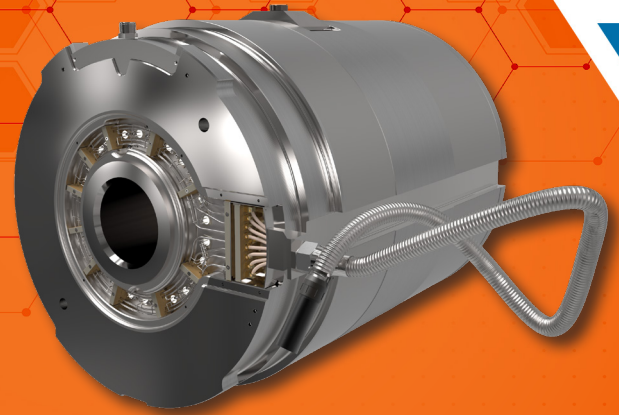


QUICK RESPONSE (QR) CONTAINER



PURPOSE

- ▶ Maintain liner 30 °C (50 °F) below billet temperature to reduce direct surface inflow onto the profile, reducing scrap from surface finish.
- ▶ Increase the billet/container differential towards the back end, and controlling shape, especially waving of wide thin extrusions.
- ▶ Reduce container and die slide effect on die temperature and resulting profile run-out, reducing scrap from shape deformation.
- ▶ Stabilize container and container housing temperatures which effect hot press alignment.
- ▶ Minimize energy usage and extend life of container mantle, liner and dummy block.

FUNCTION

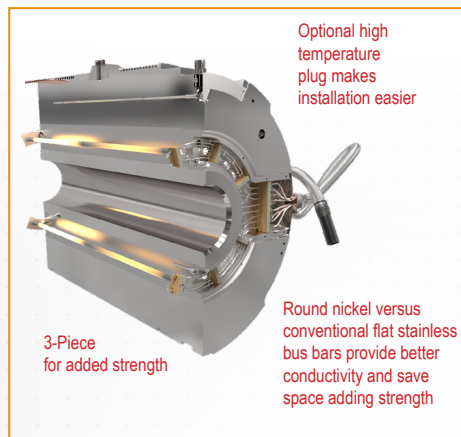
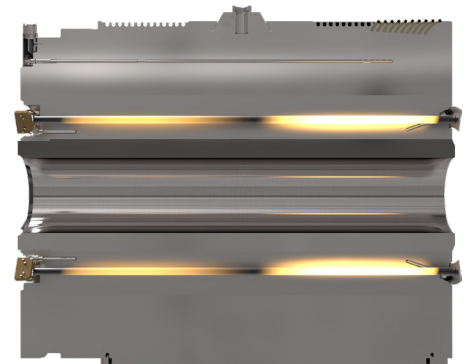
The container withstands extrusion pressure while billet is pushed through the extrusion die by the dummy block. The container maintains liner temperature at ± 5 °C of desired temperature throughout the process. When using taper heated billets intended for isothermal extrusion and higher productivity, the container liner temperatures can be set appropriately to enable best isothermal extrusion conditions.

The Quick Response (QR) Container reflects new knowledge of the extrusion process gained during its development, combined with the most basic laws of physics. Castool's QR Container consumes less energy, has a tougher mantle, better liner temperature control and better heat dissipation. Better profiles faster.

The logic of the design of this Castool temperature controlled container is unassailable.

QUICK RESPONSE

The heating elements and control thermocouples located close to the liner makes the outside of the mantle cooler than the liner, and the container housing even cooler. This maximizes support and mantle life. The built-in thermal gradient allows heat to dissipate from the liner without using auxiliary cooling or air, making it possible to maintain the liner 30°C (50°F) below the billet temperature



Optional high temperature plug makes installation easier

3-Piece for added strength

Round nickel versus conventional flat stainless bus bars provide better conductivity and save space adding strength

With a QR Container, the response to a demand for heat is therefore almost immediate. The liner is heated when and where necessary; and an improved liner temperature consistency is maintained, which is key to achieving product consistency both metallurgically and dimensionally. The QR Container reduces energy usage by over 50% from standard containers.

The container mantle is made of AISI 4340, which is 100% tougher, and has 80% better thermal conductivity than W.Nr 1.2344 (H-13) or 1.2343 (H-11) steel. This mantle is tougher and has better heat dissipation. The subliner is either 4340 or 1.2344 (H-13). The container liner is typically made of 1.2344 (H-13) which has high vanadium carbide and provides superior wear resistance or 1.2367 / E40K / Inconel 718 etc depending on the application. .

BENEFITS OF THE CASTOOL QR CONTAINERS

- Provides uniform flow of alloy through the die.
- Reduces cost of operation.
- Reduces scrap.
- Reduces downtime.
- Increases productivity.
- Makes isothermal extrusion attainable.
- Increases operating life

With The QR Container, Castool again sets a new standard of excellence in the extrusion industry.

Results may vary depending on individual press characteristics and setup.



CONTROL AND WARM-UP PANEL



ALUMINUM
EXTRUDERS
COUNCIL



QUALITY



SAFETY



ENVIRONMENT

✉ sales@castool.com

☎ +1.905.852.0121

New Equipment Spotlight...

New QR Container Provides Improved Thermal Stability

The container is a key element of the press, withstanding extrusion pressure while a billet is pushed through the extrusion die by the dummy block. Much research and development has been done over the last decade in order to better understand this system. The container works together with the billet, die, support tooling, profile exit, quench, and aging in order to ensure the smooth and efficient operation of the press line.

Temperature control is vitally important throughout the press operation. Because of the container's mass and its large contact area with the aluminum workpiece, it has a large effect on the die and profile exit temperature.

Standard containers with external heating elements (EH) have opposite thermal gradients during extrusion compared to when not extruding, which makes the liner temperature fluctuate. This makes optimizing the process difficult. On the other hand, containers with the heating elements in the center of the mantle (COM) tend to allow the container to become heat saturated, with the liner either approaching or exceeding the billet temperature.

Castool Tooling Systems, headquartered in Uxbridge, ON, Canada, developed Quick Response (QR) containers in which the heating elements are installed close to the liner (Figure 1) in order to promote a stable thermal gradient, allowing heat to dissipate as developed by the process. The mantle materials also have an effect on the rate of thermal dissipation. A comparison of the thermal maps for each type of container is shown in Figure 2.

Updated Container

Different aluminum alloys and profile shapes may require different container reactions during extrusion, depending on alloy chemistry and extru-

sion rates. Soft and medium alloys with very fast ram speeds can generate substantial heat, which require the container to dissipate increasing amounts of energy. Very hard alloys with very slow ram speeds, may re-

quire heat to be added to the process to prevent cooling the billet and a decrease in speed.

Castool has introduced a new QR container (Figure 3) that addresses these challenges in order to provide improved temperature control. The new container design includes tubular thermocouples, a saturation thermocouple, and mantle air cooling. It is also constructed from high grade materials (either H13 for the subliner and 4340 for the mantle or 4340 for both the subliner and mantle). As a result, the new container is able to offer low energy consumption, fast ram speeds, good recovery, minimal downtime, and a long operating lifespan.

The tubular thermocouples are inserted near the entrance of the subliner and located between the liner and heating elements. This enables measurement of the temperature approximately 4 inches from the container exit and entrance. All wiring connections are made at the entrance, leaving the exit side of the mantle intact. This makes it easy to change out the thermocouples and protects all the wiring at the entrance from damage (water, physical, etc.). In addition, the mantle is stronger and less likely to fail mechanically and electrically.

The saturation thermocouple is also inserted at the entrance side of the mantle and located between the elements and outside diameter of the mantle. The saturation thermocouple monitors the thermal gradient between the liner and mantle outer diameter, so that rates of heat dissipation can be adjusted to promote faster extrusion speeds.

In addition, Castool has started to use forced air cooling on the mantle surface to improve heat dissipation, enabling better management of the thermal gradient and enabling increased extrusion speeds. The company is also exploring other media for cooling, including water or oil, to promote even faster speeds. ■

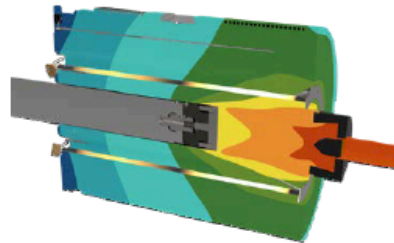


Figure 1. A QR container with saturation thermocouple showing the thermal map during extrusion.

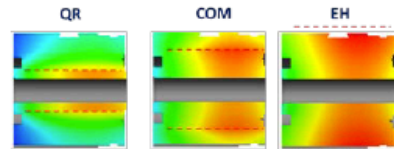


Figure 2. Thermal map of containers when idle (L-R): heating elements located close to liner, center of mantle, and external.



Figure 3. QR container with tubular and saturation thermocouples.

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LIGHT METAL AGE, OCTOBER 2020

"It is only when the conversion system, which includes the die, stem, dummy block and container is optimized that maximum productivity can be reached." Paul Robbins

