**Dynaprime: Alcoa high efficiency CFF filtering system**

A new efficient, compact, reliable, proven and qualified technology for can stock and other added-value products offered on the market. By Patrice Cote* and Francis Caron**

**Context**
The aluminium can stock demand for beverage and food packaging is increasing significantly due to the current trend in which plastic containers are being replaced by aluminium cans.

The typical filtration technology used for can stock production is Deep Bed Filter (DBF). This equipment is very large and requires large floor surface which is usually very limited in brownfield plants. DBF contains a large metal volume between casts requiring powerful heating systems and drainages to change alloy production.

High Grade CCF, such as 70 PPI, is an option for high-quality low-inclusion metal. However, priming such a filter in normal conditions with existing elevations in most brownfield cast houses is not possible or is not cost-effective as a project.

Alcoa was looking for a new, compact, simple and reliable solution for high grade CFF priming.

**Development of the DynaPrime**
The idea initiated by Alcoa was to use vibration during a short period when filling of the CFF box starts in order to prime the filter. Dynamic Concept, an innovative process equipment supplier for cast houses, was chosen for a co-development project. All steps of the development program went as planned and led to a successful industrial unit. From the first operating day of the industrial unit, the metal cleanliness performance was equal to or exceeded expectations. Following the success of the first units, additional units were installed in Alcoa plants. The technology is now IP protected in the US and other jurisdictions.

**Technology Description**
The priming technology uses specific vibrations on the cartridge applied in a controlled way to mimic the effect of a higher metal head generating accelerated gravity, thus enabling priming of the cartridge with a lower head. The technology is very reliable due to the simplicity of the vibration-inducing components.

Only a few seconds of vibration at the beginning of the box filling is required. No vibration is used during casting.

All other components of the system are like to a standard CFF box. It is available in single, double or triple configuration depending on the required capacity.

The technology package includes an automatic hot air preheating lid with accurate temperature control. Electrical and gas pre-heat lids are available. The forced air system preheats at the required temperature without overheating, allowing optimal and reliable filter cartridge gasket performance.

The retraction of the lid is mechanized with a speed controlled electrical actuator. The package also includes a PLC and an HMI to automate and optimized all sequences and make the system safe for the operators.

**Metallurgical Results and Qualification**
The DynaPrime technology has been in uninterrupted operation for over two years now. Many industrial units have been successfully installed and are currently operating. Multiple tests with PoDFA and LiMCA have been completed and qualification programs were completed with various customers during that period.

This filtration technology does deliver comparable results to DBF with the proper combination of filtration surface and CFF porosity.

Material made with the technology qualified successfully for beverage and food can body and can end stock along with other sensitive products.

**Features and Benefits**
DynaPrime technology has delivered the following performance and benefits in recent years:

- Proved capable for production of can stock and other inclusion-sensitive applications
- Demonstrated low operating and
maintenance cost compared to a Deep Bed Filter, those costs are 60% to 80% less and comparable to a standard CFF bowl and preheating system.

- Demonstrated high operation availability compared to a Deep Bed Filter, no lost operating time for alloy changes or DBF box relining. The DynaPrime pre-cast shape takes only a few minutes to replace.
- Proved fast and simple to retrofit in existing cast houses particularly if replacing an existing standard CFF. The DynaPrime footprint is small (10 m² for the DynaPrime compared to 112 m² for a DBF and ancillaries for same flow rate capacity) and requires low metal head (2-3 inches of metal head is enough).
- Demonstrated very high-priming reliability: over 99% of the time.
- Demonstrated complete use of the filtering surface area. The effective filtration area is smaller and concentrated in the middle when using a standard CFF without vibration. Thus, for the same grade and size, the DynaPrime capacity is higher (total metal volume and flow).
- Allows recovering of the metal and filter weight reduction by vibrating out entrapped molten Aluminium from cartridge at end of cast (after mold feeding is interrupted).
- Allows safe and completely automatic operating from preheating, temperature control, cast start until end of cast control activities.

Conclusion
The operational experience with the first units in recent years demonstrated that the DynaPrime is a robust, reliable and cost-effective solution, suitable for aluminium can stock and other value-added products.

Unit performance has exceeded the original expectations with proven benefits. It is a valuable option to can stock and other value-added aluminium ingots growing markets.

The technology is available for any primary or secondary aluminium producer worldwide. Dynamic Concept will adapt and manufacture the equipment to fit client requirements.

Contact
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Retrofit on existing casting line