

Proposal for:

A New Energy Efficient, Clean Way for Recovering Aluminum From Dross (Primary and Secondary Dross)

HT Continuous high temperature furnace with
guaranteed-life heating elements made of
nanostructured GAXP.

WHAT IS ALUMINIUM DROSS



- Aluminum dross is the mixture of metallic aluminum and non metal part mostly Aluminum oxide. Aluminum Fluoride and others may be present in secondary dross.
 - Dross is formed on the surface of molten Aluminum or its alloys by oxidation.
 - Dross is a valuable by product of any Aluminum Smelter or Aluminum Foundry.
 - Dross is recycled to recover the valuable Aluminum Metal world wide.
 - Typical dross generation from a primary operation can be from 0.8% to 1.3% of Aluminum output. **High Aluminum Content ~30%**
 - From the secondary smelters it can reach up to 10%. **Very Low Aluminum Content 5-8%**
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TYPES OF ALUMINIUM DROSS

- Two types powders that are called aluminum dross.
- White Dross (Primary Dross). Coarser, generally obtained from a primary smelter and contains fluoride, oxides and metal. This dross is reduced by improving fluid flow during primary smelting and also with using the cascade e-ion.
- Black Dross (Secondary Dross). Contains oxides and small amount of metal.
- The recoverable metal content varies from 5% to 50% depending of type of dross.



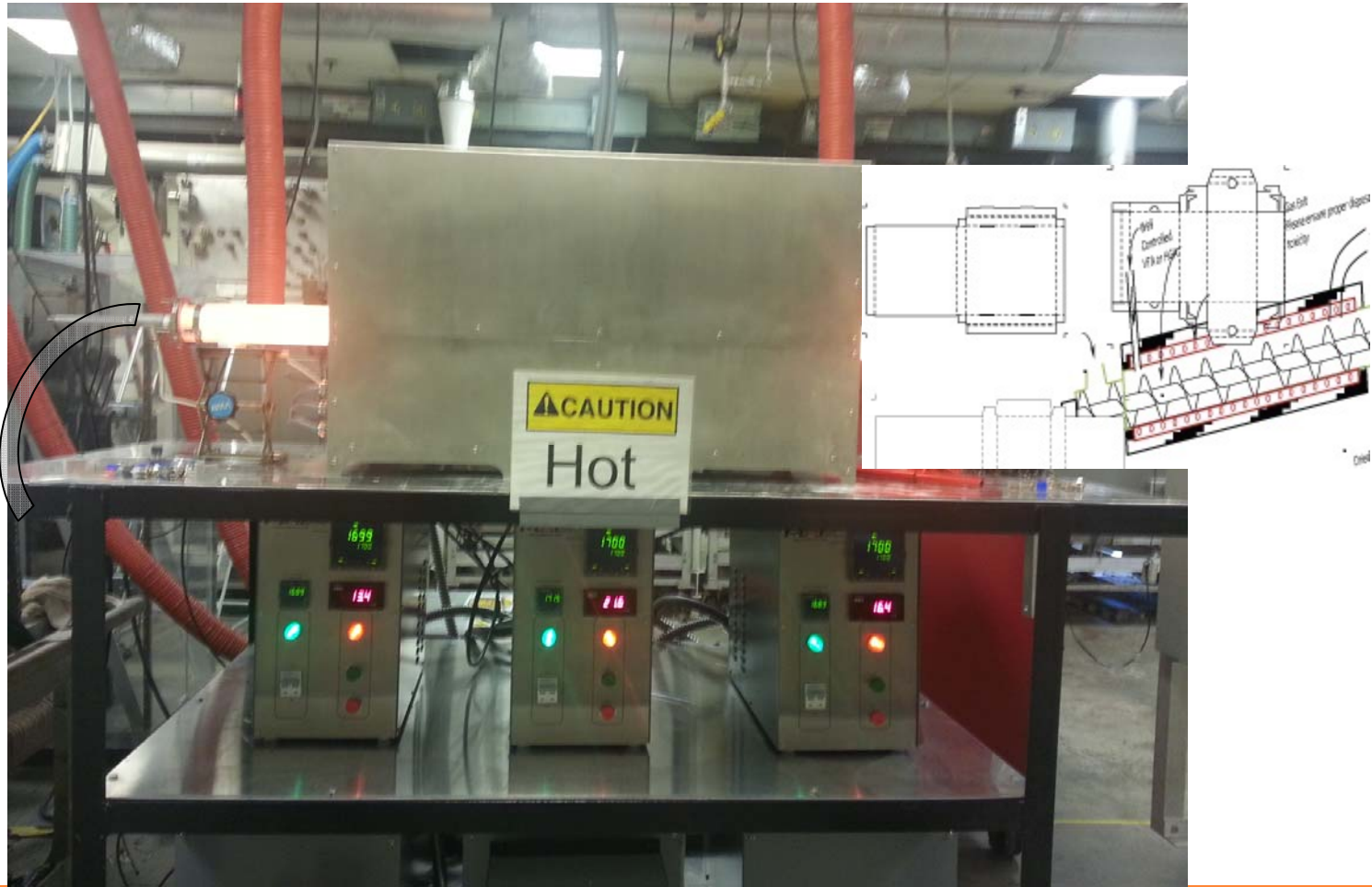
Sample A



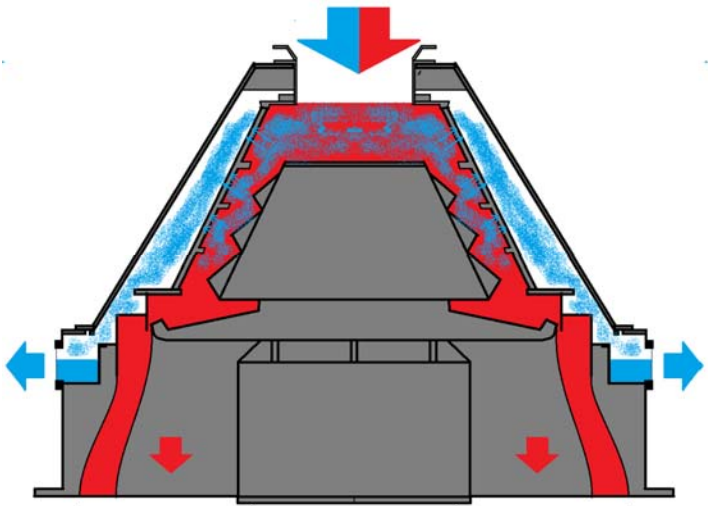
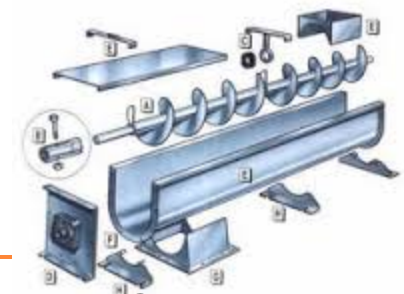
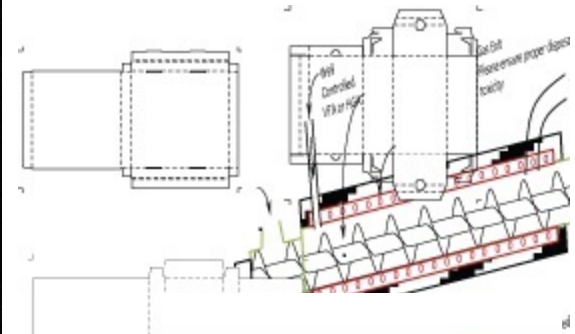
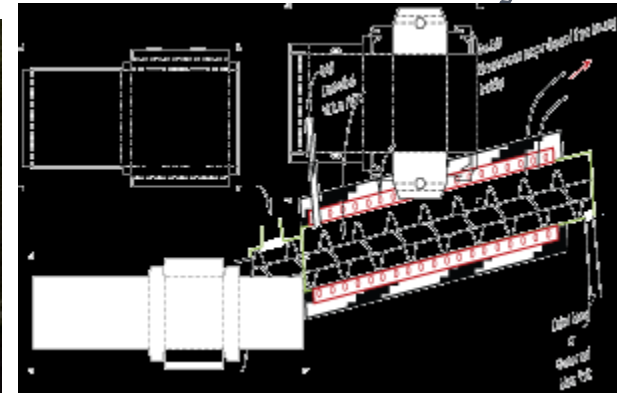
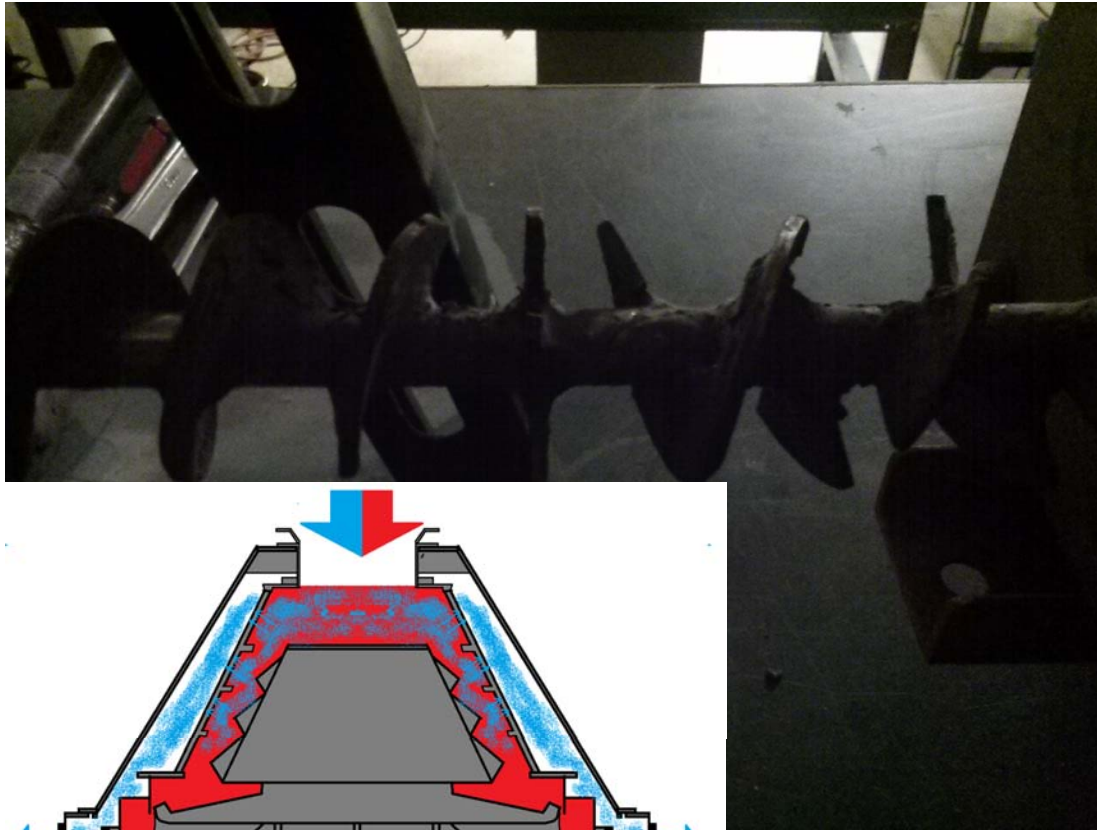
Sample B

ALUMINIUM DROSS PROCESSING

With the HT machine. Table Top Foot Print. See attached quote for dimensional details.



Screw Feeder. Nitride coated and oxidized. Good for 1450C. Functionally



The attached quotation only includes furnace, screw mechanism. Separation system not included. Will be discussed with client on case by case basis.

Helps Zero Waste and Clean Energy Concepts.



Shows how ball-up occurs at 1300C. Aluminum balls about 5 mm in Sample A (on left). About 1mm in Sample B (on right).

Without screw very little separation.



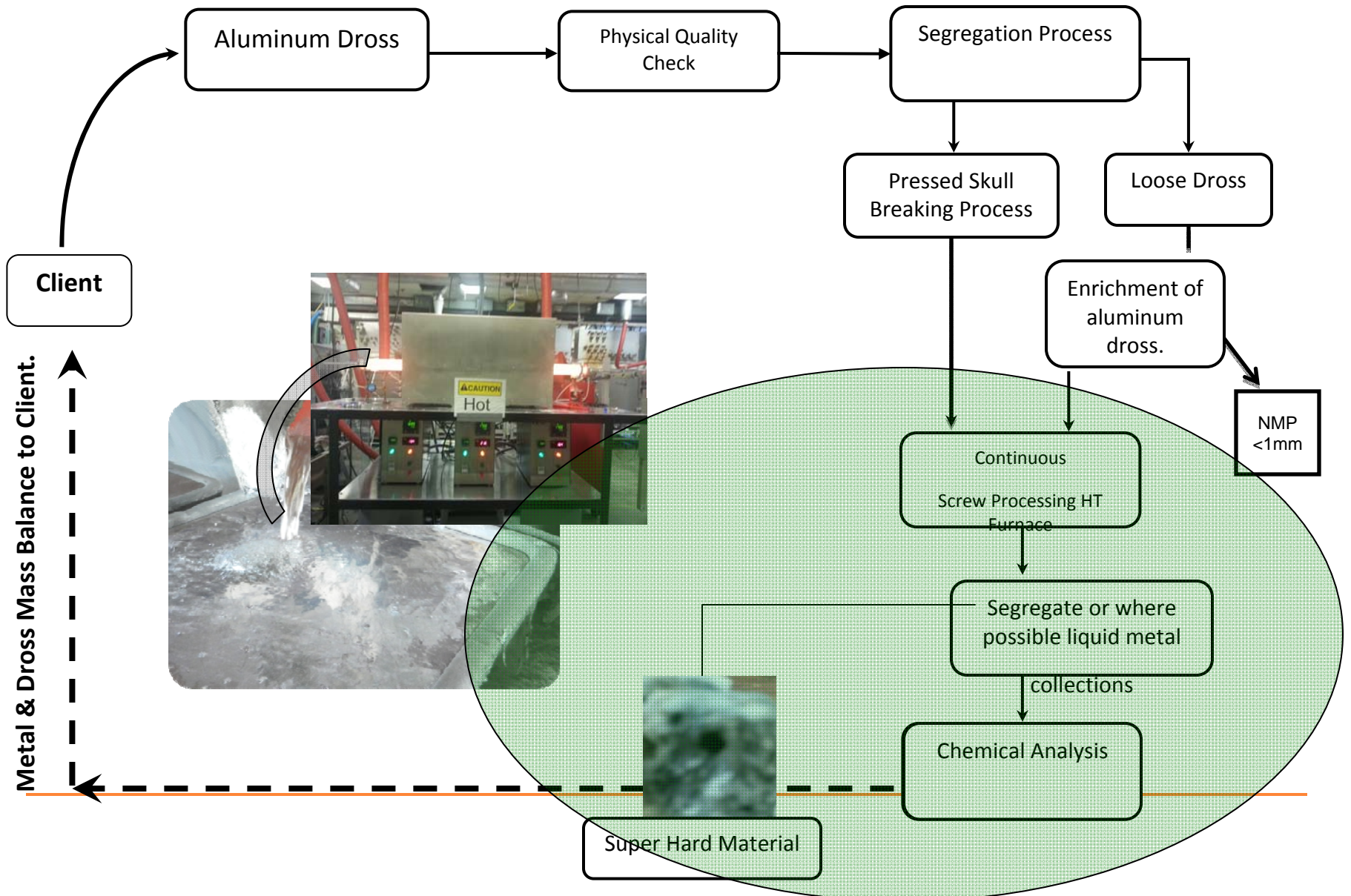
New material that forms in oxide part with addition of MgO.

Superhard material shown.


HT FURNACE PROCESSING for Zero Waste Approach (ONSITE AND OFFSITE)

- HT Furnace process is continuous screw driven with ingress screw. Machine shown is ~20kW with properly accounted residence time. Maximum recommended process is about 20 Kg of dross (from cold state) i.e. yield of ~ (3 – 7) kg per hour metal plus other materials. ROI expected is about 6 months to 1.5 Years.
 - Approximately US\$ 4-7/hr gain assuming 10 cents/KWh. More is possible if electricity is cheaper as in some countries. Labor and other costs not considered as rolled into 10 cents /hr.
 - Current Process of Thermite Method and/or Salts. Well proven, however, does not take full advantages of new clean electric know-how
 - Old process- Unstable. Relatively low metal recovery as some metal is used as fuel.
 - Old process- Dangerous salts to dispose especially where land fill seepage may occur.
 - Old process- Unstable process encourages Al Metal thermiting.
 - Old process- Specialized equipment requires maintainence.
 - Old process- Large Foot Print
 - Old process- Produces iron oxide as by product and uses iron resources.
 - Old process-Difficult to classify as zero waste or energy efficient as a lot of heat is generated.
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STEPS IN PROCESSING. Impact Oval shown shaded green.



CONCLUSION

- Dross is not a waste but a valuable by product of the smelter. The HT furnace concept is clean and low waste. Such new ideas will have quick to market impact and set leadership of good melting practices. 
 - Reporting mechanism and complete traceability of the dross by the processor is key a factor for smelter's peace of mind. The HT processes allows this as no new material addition or contamination.
 - Vision of the caster is key to adoption and encouraging such new technology. This is the vital factor in achieving private partnerships of the "Zero Waste Status".
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