product
expert series

MOVING STEEL

BY BILL GALLANT

Material handling and its role in structural steel fabrication.

THE CHALLENGE to become more efficient has become a major priority for many steel fabricators over the last several years, leading them to take a closer look at all of their shop processes.

Material handling is an especially important area of focus in terms of improving efficiency, as it represents a significant portion of the fabrication operation. The way product moves though the production facility has a large effect on the bottom line. Machines can only process material as quickly as it is moved to and from them—plus, material transport and handling has to take place at every stop in the operation, so there are plenty of opportunities for improvement.

Technology Takes Over

Technology has played a large role in improving material handling, from the physical transit of steel from one process to the next to the actual fabrication machinery itself. In the past, material was brought to each machine by lift truck, bridge crane or another semi-manual device. Individual parts were processed one at a time, put into a stack and moved to the next machine or area for processing. This practice would then go on repeatedly throughout the production facility, leading to a relatively large amount of labor time devoted to stacking, unstacking and moving material.

But over the past fifteen years, modernized equipment has really made strides to ensure that steel components can be handled more efficiently than ever. For example, a stock length of plate or angle can now be loaded into the machinery, and the appropriate CNC information can be downloaded or programmed from systems such as SDS/2 or Tekla, or programmed manually. Then, the machines will process the parts, which could include punching, drilling, milling and cutting to size, shape and piece marking, all with minimum operator input. The operator is then free to load the next piece of stock material while the machine is processing parts and dropping them into appropriate bins for future relocation. With this type of system, in some cases, material handling time has been cut by 60%. In addition, there are now multiple fabrication machines available that are able to perform more than one process, further reducing the distance that the average steel component needs to travel through the shop.

Bill Gallant (left), the production manager for Novel Iron Works (an AISC Member/AISC Certified Fabricator and Erector in Greenland, N.H.), along with **Josh Rosenthal**, Novel's production coordinator, who assisted with this article and, as Gallant puts it, "represents the future ownership of Novel." You can reach Bill at **wgallant@novel-iron.com**.

In Transit

That said, steel still needs to be moved from place to place, and the roller conveyors and cross transfers available today have taken material handling to the next level, incorporating measuring systems that work as pieces move through them, in place of the traditional tape measure and chalk method. These integrated systems use programmable controllers that allow for fewer workers to move as much if not more material than was previously possible. Another benefit of these newer programmable controllers and integrated systems is that workers are now separated from material, making for a much safer work environment with fewer injuries to personnel. In addition, overhead cranes, which are now commonplace, allow for large structural pieces and subparts to be moved easily within a shop at heights where there is less risk to shop personnel.

Material Storage

More intelligent sorting and storage of materials can be just as important to shop efficiency as the machinery itself. Conveyers and transfers, when paired with a multi-bay setup, allow for material to be stockpiled by size, shape or job. This allows shop management and machine operators to better coordinate one or multiple projects into the fabrication area.

Better sorting of materials is also important once they reach the fabrication area, in terms of "staging" materials for a specific process. One example involves a fabricator that set up its saw stations to use cross transfer tables and skids. The cross transfer tables consist of a series of bays that use hydraulic pushers and conveyers to select the desired pieces. This system is controlled by the drill and saw operators via a PLC (programmable logic controller) located at their given stations. These tables allow for a backlog of material to be stored near certain machinery until it is ready to be processed. Once the cross transfer tables are loaded, the saws are able to operate uninterrupted, since the material is right there. In this scenario, material handling combined integrated measuring and cutting systems, along with production management software, to allow material to flow quickly through the fabrication process with very little operator input.

▲ The view, from the drill operator's platform, of Novel Iron Works' main production area and a portion of the of the material handling system that services the area.

▼ A battery-powered, remotely controlled cart used to transfer material from one crane bay to another.

The Future

Automation is also contributing to more efficient material handling. As more and more companies incorporate robots and conveyors into their shops, overall material handling time will decrease, as will shop injuries. But regardless of how fast automated machines can operate, they can only work as fast as the material is delivered to them. Robotics mixed with integrated measuring systems, better sorting and storage practices, more efficient machinery that can perform multiple tasks and systems that can measure steel while moving it will result in a truly streamlined process. While it may not be possible to incorporate all of these practices and machinery at once, it is important to understand that there is more than one piece to the puzzle and that each tactic brings its own opportunities.

Structural steel fabrication has always been very labor-intensive, especially since each project is different from the next. However, modern technology and practices have brought structural steel fabrication up to speed with more repeatable manufacturing processes by reducing material handling time and lowering costs. As far as automation is concerned, it should be viewed as a supplement to a shop's workflow. Rather than replacing valuable employees, fabricators should use technology to broaden their work spectrum and improve on their current system. As these practices continue, steel fabricators will be better able to maintain their competitive edge in the construction market. MSC