Pioneering Process Improvement in **Iron & Steel**

Clyde Materials Handling

TRANSFORMING PROCESSES ► NO LIMITS ► INFINITE POSSIBILITIES

In 2006, world crude steel production reached 1.24 billion metric tons, which was an 8.8 per cent increase from 2005. Over the past ten years the most remarkable growth has been in the China and Asia region, where demand for the material has also been at its strongest. In 2006, the top three steel producing countries were China, Japan and the U.S.

Steel is created by essentially combining iron ore, coking coal, limestone and hot air in a process vessel, known as a blast furnace, to produce molten iron. This molten iron is periodically tapped to produce pig iron or can be directed to a basic oxygen furnace, which treats and converts the molten iron into molten steel. Molten steel is then transported to either slab or bloom continuous casting machines where a variety of finished products are created, which include bars, billets, plates and coils.

Clyde Materials Handling has, over the past three decades, developed a range of pneumatic conveying and injection solutions that have been deployed on various iron and steel making processes, such as a blast furnace, mini blast furnace, FINEX®, COREX® and HIsmelt®. These pneumatic conveying and injection technologies have been utilised to help producers reliably, accurately and efficiently handle the raw materials required to produce steel.

In 2002, the world steel industry established a policy on sustainable development. In order to provide the industry with a systematic way of measuring their progress in fulfilling their sustainable development commitment, 11 sustainability indicators were developed which would measure the industry's economic, environmental and social performance, which included reducing energy intensity, greenhouse gas emissions and generating material efficiency.

We, at Clyde Materials Handling, understand the importance of reducing energy per tonne of production, reducing carbon emissions, reducing non-renewable material consumption and re-using waste materials into process and are committed, as an organisation, to helping our customers in the iron & steel market create solutions that tackle these objectives.

Transforming Processes

Clyde Materials Handling is an established customer-driven solutions provider, which utilises its knowledge, expertise and technologies to transform the production processes of its customers who operate within the iron & steel industry.

Clyde Materials Handling has helped their global iron & steel customer base transform the way in which they operate their processes, which has enabled them to generate sustainable economic benefits and maintain their positions as leaders in their market.

Clyde Materials Handling's pneumatic conveying solutions have been able to transport various materials in an unrestricted, controlled and continuous manner at low velocity, consuming low volumes of compressed air.

Clyde's pneumatic injection solutions have been used to inject an array of materials such as iron ore, granular coal, pulverised coal, carbon, dust, charcoal, lime, plastics and recycled scraps into a range of ironmaking production processes. It is vitally important to the performance of a process that a consistent, stable and smooth feed of material is accomplished so that processes can be stabilised allowing superior levels of production returns to be attained.

Steel producers are striving to accomplish higher returns from incumbent equipment and to utilise the process to its highest level of production. To do this, many have found that exemplary injection accuracy and a stable, pulseless feed allows much higher material injection rates. Clyde is unique in

its ability to provide injection rates of over 150tph and an injection accuracy of ±0.5% on short time frames, which eliminate furnace surging and inefficiency.

All of Clyde Materials Handling's conveying and injection solutions are enhanced through the use of the Clyde Dome Valve, widely regarded as the best material handling valve in the world. The Clyde Dome Valve has the ability to cut through static or moving columns of material through the use of its innovative inflatable seal mechanism, ensuring that a consistent pressure tight seal is created when the valve is in the closed position, but in the open position, it provides an unrestricted full bore opening for the best product flow possible.

Clyde has developed pneumatic conveying and injection solutions for steel producers that have the ability to:

- Inject granular coal into a blast furnace – this injection solution was pioneered by Clyde with Corus over two decades ago
- Inject pulverised coal into a blast furnace
- Inject carbon and lime into Electric Arc Furnaces (EAF)
- Convey and inject metallurgical dusts into process
- Convey lime over long distances – we have conveyed this material over 1000 metres
- Convey and inject carbon used within mini blast furnaces, which produce pig iron
- Inject plastics and scrap materials used as alternative 'fuels' in the production of steel
- Injection of raw materials, such as iron ore, coal and lime, used in alternative iron making processes, such as HIsmelt®, COREX® and FINEX®

Clyde Materials Handling solutions are designed to use minimal energy, have low wear on system components and pipelines. Clyde's solutions offer reduced maintenance costs and high system availability, reliability and production stability compared to current processes used in the industry.

No Limits. Infinite Possibilities

By placing the customer at the heart of their business, Clyde Materials Handling has developed a global, extensive and diverse set of references, who have become lifetime customers. They continually seek Clyde's guidance in areas of process improvement and material handling.

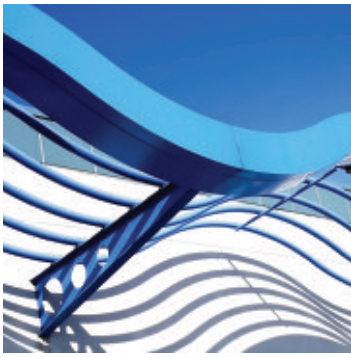
Clyde Materials Handling takes pride in the return on investment it has generated for its customers, which include:

- Significant increases in productivity
- Environmental sustainability
- High system availability, reliability and performance
- Low operating costs and maintenance
- Greater process control
- Cost savings through process efficiencies
- Flexibility to integrate with existing and emerging technologies

More specifically, Clyde Materials Handling has generated the following, typical returns for organisations who operate in the iron & steel market:

- 99% system availability levels achieved
- High total injection accuracy – better than 1%, which has resulted in hundreds of tonnes of raw material saved in the production process
- High tuyere-to-tuyere accuracy – better than ±0.5%
- Superior flow control and measurement
- Reductions in power consumption, leading to subsequent savings in energy costs
- Significantly increased production rates
- Capability to handle a wide range of materials, without blocking the conveying line
- Improved control of slag FeO levels on an EAF
- Reductions in tap-to-tap time

Clyde Materials Handling is driven by an energy and passion which enables them to make the impossible happen – there are no limits to their capabilities. Together, with their customers, the possibilities are infinite.



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