



## Beneficial Use of Used Tundish Lining

<b>Member company Category</b>	<b>North American Stainless Investment in new processes and products in order to deliver a defined sustainability benefit</b>
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### The Challenge

Currently the leftover lining of tundish are being landfilled after the casting sequence has been completed. Over the past 5 years, North American Stainless has used an average of 101 tundishes per month. It is estimated that 90% of the working lining weight remains after each sequence, leading to an average of 182 MT of material being landfilled each month. The linings from the tundish consist of approximately 85% MgO, making it a good alternative source of MgO to use as a slag former in the EAFs. The reuse of this material would reduce our quantity of waste to the landfill and purchases of dolomitic lime.

### Why?

This challenge was made to determine if the recycling of tundish lining will reduce waste generation, raw material purchases, and overall CO<sub>2</sub> emissions.

### Needed Action

1. Tundish lining was sampled and analyzed to determine the true MgO content.
2. The quantity needed to be added to each heat was then calculated (1600 Kg/heat)
3. Material was collected and then bagged (22,800 Kg/bag)
4. Material was trialed on 11 austenitic grade heats (6 in EAF1, 5 in EAF2)

- (Slag samples were collected before, during and after these trials)
5. Visual and chemical analysis of collected slag was conducted
  6. Quality of slag composition was determined to be sufficient and should not have any negative downstream effects
  7. Determined a logistical solution to continue this process for the long term

### Action Review

**Specific;** NAS wanted to determine if used tundish lining can be reused to reduce waste, and raw material purchases.

**Measurable;** Samples of the tundish lining taken prior to and during the trial were used to determine the average MgO concentration of the tundish lining material. The MgO concentration was necessary to estimate the quantity of tundish lining material to be used for each heat. Slag samples were taken throughout the trial to determine if the trials were successful. Slag samples were visually inspected to verify that the slag appearance did not change and were analyzed to verify that the chemistry of the slag was not altered. The trial showed that there were no changes to the slag when using the tundish lining material.

**Achievable;** The used tundish lining is a powder when it is dumped from the tundish, therefore minimal processing is necessary for use in the heats. The tundish lining is cooled and then placed in supersacks. The tundish dump area can also be used as the bagging area and temporary storage/staging area until the bagged tundish lining is needed. A scale, and hopper are the only additional equipment needed to bag the material.

**Realistic;** To achieve our goal, the used tundish lining and slag were tested and analyzed. Once it was determined the trials were a success, a logistical solution was put in place to bag the material long term. The used tundish lining is usually



available, depending on the number of sequences produced each month and the need for cheaper, alternative MgO units is constant. A reduction of CO<sub>2</sub> emissions will be achieved with the reduction of purchased calcined dolomitic lime.

**Time-bound;** A bagging area is being created in the tundish dump area and should be completed by the end of February. Once this is complete the material will be bagged and loaded directly into the furnace. The contract is being negotiated with an onsite contractor to include the bagging of the used tundish material.

## Target Beneficiaries from the Action

The host company and community will benefit from this practice because NAS will be reducing the amount of material that is landfilled thus extending the lifespan of the landfill for the community to use. NAS and the employees will benefit by saving money by reducing the number of flux purchases. The total global carbon footprint will be reduced due to the material being calcined once and used twice.

## Horizontal Expansion Capability

Yes this concept could be used in other member companies where they have a furnace with MgO additions and similar tundish lining composition.

## Outcome

By recycling this material NAS would have been able to save approximately \$580,000 last year, assuming 182 MT of Tundish material is recycled each month. In addition by reusing the material, the reduction of CO<sub>2</sub> output would be reduced by at least 2900 MT per year due to the reduced need of calcined material purchases.