

The unforgettable journey: 'Freedom Beams' project continues



ArcelorMittal recently featured an update on the "Freedom Beams" project that was included in the company's Web TV series.

"Freedom Beams" is the full story behind the famous steel beams produced by ArcelorMittal for the construction of the new World Trade Center's Freedom Tower in New York City.

ArcelorMittal was selected to supply the steel beams used to construct the foundation of the new center that are produced at ArcelorMittal Differdange, Luxembourg. The Web TV episode follows the journey of the beams from ArcelorMittal Differdange, Luxembourg to Ground Zero in New York City. Differdange is the only steel mill in the world that can produce these beams. This episode shows the work that goes into creating these beams and introduces the masterminds behind them.

"The selection of the Differdange site to produce the sections of the Freedom tower is a fantastic achievement. This is the merit of all those people who, in the past and presently, built and run that plant," said Boris Donnay, head of metallurgy, ArcelorMittal, Luxembourg.

The development process for the beams takes place at ArcelorMittal's Metallurgy Department in Esch-sur-Alzette, Luxembourg, and then they are manufactured with recycled steel in Differdange. The jumbo steel columns form the foundation for the 1,776-foot Freedom Tower.

"Coming from Luxembourg, one of the smallest countries in the world, we are producing the biggest steel beams in the world. Everyone is very proud to be a part of this project for such an important building in America," said Bob Manet, process engineer, ArcelorMittal Esch-sur-Alzette.

The steel beams weigh 730 pounds per-foot and range in length from 30 to 56 feet for shipping. Nearly 50,000 tons will be needed to build the 102-story tower.

By summer 2008, steel will rise above street level for the first time. The tower will include 102 stories, the same height as the twin towers, topped by a spire once likened to the Statue of Liberty's torch. The Freedom Tower will be completed in 2012.

The ArcelorMittal Web TV series, now in its second season, can be viewed by visiting www.arcelormittal.tv



Manufacturing jumbo beams

According to Boris Donnay, head of metallurgy at ArcelorMittal Esch-sur-Alzette, the following are the necessary steps to manufacture the jumbo beams that are used to construct the famous Freedom Tower:

- Selection of the raw material: (the mix of scrap among the qualities available) that constitutes the base of the steel alloying
- Loading of the electric arc furnace with the scrap
- Melting process (Basic Oxygen Furnace): the scrap is heated at $\sim 1600^{\circ}\text{C}$ – the temperature at which the steel is in liquid form
- Ladle furnace–purification and alloying: at this stage the steel is purified by removal of some impurities which are detrimental for the material properties. Alloys are also added: some carefully selected chemical elements are necessary for the expected material quality.
- Continuous casting: the liquid steel is poured in an open-ended mould in which the solidification process is initiated. After completion of the solidification, the semi-finished products are cut to length for further processing. These semi-finished products are called beam blanks and have a “dogbone” shape.
- Hot rolling: the beam blanks are reheated to 1250°C and deformed in rolling stands to obtain the final shape of the jumbo beam. A precise thermal path is defined for the rolling and cooling of the jumbo beam – required for achieving the expected material quality.
- Testing: the product is controlled (dimensions, surface and internal soundness, chemical composition, mechanical properties, etc..) and compared with the requirements
- Shipment of the certificated material

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