

Aluject offers better extrusion lubrication

Lubrication in an extrusion process is necessary to improve the extrusion product quality, tooling life and productivity.

With Aluject (ALU-JECT), Castool has re-invented the extrusion release agent and lubricant to be less harmful than graphite to extrusion profiles, cost effective and benign to the environment. Surface blisters, random streak lines, and surface pitting are all associated to the type of lubricants used, and excess lubrication on the press and tooling. Most lubricants contain some volatile compounds that generate fumes or smoke when applied to a hot surface. Also, the burnt lubricant can get trapped at the boundary of the dead metal zone, causing subsurface defects and blisters. The sheared die surface is often contaminated by stray lubricant from the shear blade, and as a result the billet to billet weld or transverse weld is usually defective. Current lubrication system options comprise:

Grease or oil-based graphite suspensions

Graphite based lubricants require some organic compound to mix with the graphite particles. The added organic compound is flammable. It burns when it touches the hot surface of the tooling. The smoke and soot causes blister holes in the aluminium profiles. Graphite is also highly conductive, and it can create a short circuit for any electrical equipment nearby. Graphite suspensions are messy and need repeat application in every cycle. It can only be applied manually.

Boron nitride

The success of boron nitride powder is in having a similar material crystal structure to graphite that provides excellent lubrication. The Boron Nitride powder needs to be electrically charged to adhere to the billet surface. The powder needs to be very fine for a proper charge, however it is hard to confine the airborne Boron Nitride powder during spraying. The fine particles float in air to a distance. This is a safety concern because the airborne particles can be inhaled. The powder has to be stored in a dry area. Typically, boron nitride powder is mixed with a boric oxide binder, which will absorb moisture in the air. Only dry air or nitrogen can be used for spraying the powder.

Acetylene

The acetylene gas is burnt fuel rich to generate carbon black on the back end of the billet. This carbon black (soots) is deposited on the back end of the billet to act as a release agent. The fine carbon black is a well-known carcinogenic substance and health hazard. In addition, it can cause black marks to the profile surface that will interfere with anodising.



Aluject product range is available from Castool Tooling Systems.

Aluject lubrication system

The Aluject lubricant is made of a blend of sodium-based acids and salts which is water-soluble. The lubricant has very high wetting temperatures to adhere onto a hot surface. It contains no suspended graphite in the solution, therefore the risk of blisters in the extrusion profiles is very low.

The Aluject ultrasonic nozzle is engineered to provide finely atomised droplets onto a hot surface to overcome the Leidenfrost Effect. The finely atomised spraying nozzle is capable of applying over 80% of the lubricant onto the hot surface. The nozzle can deposit two times better boundary layer coverage to prevent

aluminium solder to the steel than a conventional nozzle.

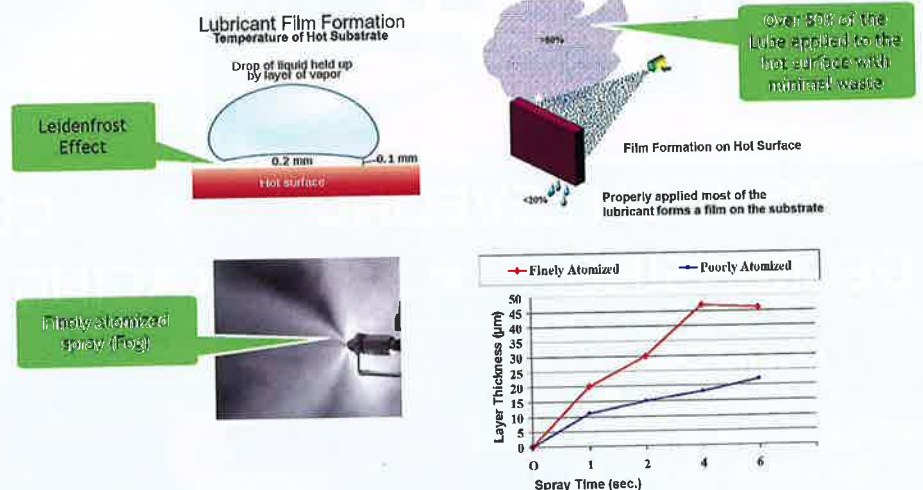
A feature of the nozzle unit, the linear actuator motion provides excellent flexibility to adapt to different billet lengths. The ultrasonic nozzle does a 270° rotation to have maximum coverage of lubricant. Also, the tapered spraying shroud creates a guide to align to billet surface and capture container overspray. Two additional clean out nozzles generate a burst of pressurised air and water to clean the spraying nozzle periodically. The clean air/water cycle ensures there is no clogging in the spraying nozzle.

Table 1 shows the typical consumption required for

Aluject to spray on various sizes of billets. The Aluject only needs a very thin film to provide a good barrier between billet and dummy block to prevent Al soldering. Properly sprayed Aluject lubricant will be in a thin film almost invisible to the naked eye on top of the billet. The photo shows Aluject properly sprayed on a billet to provide good lubrication.

Billet Size	Suggested Spray Volume (ml)
5 - 6"	3 - 4
7 - 8"	4 - 5
9 - 10"	5 - 6
11 - 12"	6 - 7

Castool Alu-ject Spray System; Atomization



Beneficial atomisation through operation of the Castool Alu-ject Spray System.