What is a glass lubricant?

It is a suspension consisting of frits and other constituents that enable the part to be coated at ambient temperature and fuse to protect the part during preheating and forging operations.

Benefits of a glass lubricant

Insulation

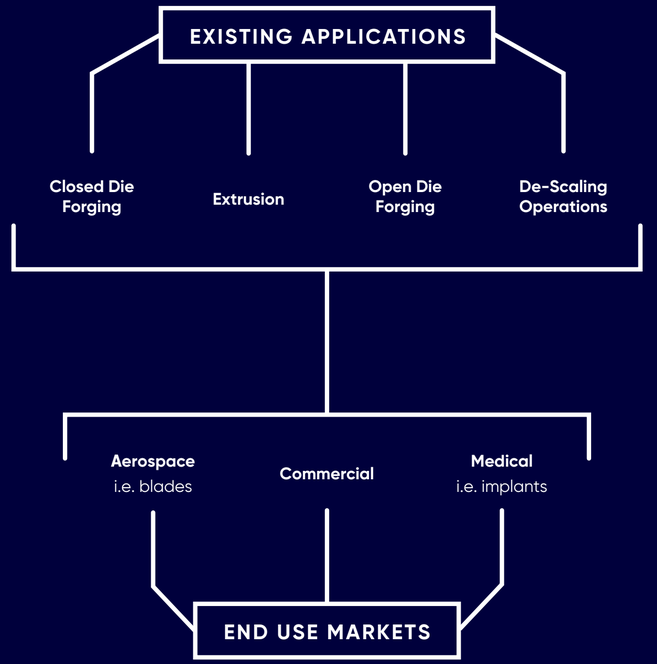
Heat Retention

Oxide Protection

Barrier Between Metal and Environment

Lubrication

A Layer Between Metal and Die to Reduce Friction and Improve Metal Flow



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Glass Lubricants for Metal Forming

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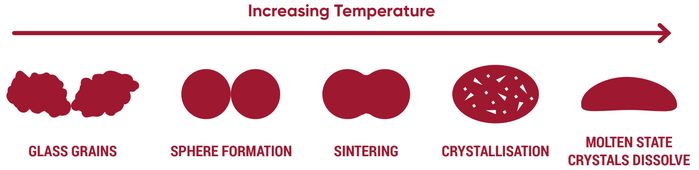
Economic Benefits of Glass Lubricant

- Glass lubrication can reduce the energy needed to form a part. The reduction in energy also translates to longer die life.
- Surface improvement – as the part deforms, so does the glass. By matching the flow of the glass to that of the metal the glass is capable of encapsulating the part through numerous hits.
- Longer heat retention can reduce/eliminate the need for reheating.
- Minimizing oxide layer growth.
- By providing a barrier between the work piece and the atmosphere the potential exists to eliminate expensive furnace conditions such as preheating in an inert or reducing atmosphere.
- For alloys where oxide growth occurs rapidly prior to glass fusing, the glass coating can enable easier removal of scale.

At What Temperature Does the Glass Fuse?

- Each product will fuse at slightly different temperatures. It is important to select the appropriate lubricant based on the parameters of each work piece.

Glass Transition During Heating



How Many Products are Available?

- Glass lubricants are engineered to meet the needs of the forger. Due to variances in preheat temperature, preform size, surface area, and deformation. It is possible to vary the recipe to highlight certain properties (such as insulation or lubrication).
- For a trial, multiple recipes are evaluated in order to gain a baseline understanding of the specific part and process. Once the initial data is captured an evaluation will take place in order to identify the best product.

How is Glass Lubricant Applied?

- Glass lube can be applied via dip, spray, flow coat or electrostatic spray. For best application, the part can be coated at any temperature below 212 F (100°C). The warmer the part the quicker the part will dry and allow for additional layers of coating if necessary.
- Following the application the part can be easily handled once the coating is dry. The adhesion/green strength of the coating to the part is strong and durable.
- The part will then go through the standard/existing preheat process as it normally would.

How Thick Should the Coating Be?

- This is dependent on a number of factors, but typical coating thickness ranges anywhere between 25-500 microns (mil 52-20).
- When looking to maximize the lubrication properties it is necessary to calculate the change in surface area from preform to final forging, this will determine the necessary amount of glass lube to retain full encapsulation throughout forging.

Why Glass?

- Easy removal
- Insulative
- Engineered formulations