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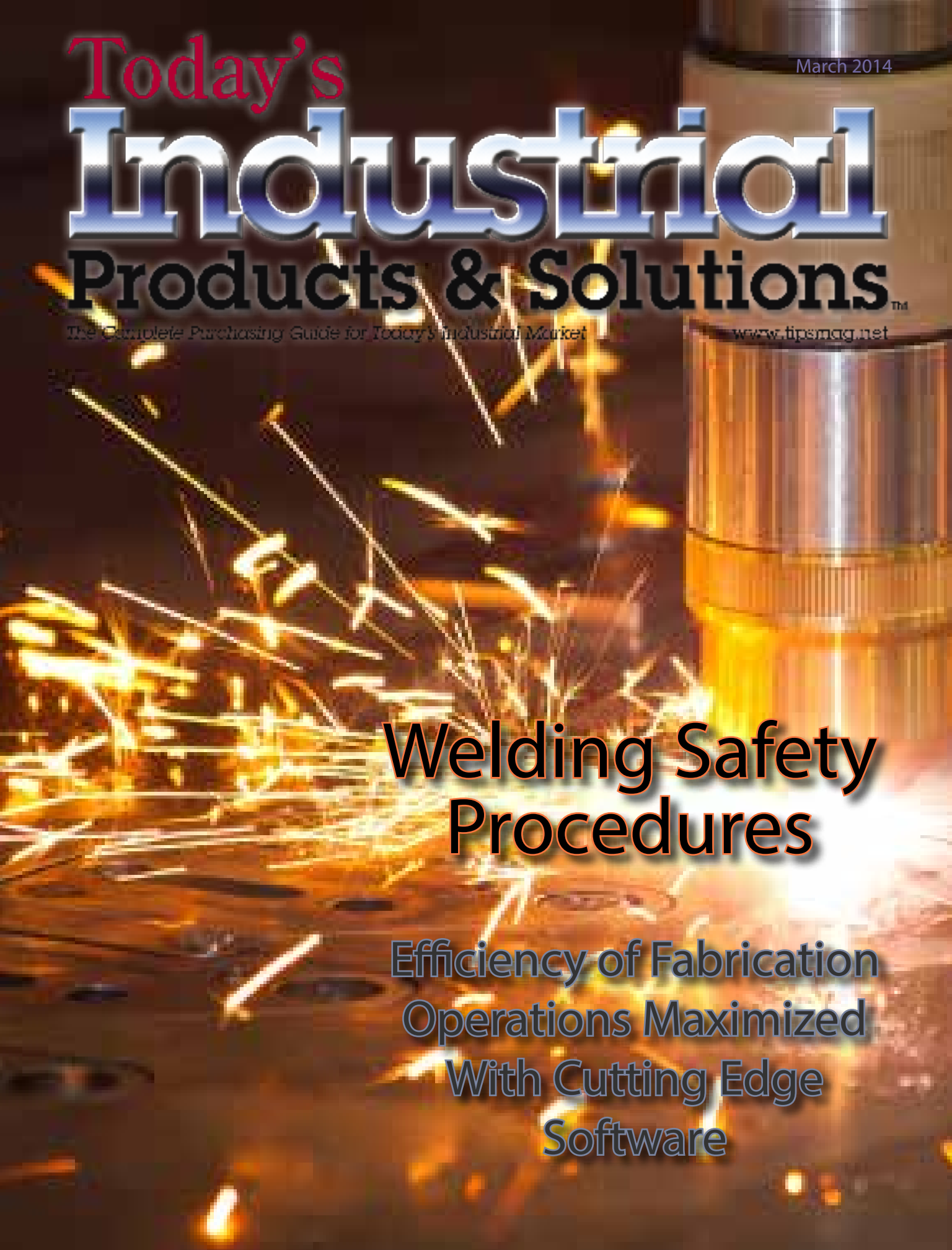

Welding Safety Procedures

Efficiency of Fabrication Operations Maximized With Cutting Edge Software

Feature STORY

Today's Industrial Products & Solutions

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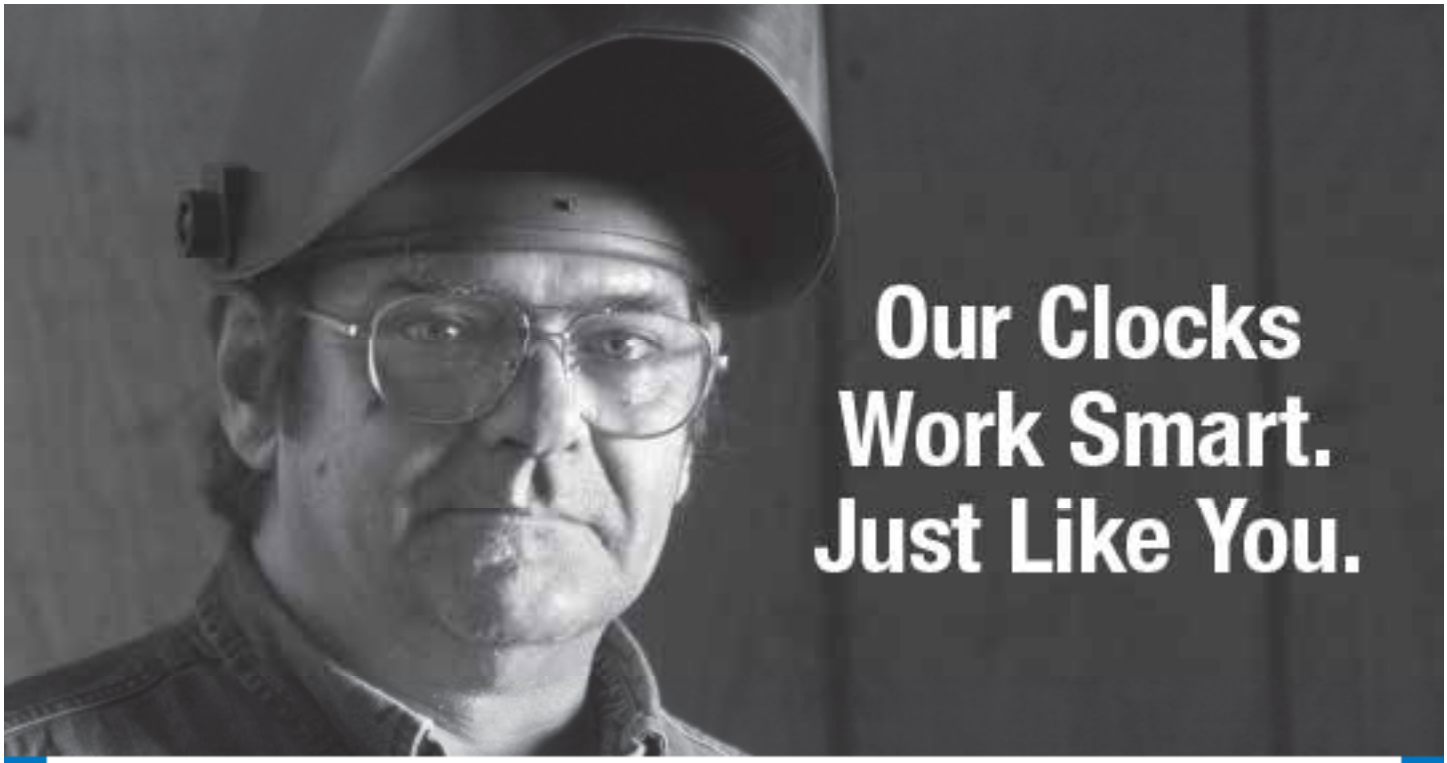

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Alliance Automation, a leading designer and manufacturer of custom industrial automation and robotic systems, is powering its latest generation of robotic waterjet trimming cells with Jet Edge intensifier pumps.

Featuring dual wall-mounted Motoman HP20D robots and Jet Edge's 60KSI (4100 bar) iP60-50 waterjet intensifier pumps, Alliance Automation's new 6-axis robotic waterjet trimming cell leads the industry in precision and dependability with Motoman's ±0.06 mm repeatability and Jet Edge's reliable tie-rod intensifier design. The cell's sturdy, compact frame design allows stability to both the tool and robots to ensure consistent tight part tolerances.

Alliance Automation's robotic waterjet trimming cell precisely cuts shaped parts with many angles from a wide variety of materials, including carpeting, fiberglass, foam and plastic. The system has numerous automotive interior applications, including trimming headliners, dashboards, dash liners, bed liners, wheel liners, door panels, trunk trim, car carpet, and acoustic dampening components.

Alliance Automation's Steven Cranston said the company's robotic waterjet trimming cell features numerous design innovations that distinguish it from other robotic systems and promise to increase productivity, lower operating costs and improve worker safety.

The wall mounted robots allow for the first 2 axis to be mounted forward, over the part, Cranston noted. This feature allows for a larger work envelope and motion to work easier around larger shaped parts. The robots also are able to quickly retract to a home position out of the way for the loading and unloading of parts, drastically reducing cycle times and increasing operator safety.

The system lowers operating costs by eliminating the need for complicated trimming dies, he added. It is set up so that many different parts can be programmed to make a quick change of tools or products. Jobs also can be installed with multiple parts to maximize productivity. In addition, the innovative design of the coil package on the robots allows for a quick change. All coils are a standard design (for each specific robot model), factory wound, pre-coned and pre-threaded.

Cranston said Alliance Automation chose Jet Edge waterjet pumps to power its latest systems based on Jet Edge's reputation for quality, support and free lifetime training.

"Knowing that Jet Edge is a leader in waterjet technology, we knew we could trust the dependability and consistency of the Jet Edge intensifier," Cranston said. "We have been involved in the robotic waterjet market for a number of years and utilizing the Jet Edge Intensifier helps us to provide the product and support we need to satisfy our current and future customers."

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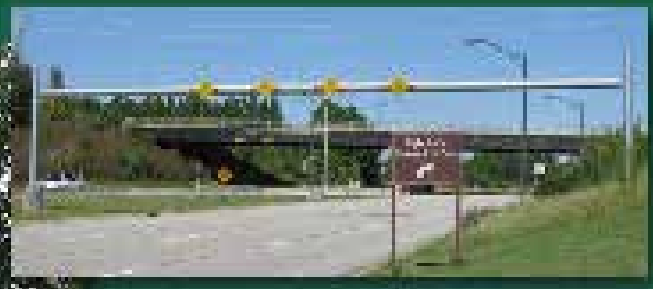

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Automating

& Integrating CAD CAM Into Shop Floor Data Systems

By Martin E Bailey

CNC programming and nesting for cutting of sheet or roll-based materials differs from other manufacturing processes as a nest of components cut say on a laser, waterjet, knife cutting or punch press machine can contain many parts spanning many orders. Compare that with milling or turning where orders are generally made on a per-part basis and you begin to see the problem. The usual scenario is that orders are placed into an MRP system, material is ordered, orders are printed and physically sent to manufacturing for CNC programming and production. Here the CNC programmer needs to interpret the paper order for each component, locate correct CAD drawing (geometry) for it, import it into his CAM system and prepare it for nesting.

To maximize material and processing efficiencies, forward looking companies will employ powerful 'free form' nesting systems, which by default, produce best results when given a mix of components of various sizes. To achieve this, orders have to be consolidated. This however, presents a number of problems - to start with, every component ordered and its manufacturing information has to be entered into the 'order' list of the nesting system. If production orders arrive on paper, this obviously is a time consuming and error prone manual task. Secondly, to maintain any visibility over production, management (and often sales), need real-time feedback from the shopfloor. Again, with the above scenario this can only be achieved by manually entering relevant CAM and shopfloor information, this time into the MRP system. There are also other problems, ie. maintaining reliable component/material traceability, etc.

Full automation - the Holy Grail

Ideally, your CAM system should communicate directly with your MRP system, automatically fulfil any orders received from it and immediately report back on the actions executed and results obtained. This means that there must be a direct and automatic link between these two systems. However, to achieve full automation, the CAM system must also be able to locate the component geometry files associated with the order, apply tooling or profiling to them, nest all parts for a given material, thickness and CNC machine, generate correct CNC code and report back to the MRP that this has been done - all without human intervention. Although such a level of automation is seen by some as prohibitively expensive, it is simple to justify such an investment if you can quantify the time you are currently spending to manually perform these tasks. Return on investment is often measured in months or even weeks, not years.

Of course, a chain is only as strong as its weakest link, and if the CAM system cannot perform above tasks well and without error, then you may end up spending more time fixing problems than what you tried to save in the first place.

What you need for Full Automation

If you decide to opt for full automation then you need a CAM system which is able to deliver such automation (while being able to support all of your CNC machines) and can also seamlessly communicate with your MRP system. That is, it should be able to understand commands from the MRP system and send back relevant information in a format the MRP system can

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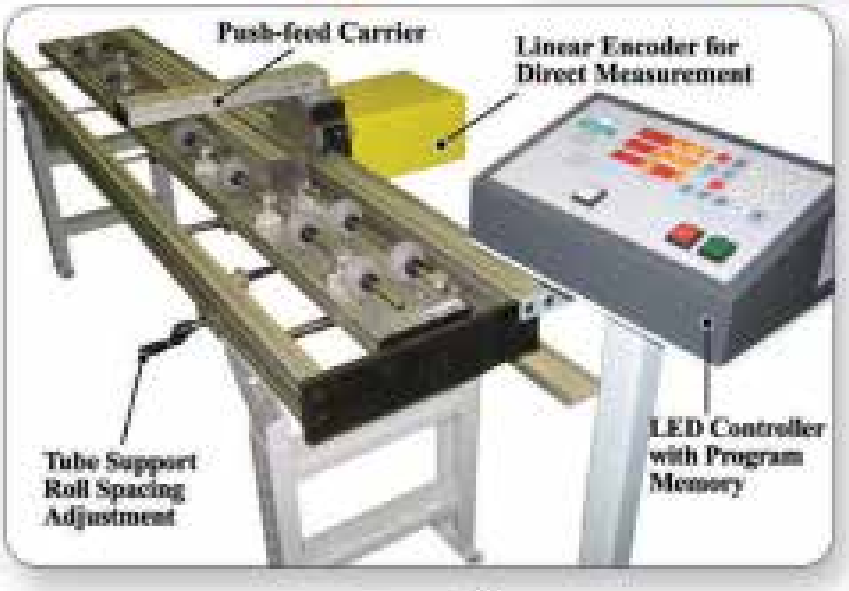

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understand. As in majority of cases each system will have its own (and incompatible) databases, a special translation module will need to be implemented to facilitate a link between these two systems.

Finding a happy medium for your business

There are companies which either cannot justify such an outlay, or feel that their business is not suited to full automation. However, they can still take advantage of automatic communication link between their MRP and CAM systems and go for lesser automation on the CAM side (with the right CAM vendors you should be able to upgrade your CAM system at any time in the future to make it more or even fully automatic). Let's take a look at each element of the CAM and nesting process, the problems often faced and what you should look for to overcome them:

CAD import: Many CAM systems will provide the ability to either draw components or import from popular CAD systems. Importing files often brings problems due to the quality of the CAD file. For example lines may not be joined or arcs may not be ‹true arcs›, instead comprising of dozens or even hundreds of short lines segments. Some higher end CAM systems will be able to ‹clean› such CAD files within predefined tolerances, saving a considerable amount of time. The part is then ready to apply tooling or profiling information.

Tooling/profiling the part: Some CAM systems apply tooling/profiling information to parts on the nest, however this can create significant problems, especially if one or more parts are changed or need to be made on another machine. If tooling information is stored within the component file then tolling information for every available machine can be stored, making the part available for automatic nesting at any time and on any machine without any further considerations.

Sequencing and simulation: Very often what appears to be the optimum cutting path does not take into account manufacturing constraints, such as parts that may become loose as the sheet becomes more structurally unstable. Being able to either manually or automatically apply logic to the cutting order of general and finishing cuts that separate the parts from the sheet, or apply unloading or tagging commands depending on part orientation can make the difference between a job that can run unmanned and one that requires constant attention or, worse still, can damage parts or the machine itself.

Nesting: This is the area that can yield the most immediate

savings if automated correctly. An efficient nesting engine will be able to take into account individual part characteristics that must be applied, such as nesting at restricted angles, or if they should be nested with other components. The ability to specify ‹filler parts› is also useful, allowing you to utilise otherwise wasted material for frequently used components.

CNC code generation: The reason you have a CAM system is to generate CNC code, and while your system may have all of the bells and whistles up to the point of code generation, if it cannot make accurate CNC program using a reliable postprocessor then it defeats the object. Ensure that your CAM system has a tried and tested postprocessor(s) to support all of the required features of your machine(s).

Reporting: Your CAM system›s ability to report back to MRP on each job›s status completes the circle. This will either be a case of CAM updating files within the MRP system, or the MRP reading updates from within the CAM system. This will consist of information such as material used, actual material utilization, parts created, material used per part, material/parts scrapped, estimated processing time, etc.

Summary

Although the initial aim of a CAM system is to automate the generation of NC code as much as possible rather than writing it by hand, there are many more processes where human intervention is not necessarily required. Is your programming department currently automating all of the areas it could? By breaking down each stage of the process you can get a much clearer picture of where improvements could be made. Once any initial costs have been recouped, which can often be over a much shorter period then you may think, then your company can enjoy the additional and ongoing profits.

Martin Bailey is the Marketing Manager for JETCAM International s.a.r.l., and is also the author of several marketing and technology sector books. JETCAM Expert is used in over 7000 locations worldwide and supports virtually all punching and cutting/profiling CNC machines in the sheet metal, aerospace/automotive and other industries.

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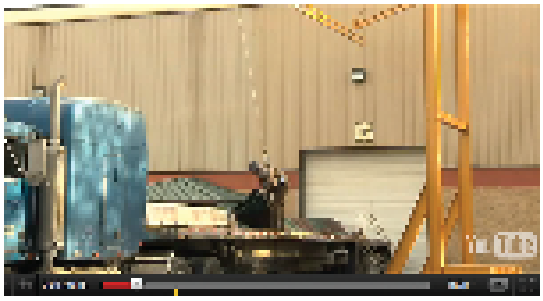

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Efficiency of Fabrication Operations Maximized With Cutting Edge Software

By Cornel S TerreBlanche

Not too long ago, Computer Numerical Controlled (CNC) machines took the sheet metal fabrication world by storm. Working in conjunction with plasma, laser and other types of cutting machines, the arrival and subsequent integration of computer programming into these machines has all but eliminated laborious manual cutting tasks. As with so many areas in our lives - from sheet metal fabrication to the ways in which we communicate - technology has helped make things more efficient.

Sheet Metal Software

In order to achieve the desired results, laser, plasma, waterjet and punch machines all need to be programmed according to detailed specifications. By using the latest generation of CNC laser software, cutting and forming parts from metal is now an exercise in extreme precision. A level of consistency now exists that was never imagined when cutting and shaping was done mostly manually.

After programming information is entered and sent using Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) software, a CNC machine will operate autonomously with little or no human intervention other than to administer to the occasional contingency. Any glitches in the system or issues with the performance of a laser cutting system can be remedied by sending an alert to a programmer or technician.

Plasma Cutting

CNC plasma cutting machines are very powerful tools that are CAD/CAM programmed. The intense, concentrated plasma stream used for cutting is created by ionized gas, which is infused with an electrical charge and directed out of a small opening. Though this plasma stream is very powerful and can even cut through thicker sheets of metal than a laser cutter, it is not as quite as precise or detailed as laser cutting.

Laser Cutting

Fabrication software allows a programmer to input information that will direct a cutting tool to move along a design path with the goal of cutting out a piece or part exactly as it was drawn up. There is no better tool for executing the precise cutting of a programmed pattern than a laser cutting machine. When combined with quality CNC laser software, lasers can perform very detailed cutting functions that include holes, slots and complex design patterns.

However, laser machines do have their limitations. When using a laser cutter, the more wattage the deeper the cutting ability. Lasers are extremely quick and accurate when used to cut thinner metals. But when thicker metal is used, “heat zones” can develop which will sometimes melt more sensitive metals or cause unevenness or rough spots in the material.

Therefore, laser cutting thicker metals is impractical not only because of possible damage to the material, but because it is more costly. If heat zones or hot spots occur from overexposing the metal to the laser, extra work such as grinding the part may become necessary. This will increase labor and material expenses, in addition to the higher costs associated with more energy usage.

Water Jet Cutting

Although not as precise as laser cutting, water jet cutting is able to cut thicker material without causing damage. Considered an “abrasive” process, water jet cutting uses an abrasive material combined with water in a highly concentrated stream to “erode” or break down the material being cut.

Though there may still be some sanding or finishing involved after processing a piece, water jetting tools are much more acceptable to be used with thicker materials as well as those that are sensitive and susceptible to damage under extreme heat.

However, precautions must also be taken when cutting metal with a water jet tool. The material must be dried right away after cutting to avoid rusting. Also, since a cut from a water jet machine isn’t as even or clean as when using a laser, the edges of the cut usually need to be sanded or grinded. The piece must be “finished” in order to smooth it out and make it ready for possible welding.

Nesting Software

“Nesting” allows manufacturers to get the very most out of their fabrication operations with very limited waste. Nesting software integrates with almost all fabrication software. Once a file is created in 3D for a proposed part, the nesting software will convert it into a 2D format where information about size, thickness and placement of cuts and holes among other design characteristics will become more detailed. Nesting software will also store this information for repetitive production.

The reporting capabilities within nesting software is another advantage, which includes information on just about every aspect within an operation such as utilization, production, inventory, cost and even man-hours.

Nesting software can assist with everything from reducing programming time and increasing the speed of an operation to optimizing material usage. Overall, nesting software has vastly improved the production process for sheet metal fabrication operators. It’s safe to say the technology surrounding the sheet metal fabrication industry is “cutting edge.”

Cornel TerreBlanche, marketing coordinator of SigmaTEK, is the author of this article about nesting software, CNC laser software and sheet metal software. SigmaTEK is a Cincinnati-based company providing automatic nesting software solutions to enhance efficiency and profitability for sheet metal fabricators through its CAD/CAM software, SigmaNEST.

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Industrial Lubricants

The Importance of Lubrication in Industry

By James Martindale

Most of us use types of industrial lubricants regularly - if you apply some oil to a squeaky hinge, you are using a lubricant. Of course, many industrial uses of lubricants are much more complex than that; many industries can use a large amount of lubricants on a regular basis.

There are several different types of lubricants that are typically used in industry, although the basic purpose of the product is the same - to ensure that moving parts operate more smoothly and to reduce friction. Using the right lubricant can reduce the need for unscheduled maintenance; help to prolong the life of machine components - and ultimately save money.

Industrial lubricants also vary a great deal in terms of chemical composition - some contain silicon-based fluids, some mineral or petroleum oils, while others may contain natural oils. Some contain high water content and are known as HWCF fluids. Typically, this type of fluid has a high level of heat resistance and also accelerates the cooling process.

One of the biggest decisions when it comes to choosing a lubricant is deciding between liquid or solid. Liquid or fluid lubricants would include such things as oils, refrigerants and coolants. An example of this would be the coolant in the radiator in your car bonnet. Some lubricants can also be diluted with differing amounts of water if necessary.

An example of a solid lubricant that's widely used would be a compound such as hexagonal flake graphite, or boron nitride. Typically, solid lubricants are particularly effective when it comes to keeping out moisture as well as reducing general wear and tear.

Depending on your needs, you may want to choose a lubricant with a specific feature or characteristic. Some industrial lubricants are biodegradable, fire resistant or oxidation inhibiting. Many are also odorless and colorless.

Most synthetic fluids offer excellent cooling properties and fire resistance, making them particularly versatile. Synthetic fluids can be used in a diluted form, with concentrations generally ranging from 3% to 10%.

Certain industries need certain lubricants - lubricants used in the food industry are specifically designed to be safe if they come into contact with food. Food processing plants in particular need a lubricant that offers this feature.

An important feature of lubricants is the kinematic viscosity - the time that it takes for an amount of fluid to flow through a tube of certain size. Viscosity - or flow - is measured at two different temperatures - 100 degrees F and 210 degrees F.

Some lubricants use additives so that they can withstand a heavy weight or a rapid movement. So-called extreme pressure (EP) lubricants use chemical additives which help to provide an effective film layer for heavy-duty work.

The world of lubricants is constantly changing and new advances are made almost daily. The trend is towards lubricants that offer more than one feature - for example, a lubricant that offers protection against corrosion and can also be effective at higher temperatures.

Metal Working Lubricants - A History of Industrial Lubrication
Lubricants, fluids and coolants regularly used in the metal working industry are highly specialized and designed to perform specific tasks. In addition to metal forming, metal working includes a fairly broad range of tasks - including polishing, cutting, embossing and grinding.

Metal working lubricants are used for several reasons. While one of the primary functions is to increase lubrication, they can also reduce thermal deformation, improve the overall finish of a metal surface and help to effectively remove loose metal chips from the cutting area.

Lubricants can be used to carry abrasive powders, when used for polishing or lapping of metals. They are effective in acting as a cooling agent when used in grinding applications and they also prevent certain materials from sticking to surfaces. Lubricants can help reduce the effects of corrosion and rust.

And perhaps most importantly, the correct use of metal working lubricants will help to reduce wear and tear, prolong the life of tools and other moving parts, reduce the time spent on maintenance - and of course ultimately ensure a company's profitability over the long term.

Different lubricants possess different properties and features. Features that might be important when choosing a lubricant include resistance to heat, oxidation inhibiting ability and biodegradable ability. Flash point is also an important consideration - the flash point is the lowest temperature at which liquid can emit enough vapors to cause an ignition.

Metal working lubricants come in three types: greases, fluids and solid lubricants. Each has different properties and can be used most effectively in different industrial applications. Which lubricant to use will depend on several factors - the characteristics of any die used, the temperature and the overall processing conditions.

Solid lubricants are chemical compounds such as boron nitride and often have such qualities as being able to keep out moisture, reduce friction and generally reduce wear and tear.

Some industries need specialized lubricants - the transportation, aerospace and automotive industries are some of the biggest users. The steel forging industry commonly uses graphite based lubricants which is often graphite immersed in oil or water. This type of lubricant also has the advantage of having no fumes and is able to keep the steel forge and surrounding area clean.

Lubricants used in metalwork vary widely in their chemical composition as well as their uses. Lubricants may contain such varied ingredients as mineral or petroleum oils, natural oils, waxes or paraffin.

Some lubricants contain a high percentage of water and are generally known in the industry as HWCF - high water content fluids. Synthetic fluids generally provide an effective resistance to heat as well as excellent cooling abilities; they don't contain a petroleum or mineral oil base.

They may not be the most glamorous part of the metal working industry - but without a doubt, the indispensable lubricant is certainly one of the most important.

James Martindale writes for Rocol. Rocol specializes in anti graffiti products, traffic management and industrial metal working lubricants. Rocol takes pride in producing advanced products for industry needs.

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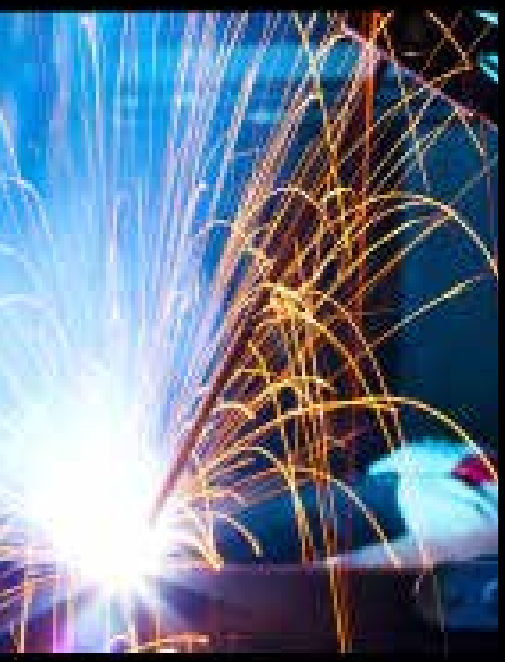

Welding Safety Procedures

By Sharon J. Ropp

Welding is an area of the industry which has recorded a lot of work related injuries. There are so many hazards associated with welding and each can have longlasting effects on the worker. Fire hazards are also known to occur during welding operations and in welding sites. The American Welders Society (AWS) and Occupational Safety & Health Association have come up with welding safety procedures to protect welding workers from danger.

Fire Prevention and Protection

To guard against fire outbreaks during a welding operation, welding activities should be moved to a safe location. However, if the object to be welded cannot be moved from its current location, the vicinity should be examined and all movable fire hazards should be removed.

In the event that neither the object to be welded nor the fire hazards can be moved, guards should be used to separate the two. If it is not possible to separate the object to be welded and the fire hazards using guards, under no circumstances should the welding operation be carried out.

The importance of having fire extinguishers within handy distances is paramount as this can help control any outbreak. Furthermore, fire watchers need to be put on alert while welding is going on.

Welding has been taken up as a hobby by a lot of people and the recent rise in do-it-yourself projects have made it important to state that a welding operation should only be carried out by someone who has been properly trained.

Protection of Welding Personnel

In adhering to welding safety procedure, it is important to make sure that when working on platforms, scaffolds or runways,

adequate protection is taken against falling. Protective clothing should be worn by all those who would be exposed to the welding operations to guard against harmful fumes, vapor and exposure to dangerous UV rays.

Furthermore, welding cables and other equipment used in the welding operation should not be placed in passageways, ladders and stairways as this could obstruct passage and will constitute a potential danger to the workers.

The right eye protection is essential for welders and those who participate in the welding operation. Welding goggles and flame retardant headgear are recommended for effective protection.

The welding operation should take place in an area that has adequate ventilation to prevent inhalation of harmful substances.

Welding Safety Equipment

Welding safety equipment comes in various designs and fitted for different purposes. Regardless of the purpose or design, they each have one goal in common; to provide the utmost protection for welding professionals.

When choosing welding safety equipment, there are many things to consider but a prime consideration would be the type of welding that would be going on. This would determine what possible dangers the welding professional would be exposed to and how best to go about combating these dangers.

The use of welding safety equipment is essential to protect the areas of the body most vulnerable to hazards, which result directly from welding activities. As a result, welding safety equipment focus on protecting the head, the eyes, the body, the legs and feet of a welding professional. Welding safety equipment would include welding apparel, welding safety goggles and safety harnesses amongst others.

Welding apparel come in many forms, some of which are headgears for protection from flames. They are designed for use in welding activities where high levels of heat or sparks are expected. They drape over the worker's face and are flame retardant. A great material for these headgears would be leather.

Welding safety gloves are another form of welding safety apparel which is designed to be worn by workers for protection during welding activities. They are made from a number of materials including cowhide and deerskin. There are also welding safety gloves made from heat resistance fiber glass.

The safety harnesses are used by workers for welding activities in the air and are imperative in protection from falls. There are a lot of injuries from falls resulting from malfunctions of safety harnesses. The major reason for these injuries is that most safety harnesses have nylon webbings which could easily burn when sparks from welding activities touch them. Welding apparel protecting vulnerable parts are advised.

Some of these harness protection apparel include the bib aprons which are fire retardant. They repel the sparks which result from welding activities and protect the webbing of the safety harness. There are also waist aprons which are flame retardant and provide protection against burns from sparks. The arms, waist and legs of the safety harnesses have been found to be most vulnerable to burns therefore flame retardant sleeves are highly recommended.

Welding goggles are another important aspect of safety protection equipment. The eyes are particularly vulnerable to injury and damage during welding operations. There are so many hazards which exposure to would be extremely dangerous for the eyes. Some of these hazards include exposure to harmful ultraviolet rays, flying particles and molten metal amongst others. Welding goggles are highly recommended and are in fact, mandatory for welding operations.

OSHA (Occupational Safety and Health Administration) recognizes three broad categories under which welding goggles fall. These are the Eyecup Clear Safety Lens welding goggles; the Eyecup Coversepc Clear Safety Lens welding goggles and the Eyecup Coversepc Tinted welding goggles.

All welding safety equipment should be purchased from reliable vendors and should come with clear and legible instructions.

The Welding Environment

The environment where the welding operation takes place must be one that is screened on all four sides to contain flying sparks and other hazardous elements from escaping. However, the screens should not restrict ventilation as that is really important during welding operations.

If there is an exhaust system, it is important to make sure that it keeps the amount of toxic fumes, gasses or dusts below the permissible exposure levels to protect the welders and their assistants or helpers from poisoning.

Although these safety procedures cannot guarantee that there will be no welding related accidents, they will help to greatly minimize the effects of the accidents and in some cases, eliminate the harm to the welders. Above all, the personal safety of the welder should not be compromised and the right safety gear should be used at all times.

Sharon J. Ropp works with Bakers Safety as a public relations consultant. More information about Bakers Safety can be found athttp://www.Bakerssafety.com

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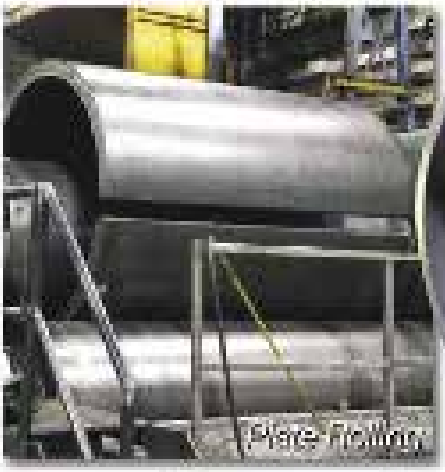

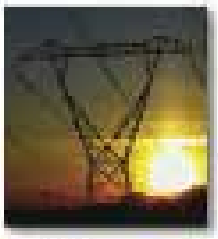

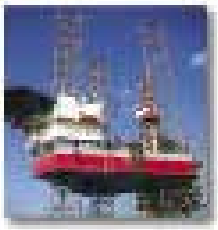

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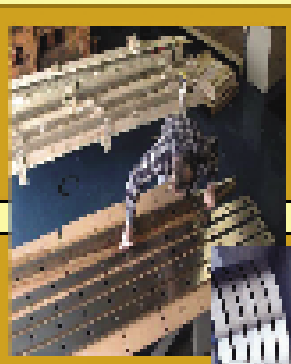

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