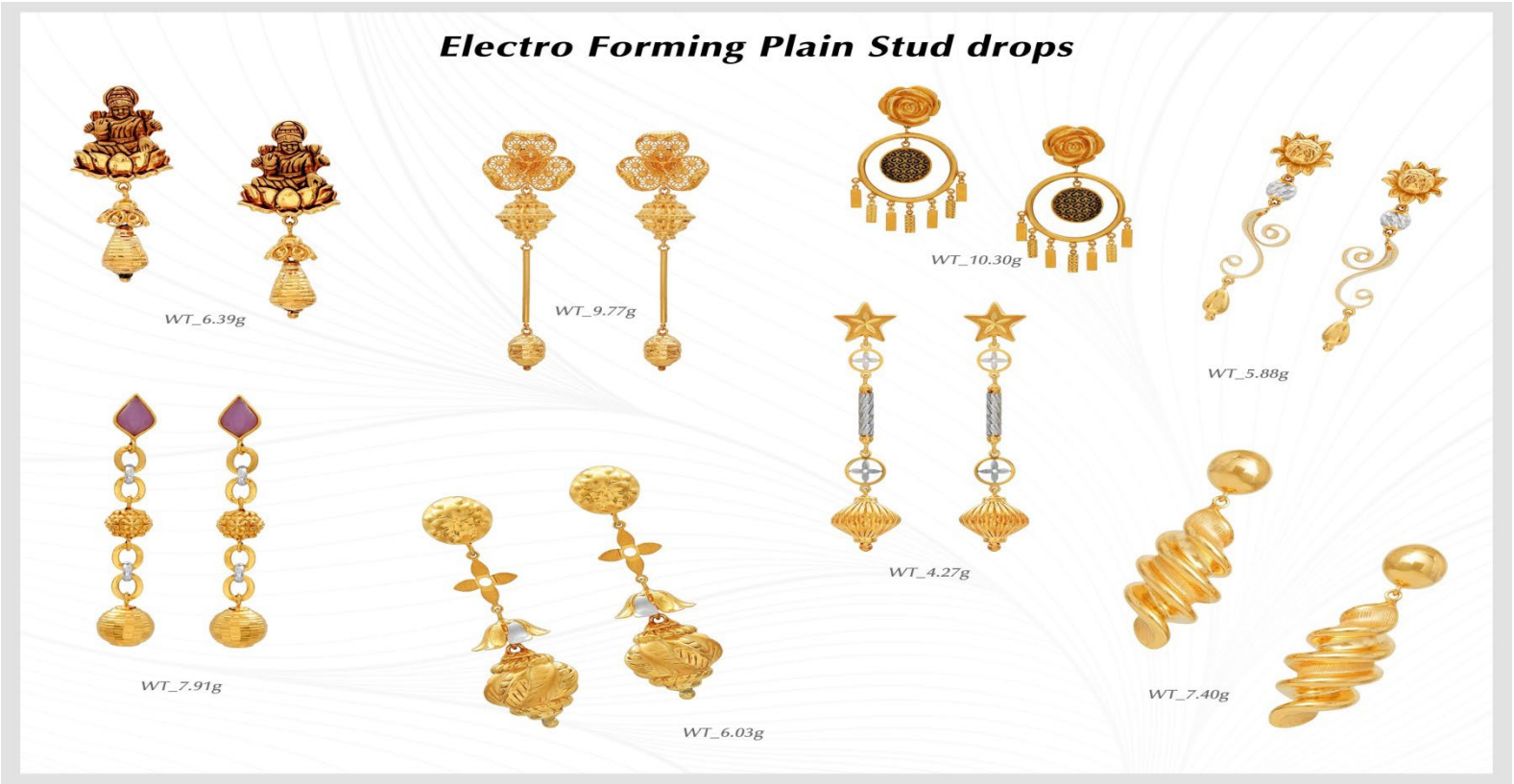

Electro Forming Stone Neck Chains
WT_41.57g
WT_26.09g
WT_31.69g


Electro Forming Plain Bracelet
WT_24.24g
WT_28.11g
WT_14.61g
WT_24.15g
Side View
WT_22.82g


Electro Forming Stone Bracelet
WT_20.52g
WT_27.21g
WT_33.05g
WT_25.15g
WT_23.80g
WT_29.33g
Side View


Electro Forming Plain Stud
WT_10.78g
Side View
WT_8.37g
Side view
WT_3.00g
WT_7.31g
WT_4.53g
Side view
Side View
WT_5.00g
WT_5.23g
WT_12.42g
Side View


Electro Forming Stone Stud
WT_4.36g
WT_3.74g
WT_6.01g
WT_4.28g
WT_4.57g
WT_4.92g
WT_5.07g
WT_3.06g


Electro Forming Plain Stud drops
WT_6.39g
WT_9.77g
WT_10.30g
WT_5.88g
WT_7.91g
WT_6.03g
WT_4.27g
WT_7.40g


Electro Forming Stone Stud drops
WT_6.18g
WT_6.76g
WT_10.75g
WT_14.10g
Side View
WT_11.58g
WT_10.13g
Side View
WT_2.42g

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Electro Forming Mugappu

EMERALD


Electro Forming Pink Gold
WT_4.22g
WT_7.26g
WT_3.00g
Side view
WT_5.82g
WT_4.14g
WT_3.81g
WT_5.27g
WT_16.05g
Side View
WT_5.49g
Side View
Side View
WT_6.62g

Gold Electroforming – Products – Pure Idols

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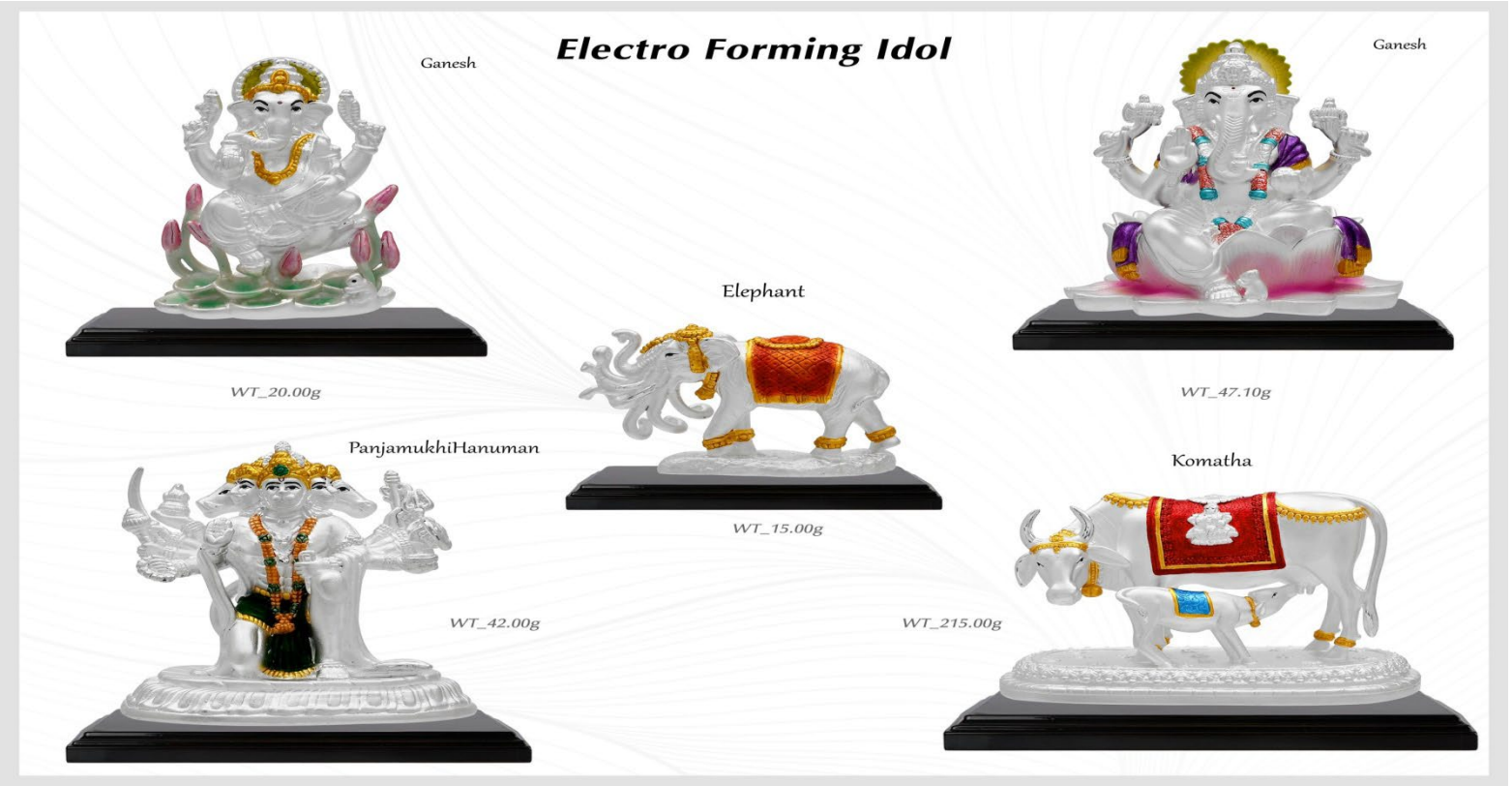
Electro Forming Feather Light Idol
WT_1.10g
WT_1.10g
WT_2.00g
WT_2.00g
WT_3.00g
WT_3.00g
WT_1.10g


Electro Forming Idol
Ganesh
WT_20.00g
Elephant
WT_15.00g
Ganesh
WT_47.10g
PanjamukhiHanuman
WT_42.00g
Komatha
WT_215.00g

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Electro Forming Mural

WT_510.00g

WT_65.00g

WT_30.00g

WT_21.00g

WT_11.00g

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Silver Electroforming – Products – Garland

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Silver Electroforming – Products – DIYA

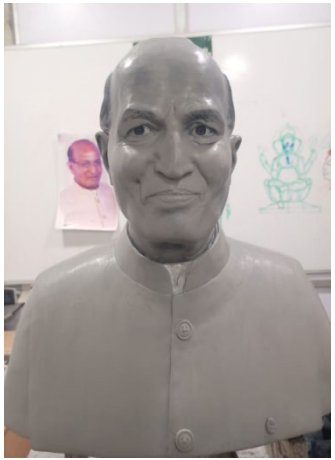
Silver Electroforming – Products – Gift Items

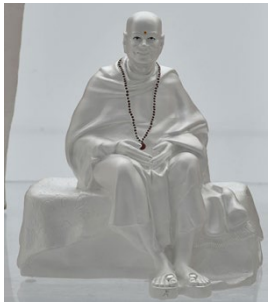
Benefits Of Electroforming Products

- We can able to produce jewellery/idols which are big in size and weighs low.
- Three dimensional(3D) complex shaped articles shall be made using this technology with high dimensional accuracy.
- Hard and durable jewellery product with 0.15 mm (150 micron) thickness.
- Out of our 15 years of nonstop experience we can produce any thickness with absolute accuracy.
- EFM products has high shine with good strength.

Customised Products in Electroforming

- We can able produce customised products in electroforming





- Weight Comparison of Silver Idols

- In Solid Idol Weight – 1170 gms
- In Electroforming idol Weight – 70 gms

- In Solid Idol Weight – 102 gms
- In Electroforming idol Weight – 10 gms

Weight Comparison of Gold Items

- In Casting weight – 17 gms
- In Electroforming weight – 6 gms

- In Casting weight – 4 gms
- In Electroforming weight – 1.5 gms

- In Casting weight – 16.5 gms
- In Electroforming weight – 6 gms

- In Casting weight – 7 gms
- In Electroforming weight – 2.5 gms

- In Casting weight – 4 gms
- In Electroforming weight – 1.5 gms

- In Casting weight – 17 gms
- In Electroforming weight – 8 gms

Challenges in Electroforming production

In gold electroforming majorly faced problems are……

1. Blister/Bubble issues.
2. Roughness/Nodular deposition.
3. Purity Control.
4. Dullness.
5. Soldering property.

We are overcoming all these problems for past 15 years and attain International Product Quality.

We are striving for continuous improvement & our journey of learning is still going on…….

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