

# FOUNDRY SAND CASE STUDY

## IMPROVING THE NO-BAKE FOUNDRY CASTING PROCESS

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### Introduction

In the No-Bake foundry process, sand is blended with a small amount of expensive ingredients including a chemical binder and catalyst in a high speed mixer. The ingredients begin a chemical reaction process of hardening when discharged from the mixer to the mold or core box. An important step in this process is to maintain consistent temperature of the sand before it is blended with the ingredients. If the sand is too hot or too cold the amount of ingredients added has to be adjusted, which can create inconsistencies in the castings quality as well as wasting expensive raw materials.

A foundry sand customer in the USA understood the importance of this chemical reaction and, when expanding their production capacity, wanted to maintain each sand grain to within 2°F of 75°F. The sand temperature entering the process could be as low as 60°F or as high as 120°F. Another challenge was fitting the equipment into a space of less than eleven feet tall by three feet square while achieving a production rate of 8,000 pounds per hour. Fluidized bed technology was not preferred as it would have required much more overall space, extensive air handling equipment and ducting as well as requiring more utility consumption and maintenance.

### Description of Equipment (Solution)

Solex Thermal Science was awarded the project based on a modeled design using a standard plate bank style exchanger. To further guarantee the system performance, Solex also provided the closed loop heating/cooling water temperature control module or TCM. In the cold months when the sand is below 75°F, the TCM is reheating water in the closed loop and cooling the water when the sand is above 75°F.

### Solex Heat Exchanger Advantages (Benefit)

In a sand casting foundry it is critical to maintain the consistency of AFS-GFN (American Foundry Association Grain Fineness Number).

Great care goes into designing equipment to prevent and eliminate sand segregation. Sand is an abrasive product so there is always concern on its abrasiveness to process equipment. Solex technology offers this advantage since there is neither abrasion nor segregation occurring within the equipment.

The system maintains the highest obtainable efficiency using water indirectly as the heat transfer medium. Fluidized beds require blowers, ducting, and cleaning equipment.

The Solex heat exchanger has a compact design and footprint with easy access to heat exchange plates, with no moving parts or pinch points for safety.

### Return on Investment

- As a result of using Solex technology there are fewer castings rejected and there is less waste of expensive raw materials.

### Solex Background

Solex Thermal Science Inc. is a global developer and provider of high efficiency, indirect heat exchangers for bulk solids heating, cooling and drying. Solex has over 500 projects installed in more than 50 countries on a variety of applications including fertilizer, oilseeds, plastics, chemicals, industrial minerals, biosolids and food products. Solex's technologies are subject to patents and patent applications in various jurisdictions around the world. Solex is based in Calgary, Alberta, Canada and has offices in North America, South America, Europe, Russia and China.

Solex products provide lower power consumption, little to no emissions and zero product degradation. Unlike more traditional methods, air is not used as the heat transfer medium resulting in a more energy efficient process.