In the Shop

EDITED BY GEOFF WEISENBERGER
PHOTOS BY JESSICA SLADEK PHOTOGRAPHY

Manufacturers of fabrication equipment large and small share their thoughts on the fabrication industry and the machinery they're providing to it.

How has the fabrication shop changed in recent years?

Menke: One major change in recent times has been the focus on material handling and shop layout. A fabricator can save incredible amounts of time if they take a closer look at how material flows through their shop. On average a fabricator loses 15 minutes when he handles material with a crane. A fabricator that can minimize the amount of time used to physically handle material will stay competitive now and for years to come.

Additionally, fabricators become more competitive and have the capability to react more quickly to "fast-track" jobs when using BIM detailing software, which seamlessly integrates with shop floor machine tools via a DSTV interface package.

In addition to that, CNC machinery has become a much stronger element in the common shop. Over the years we have seen the overall physical size of structural shops shrink, but the amount of automation, and fabricated tonnage, dramatically increase.

Walsh: Recent developments in structural steel fabrication shops include the increased use of computerized plasma cutting systems. One of the traditional knocks against the use of plasma machines has been the severe bevel created on the edge of the cut part, especially on thicker metal. However, today's high-density plasma power supplies have solved this problem. These systems can accurately pierce and production cut at high speeds with less than 2% bevel.

Morrall: There have been many recent developments, but as far as the fabrication shop itself, it has been the introduction of fully automated systems that can run practically unmanned. Some equipment can now be left to run without the intervention of a machine operator, reducing labor and material

Participants

Ficep Corporation	www.ficepcorp.com	Tom Boyer, President
Hougen Manufacturing, Inc.	www.hougen.com	James Kaiser, Sales Manager
Ocean Machinery	www.oceanmachinery.com	Danny Steyn, Vice President
Peddinghaus Corporation	www.peddinghaus.com	Lyle Menke, Vice President of Marketing
Plasma Automation, Inc.	www.plasma-automation.com	Timothy E. Walsh, President
Voortman USA Corporation	www.voortmancorp.com	Adrian Morrall, President

handling costs. Such equipment will automatically load itself and sort, by contract, the parts produced. We have such a machine in our own fabrication shop that runs up to eight hours a day after normal working hours and will text you on your cell phone should a problem occur. You can even restart the system with a text message back to the control.

Boyer: For years, the machine tool industry has been concentrated on the fabrication of structural steel and plate; it's been fixated on process speed to the point that the amount of time it takes to drill and saw a structural member has never been faster, as the latest in spindle and tooling technology now permits drilling at speeds up to 50 in. per minute. This ability to process structural steel at rates that seemed impossible 5-10 years ago has exposed other challenges that were not apparent previously. Today, a progressive fabricator needs to focus their attention more towards integrated solutions, as the ability to drill and saw structural steel sections efficiently is a given in most cases.

Traditionally, the most expensive operation that a fabricator faces is the one of manual layout. CNC drill lines have always offered the ability to produce layout marks to facilitate manual layout, but it was necessary for a CNC programmer to enter these layout commands and determine the proper location. The laborious nature of this process, when compared to the ability to download the cut length and hole location data automatically with a DSTV interface, meant that the ability to use a CNC drill to generate layout marks was generally not utilized to its fullest extent.

Kaiser: Like virtually every aspect of industry and manufacturing today, fabricating and fabrication shops have had to adapt their fields of expertise and disciplines to become more quality conscious. Gone are the days of doing layouts with pieces of chalk, grease pencils, and rulers on steel plates; CMMs and laser measuring have found equal opportunity in the fabrication atmosphere. With this need for quality has come a need for suppliers of manufacturing equipment to enhance the precision and accuracy of their machines.

Steyn: Going back to our first ventures into CNC automation in 2001, our original feelings were that we would anticipate around 10% of the small to medium fabricators adopting some form of CNC fabrication. Today, the picture is significantly clearer. Except for the smallest of shops, 100% of all fabricators will have to make the transition to CNC fabrication in order to remain in business, just in the same way we had to embrace the fax, cell phone, internet, and email, despite how much we might have resisted at the beginning.

What have been the most significant challenges to the fabrication industry in recent years?

Morrall: Challenges have been many. Finding good reliable labor is [certainly] an issue. This lack of individuals coming into fabrication has driven the fabricators to invest in CNC equipment, and in the last four years we have seen investment like we have never seen before. This has been worldwide. Fabricators are always trying to find a way to reduce material handling and labor. Voortman, with its unmanned systems, is the only company that at this time has achieved that goal.

Menke: The structural steel industry, as well as many other manufacturing industries, must adapt to this era of changing skilled labor availability. There have been many articles written on this subject, but the fact is that the number of individuals who understand and appreciate the opportunities that our industry offers them is shrinking. This is a major influence on the manufacturing world that is forcing many fabricators to rethink the way they run their operations. As always with change, some will adapt and some will not; however, you will never replace the human element.

People are smarter than machines. A well-trained CNC operator is the industry's strongest tool, and working with a machine tool manufacturer that can offer high levels of training and service is crucial to the success of that shop. Peddinghaus currently has 60-plus field service technicians and 20-plus in-house phone service technicians, and offers a thorough training curriculum for customers of all sizes.

Boyer: Over my years in the business, the trend of skilled labor shortage is the one that never changes. In bad times you may be able to hire a more energized workforce, but the skills required, such as manual layout, more often than not have to be developed within the organization. When times are good, the guy that you have invested significantly in training over the past years may end up leaving you for just a few [more] bucks a week.

Certainly, we have to identify steel prices as the most significant challenge in recent years. The price increases we have experienced recently go hand-in-hand with the unprecedented transfer of wealth from this country to the oil-producing countries of the world and the corresponding decline of the dollar.

This trade imbalance would be one thing if it represented capital goods that added productivity to our economy—in a 10-20 year life cycle—but in this case it literally goes up in smoke in just a few days, only to be faced with the requirement to do it again! As our dollar declines we have to pay more for the portion of steel that we historically imported, and in addition we now have to compete with foreign fabricators to purchase steel, as our domestic steel producers can realize higher prices due to export opportunities that are subsidized by the weak dollar.

I believe that enough has been written about this national energy challenge in the recent months, and as we proceed

further, hopefully our politicians will finally establish an energy policy that we can all live with, and the value of the dollar will then rise so that steel prices can decline to make steel construction, once again, more competitive.

Steyn: For the most part, small fabricating shops are either swamped with work or don't have enough, and their owners are always too busy with the day-to-day pressures of satisfying customers, chasing up orders, dealing with uncooperative vendors and employees, and the never-ending administration of running a business that they have built painstakingly from scratch. They seldom have the time to give much thought to how they can be making incremental productivity improvements in their operations. And so for most fabricators, productivity is often a misunderstood term.

But unless the fabricator gets out from under this cycle and starts looking at productivity, there will be a lot of hard work, sweat, and grind and very little profit at the end of the day.

And to complicate matters, here in the U.S. we have always had an "on-off" approach to labor. When we are swamped with work we crew up, and when we are short of work we crew down.

This approach has had long-term negative effects on our understanding of how to make productivity improvements. In other countries where employees are typically very difficult to terminate, owners take a long hard look at all possible options prior to hiring a new employee who might have to be there for the next 20 years! Two of the most commonly considered tactics are outsourcing work or investing in machinery to do the work, as the machine can be paid off in a few years and it will continue to work for free for many more years, while the new employee will require a salary for as long as they are at the company.

What are some solutions to these challenges and/or what are some of your company's latest offerings?

Steyn: Today there are fortunately many affordable solutions on the market and all of them embrace some form of automation, essentially CNC fabrication. In the realm of beam fabrication, the proven solution for the small to medium fabricator is the single-spindle beam line. It is this machine that has transformed fabrication for steel fabricators that would never otherwise be able to afford larger and more expensive multi-spindle beam lines.

And the flexibility of the single-spindle drill to process the entire spectrum of profiles—including angles, base plates, channels, stair stringers, etc.—has made it very attractive to even the smallest of fabricators who do miscellaneous metals and just a hint of structural steel. Moreover, the ability to tackle the heaviest jumbo columns, as well as large-tonnage projects, has allowed the steel fabricator to cast the net to a far wider range of jobs than he had traditionally gone after, and because of this we have seen many small fabricators with exceptional tonnage and revenue figures per employee.

Furthermore, with the advent of the 3D detailing software that has become so prevalent and more affordable, the ability to import data from the detail drawings directly to the CNC machine, essentially eliminating the unnecessary costly and potentially inaccurate step of laying out the steel, has made additional improvements in productivity, speed, and accuracy.

Walsh: Plasma Automation, Inc. has introduced the Vicon Monarch heavy-duty precision plasma cutting system with I-beam construction. The machine was engineered to provide total cutting versatility for structural steel shops. Its capabilities include cutting, via plasma and/or oxyfuel, sheet metal to 4-in.-thick plate, I-beams, angle iron, channel, and fixturing, as well as square and rectangular tubing.

Morrall: The introduction of DSTV ++ in September will now allow real-time feedback to an ERP/MRP system from the fabrication equipment. Voortman has opened its database, and as we use a PC-based control system, this allows the end user to select certain information from the equipment, such as cycle time (to compare to estimates made during the bidding process), tracking information to locate piece parts during fabrication, number of saw cuts made, number of holes drilled, and material used to update inventory.

We also have the first true robotic structural burning/cutting system for coping all structural shapes. The Voortman V806 uses a Panasonic industrial robot integrated with the roller-feed measuring system.

Also, our marking system can obtain layout information from the CAD software and print the part location and part number on the material.

In addition, our high-speed drilling system with carbide tooling employs spindle speeds up to 2,500 rpm and can produce up to three times more than hydraulically fed systems.

Menke: Some of the Peddinghaus' latest offerings include:

- The high-speed FDB-2500 plate-processing system, which includes a rotary tool changer that travels with the spindle throughout its full range of motion and provides drilling, tapping, countersinking, part marking, layout marking, and thermal cutting (both oxyfuel and plasma) all in one machine.

• The BDL-1250/D three-axis, high-speed carbide drilling with a 1,800-rpm motor.

• The Ring of Fire, which features 400 degrees of plasma cutting motion and is the only plasma machine with this range of motion that comes complete with a dust and particulate collection system.

Boyer: Today, CAD systems permit the ability to download in a seamless fashion from their 3D model to a Ficep interface that not only generates the hole and cut length data, but also generates the data to scribe the main section to facilitate the fitting operation on all four surfaces by indicating layout location; part number of the detail element that is to be welded at this location; and orientation mark on the detail member and the main member to show the orientation for fitting.

The data that flows from this Ficep interface with Tekla to generate the CNC program for the detail lines, such as an angle line or plate fabrication system, also includes the program to scribe the part number on the detail part and orientation mark to match up with the main member.

Even the material-handling systems that we offer today can be fully automated so the stock length material will automatically transfer into the drill/saw entry conveyor, load the program and start the CNC process, remove trim cuts, and convey finished parts to the storage table. All this is now done today without an operator to start each process correctly and without delay.

Kaiser: One recent advancement by Hougen Manufacturing has resulted in providing improved productivity and accuracy for drilling holes in awkward positions, including horizontal or upside-down. The Hougen model HMD904S portable magnetic drill features a swivel base that allows users to first engage its magnet to secure the drill in place in awkward locations, then to pivot and move the cutter point to precise drilling spots, then lock the base/drill in final position. This innovation is helping fabricators speed up hole-making production both in the shop and on-site.

Another recent development from Hougen is the HMD150 model for drilling in hard-to-reach or limited access places. Measuring $7\frac{13}{16}$ in. high, the HMD150 fits in places where even hand-held drills won't fit, yet provides drilling capacity of up $1\frac{3}{8}$-in.-diameter by 1 in. depth of cut. The inclusion of a sturdy quill feed arbor has also added new rigidity and accuracy to this tool.

Hougen also offers the Punch-Pro lineup of electro-hydraulic hole punchers. The self-contained hydraulic system eliminates the need for separate, remote hydraulic power units that leak and are a deterrent to easy usage and portability. The five models of punchers provide from 13.2 tons to 34.1 tons of pressure to punch round (to $\frac{15}{16}$-in.-diameter) or oblong (to $\frac{11}{16}$-in. by $\frac{13}{16}$-in. dimensions) holes through material up to ½ in. thick. MSC

2008 AISC Seminars:

Coming to a Location Near You!

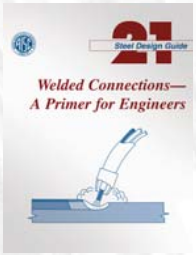
Enhance Your Professional Development with AISC Seminars

Designed to help working professionals enhance their skills in a productive training environment, the American Institute of Steel Construction (AISC) is dedicated to providing you with focused seminars on relevant, timely topics designed to meet your continuing education needs.

Attend an AISC seminar and discover how to get the most value from your professional development dollars and earn credits from courses taught by leading industry experts.

Façade Attachments to Steel Frames

Perhaps the most complicated details in a building occur where the façade and structural frame meet. The details of this interface have a significant impact on the cost of the project. The performance issues that affect the façade attachment details include: proper support of the façade elements, structural anchorage to the frame, relative movements, fire protection, waterproofing, thermal and moisture migration, air infiltration, and sound transmission. Just as these details need to integrate performance issues, the design team needs to coordinate responsibilities between the architect, base building engineer, façade engineer, general contractor, steel fabricator, steel erector, and façade subcontractors.

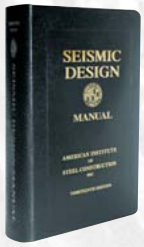


NEW! Listen to Steel: Duane Miller on Welding

Everything you need to know about structural welding applications is discussed in this new one day seminar. Each module gives concise resolutions to steel welding issues and together they represent the full spectrum of welding concerns.

NEW! Intelligent Design: Low-Rise and Mid-Rise Buildings

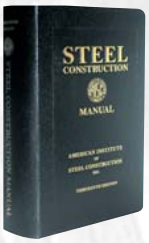
This new seminar focuses on rational and efficient building design methodologies that you can incorporate into your practice as soon as you get back to the office. The lectures cover the philosophy of design, design considerations relative to loads, selection of training systems and their components, preliminary design techniques and much, much more. Don't miss this opportunity to obtain valuable information relevant to design efficiency!



AISC Seismic Provisions/Manual

AISC Seismic Design – Updates and Resources for the 21st Century

Structural engineers across the country have appealed to AISC for good resources and continuing education seminars on seismic design. In response, Thomas Sabol, Ph.D. – referencing AISC's extensive seismic design resources – has developed a seminar to meet those needs. If you are a practicing structural engineer looking to increase your knowledge of seismic design of structural steel – make sure you attend this seminar!



NEW! Seismic Connections/Manual

Practical Applications of the 2005 AISC Seismic Provisions

With recent advances in code requirements and options, it can be a challenge to design cost-effective connections to resist seismic demands. This new seminar demystifies seismic connection design. You will learn how to design connections for moment frames, braced frames, and other seismic load resisting elements.

AISC Fall 2008 Seminar Schedule

NEW Building Design Seminar

- ☐ 9/16 Miami, FL
- ☐ 9/23 Boise, ID
- ☐ 9/23 Cleveland, OH
- ☐ 9/25 Albuquerque, NM
- ☐ 9/25 Chicago, IL
- ☐ 10/7 New Orleans, LA
- ☐ 10/16 Memphis, TN
- ☐ 10/21 San Jose, CA
- ☐ 10/21 Washington DC
- ☐ 10/28 Albany, NY
- ☐ 10/30 Minneapolis, MN
- ☐ 11/5 Oklahoma City, OK
- ☐ 11/6 Dallas, TX
- ☐ 11/12 New Brunswick, NJ
- ☐ 11/13 Pittsburgh, PA
- ☐ 12/3 Charleston, WV
- ☐ 12/4 Columbus, OH

Façade Attachments Seminar

- ☐ 9/25 St. Louis, MO
- ☐ 12/9 Orlando, FL
- ☐ 12/10 Atlanta, GA

NEW Listen to the Steel-Welding Seminar

- ☐ 10/2 Philadelphia, PA
- ☐ 10/23 Honolulu, HI
- ☐ 11/11 Chicago, IL
- ☐ 12/9 New York, NY*
- ☐ 12/11 Boston, MA

NEW Seismic Connections/Manual Seminar

- ☐ 9/16 Seattle, WA
- ☐ 9/17 Denver, CO
- ☐ 9/23 Houston, TX
- ☐ 10/2 Las Vegas, NV
- ☐ 10/7 Boston, MA
- ☐ 10/14 Los Angeles, CA
- ☐ 10/15 San Francisco, CA
- ☐ 11/5 Indianapolis, IN
- ☐ 11/13 Spokane, WA
- ☐ 12/2 Burlington, VT
- ☐ 12/2 Sacramento, CA
- ☐ 12/4 San Diego, CA

Seismic Provisions/Manual Seminar

- ☐ 10/21 Lexington, KY
- ☐ 10/23 Richmond, VA

* Co-sponsored by the Steel Institute of New York.

www.aisc.org/seminars

Register online at www.aisc.org/2008seminars

Visit www.aisc.org/seminars for more information.