Plibrico's Integrated Response Brings Aluminum Melter Back Online Fast

Plibrico and its partners provided a swift response to an aluminum remelt furnace brought down by a catastrophic explosion. During one of the coldest winters on record, a remelt furnace was heavily damaged by a melt explosion due to a wet charge. Plibrico assembled a response team to clear away the roof and walls, engineer a full repair plan for replacement of the damaged lining, bringing the furnace back up for service in 17 days.

Background

During a month of extreme winter temperatures, a US aluminum remelt billet production facility was struck by a catastrophic explosion due to an accidental wet scrap charge into its stationary furnace. The 190,000# capacity melter erupted with approximately 18" of melt that fractured the refractories in the rear wall. The 12" refractory and steel roof structure was raised over 5". The charging machine was damaged. Fortunately, no injuries were incurred, due to the furnace's modern design that limited direct operator involvement and provided necessary protective housing. The preliminary downtime estimate was at 6 weeks, at an estimated production loss in excess of $225,000 per day.

Assessment

Within hours of the incident, our client's operations manager requested Plibrico's account manager to come to the site, counting on a strong, trusted working relationship to assess the damage and recommend a plan of action to bring the furnace back into operation. Plibrico had recently completed relining another furnace for the client, so we had an elevated baseline of knowledge that accelerated our response.

Before getting onsite, our first direction was to pump out the remaining melt from the furnace. From there, onsite inspection confirmed that the roof was decimated, the roof beams destroyed, the rear wall and side walls' lining integrity was questionable. The arctic-like weather added challenges to the repair, as all new componentry would have to be preheated for correct installation.

Solutions

Assemble The Team

There was an urgency to return the furnace to full heat as quickly as possible. Working closely with the client, we assembled our team, including a refractory demolition contractor to tear out the furnace; Plibrico's Oak Hill, OH manufacturing plant for emergency production of refractory; our local office construction craftsmen and supervision to repair the furnace; and a refractory dry out specialty firm to manage the furnace's controlled return to operating temperature. Throughout, scheduled tactical meetings were hosted every day to address known obstacles, unanticipated findings, and to report on progress against timelines.

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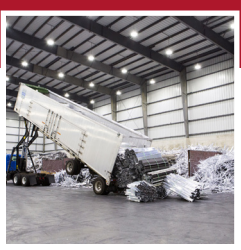

Refractory Demolition and Clean Out

Four days after the initial explosion the furnace was cooled sufficiently for clean out. Plibrico's partner in this process employed robotic equipment to tear out the refractory lining. Work on the structure led to the removal of the questionable rear wall. The casthouse floor was scraped and vacuumed, removing the last of the expelled aluminum and dross. Cleanup of the site was completed in 3 days.

Repairing the Furnace

Working against the clock, Plibrico executed a just-in-time delivery of materials from our refractory manufacturing facility as well as installation of the new components. New roof beams were put in place, and the walls were completed with the correct anchoring, insulation and shotcrete. In total, we installed 15,000 insulation bricks, with an array of 87,000 lbs of castables and shotcretes. Due to the frigid temperatures we assembled a holding area for preheating the materials to bring them up to a temperature suitable for application. In total, Plibrico and its team logged 881 man-hours and completed the repair in 7 days.

Re-Heating The Furnace

With the repair completed, forms were stripped off and the burners were cleaned and inspected. Plibrico's dry out partner immediately came onsite to execute the precise and regulated the start-up process. Their experience, and state of the art controllers were critical to getting the two-year-old furnace up to working temperature following Plibrico's heat up schedule precisely without destabilizing the newly applied refractory. The furnace was reheated to operating temperature in 3 days.

Results

Complete return to uptime was accomplished in 17 days from the date of the initial explosion. Our client was delighted that the total team—operations leadership, Plibrico and our partners—could fast- track the repair, cutting a full month out of the estimated outage schedule. The furnace is fully operational, producing an estimated 250,000 lbs of billet daily.

Plibrico Total Solution Approach

Using our Total Package Solution approach, we helped our client overcome an extraordinary event:

- Solution architecting and project management, to identify the key components of a tactical action plan that would achieve our client's goals quickly, effectively, and safely
- Engineering expertise to define key rebuild requirements, from clean out to dry-out
- In-house emergency manufacturing expertise to provide the strongest and most dependable refractory materials for relining the melter
- Construction leadership through our experienced Plibrico workforce, from robotic clean out and extraction to complete thermal dry out and online furnace production

Plibrico has built a thriving business over more than a century, based on trust, knowledge and experience, qualities that create close lasting relationships to deliver superior heat control solutions.

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