August 2014

Today's Industrial Products & Solutions™

The Complete Purchasing Guide for Today's Industrial Market

www.tipsmag.net

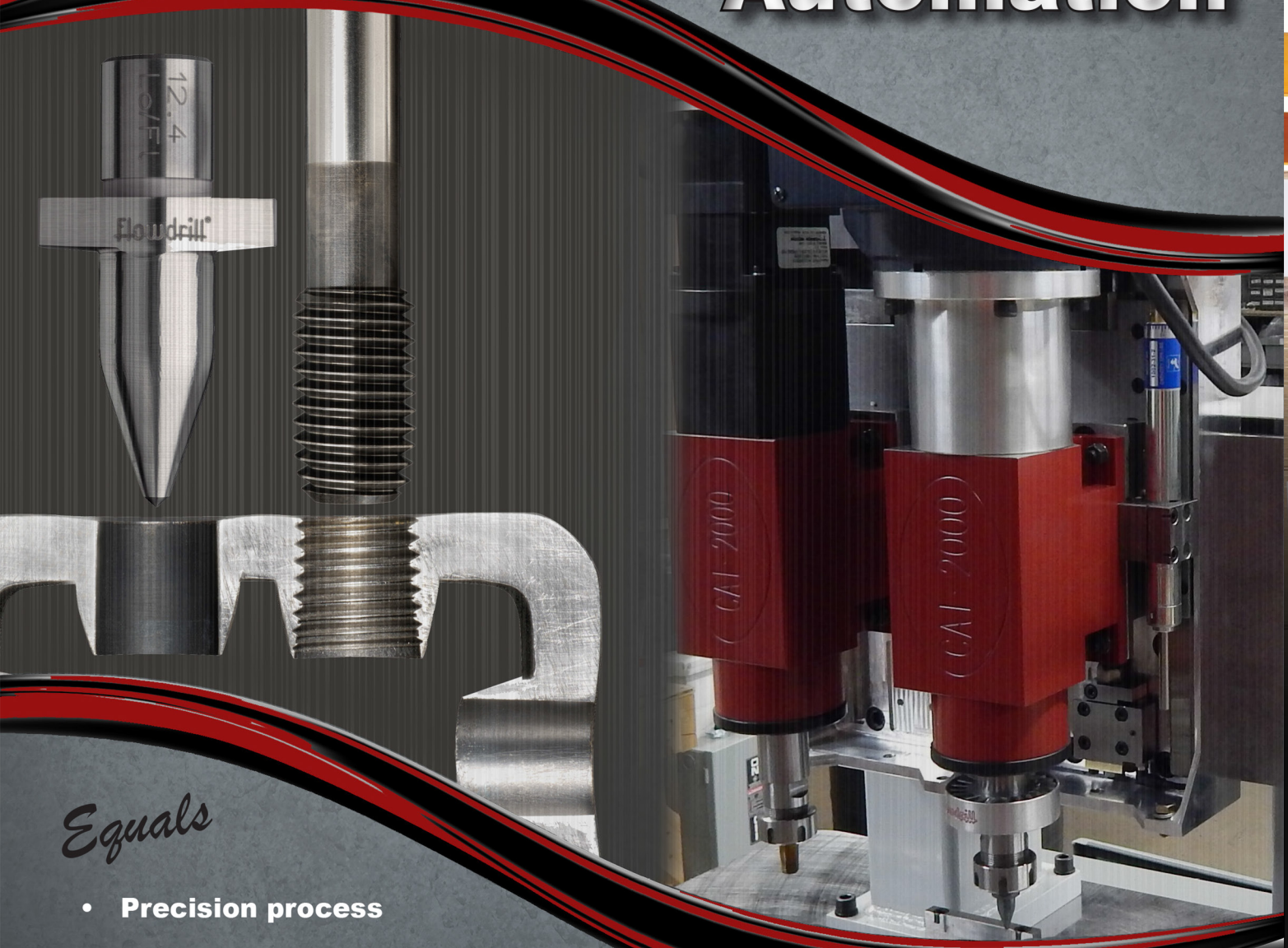
CAD/CAM Software and High Speed Machining

Safe & Efficient Thermography Practices

Flowdrill®

partnering with

Cullman Automation



Equals

- **Precision process**
- **Machinery design/build capabilities**
- **Clean/chipless process**
- **Spindles manufactured in USA**
- **Flowdrill sizes from 1.5mm to 67mm**
- **Replaces weld nuts, threaded inserts, riv nuts**
- **Success in any malleable material(stainless steel, steel, aluminum, copper)**

WWW.FLOWDRILL.COM

WWW.CULLMANAUTOMATION.COM

ISOLATED PROTECTION

TO PREVENT GROUND LOOPS

The Lind Isolated Power Adapters provide a regulated, isolated DC output to power laptops, thin clients, monitors and other devices from a DC voltage source. Output and input DC returns are isolated, allowing the prevention of possible electrical noise caused by ground loops.

The Isolated Power Adapter's electronics are enclosed by an epoxy-sealed case to protect the internal circuits from damage caused by shock and/or vibration. Its durable construction withstands extensive wear and tear in any harsh mobile environment. Snap-in connections make replacing missing or damaged cables from anywhere in the field easy and hassle-free.

Lind's Isolated Power Adapters are built to work with most existing laptop brands and models. These adapters can also be designed for custom applications. Contact Lind to discuss solutions for your exact mobile power needs.

LIND

POWER SPECIALISTS FOR MOBILE COMPUTING

1.800.697.3701 info@lindelectronics.com www.lindelectronics.com

TIPS CONTENTS

Today's Industrial Products & Solutions™

The Complete Purchasing Guide for Today's Industrial Market

www.tipsmag.net

GROUP PUBLISHER
Brandon Greenhill
205-733-4343
brandon@tipsmag.net

SENIOR ACCOUNT EXECUTIVE
Jody Watson
205-913-9283
jody@tipsmag.net

EDITOR/ DIGITAL DIRECTOR
Danny Thompson
danny@handfmedia.net

CREATIVE DIRECTOR
Jacklyn Hobson
jacklyn@handfmedia.net

ADMINISTRATIVE COORDINATOR
Annie McGilvray
annie@handfmedia.net

FACILITATOR/ LEAD COORDINATOR
Steven Hobson
steven@tipsmag.net

CEO
Christy Hobson

PRESIDENT
Glen Hobson

H&F Media

Executive and Advertising Offices
951 1st Ave. W.
Alabaster, AL 35007
phone: 205-624-3354 fax: 205-624-3354
www.tipsmag.net • glen@tipsmag.net

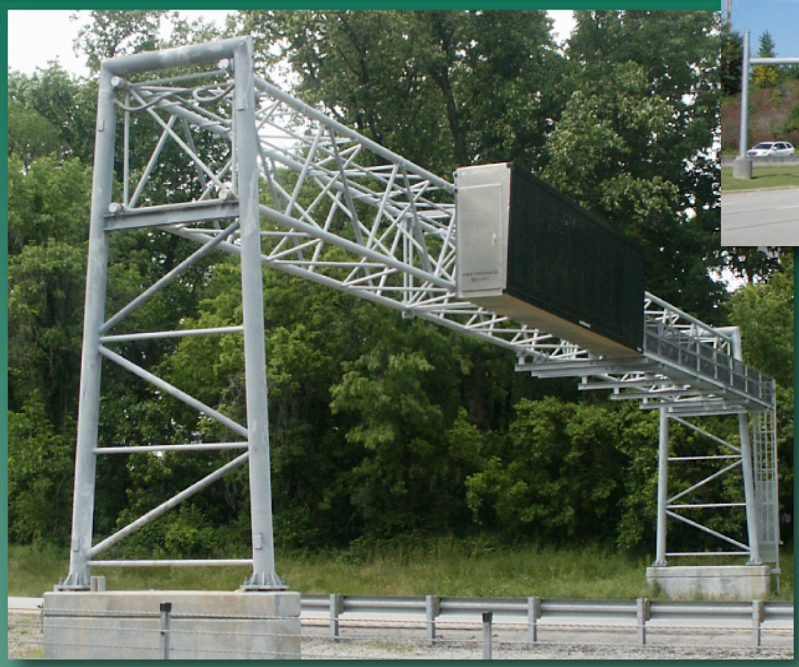
Today's Industrial Products & Solutions™ is published ten times a year on a monthly basis by H&F Media Group, Inc., 951 1st Ave. W. Alabaster, AL 35007 USA. *Today's Industrial Products & Solutions*™ is distributed free to qualified subscribers. Non-qualified subscription rates are $57.00 per year in the U.S. and Canada and $84.00 per year for foreign subscribers (surface mail). U.S. Postage paid at Birmingham, Alabama and additional mailing offices.

Today's Industrial Products & Solutions™ is distributed to to qualified owners and managers in the industrial industry. Publisher is not liable for all content (including editorial and illustrations provided by advertisers) of advertisements published and does not accept responsibility for any claims made against the publisher. It is the advertiser's or agency's responsibility to obtain appropriate releases on any item or individuals pictured in an advertisement. Reproduction of this magazine in whole or in part is prohibited without prior written permission from the publisher.

POSTMASTER: Send address changes to
H&F Media Group, Inc., P.O. Box 1568
Pelham, Al 35124
PRINTED IN THE USA

UTILITY METALS

Manufacturing products you can look up to!



UTILITY METALS...
Manufacturers of Quality:

- Area Lighting Poles
- Lighting Brackets
- Traffic Sign Structures
- Traffic Signal Structures
- Custom Manufacturing

New
"In-Stock" Product

- 4" Square Steel Pole
- 20 ft. Long
- Powder Coated Dark Bronze

In stock locations:
- Sparks, NV
- Malvern, PA

UTILITY METALS
A Division of Fabricated Metals LLC.
P.O. BOX 9054
LOUISVILLE, KY 40209
800•627•8276
502•363•6681
Fax: 502•368•2656

UTILITY METALS

Made in U.S.A.

Company In Focus • Flowdrill

Since 1980, Flowdrill has maintained a commitment to providing customers an overall cost savings alternative to current fastening methods by offering the highest quality thermal drilling products on the market in conjunction with unmatched customer service and support at a competitive market price.

In fact, the company's process is so refined, it speaks for itself. To show any prospect how the Flowdrill process will work for their specific, they must simply provide the sample material to Flowdrill. Flowdrill will thenl complete these samples per instructions at no charge to the customer.

A Recognized Leader

Flowdrill is known world-wide as the leader in the thermal drilling industry, offering a complete range of sizes to include standard, metric, NPT with bit sizes from .060" diameter through 2.500" diameters. They maintain a large inventory in order to ship most items immediately to the customer, as well as offer close customer service and technical support throughout the life of the project.

The company has been recognized in several publications by industry leaders in various sectors including Automotive, HVAC, Metal furniture, Agricultural, etc. for providing a high quality, cost saving alternative to their past fastening processes.

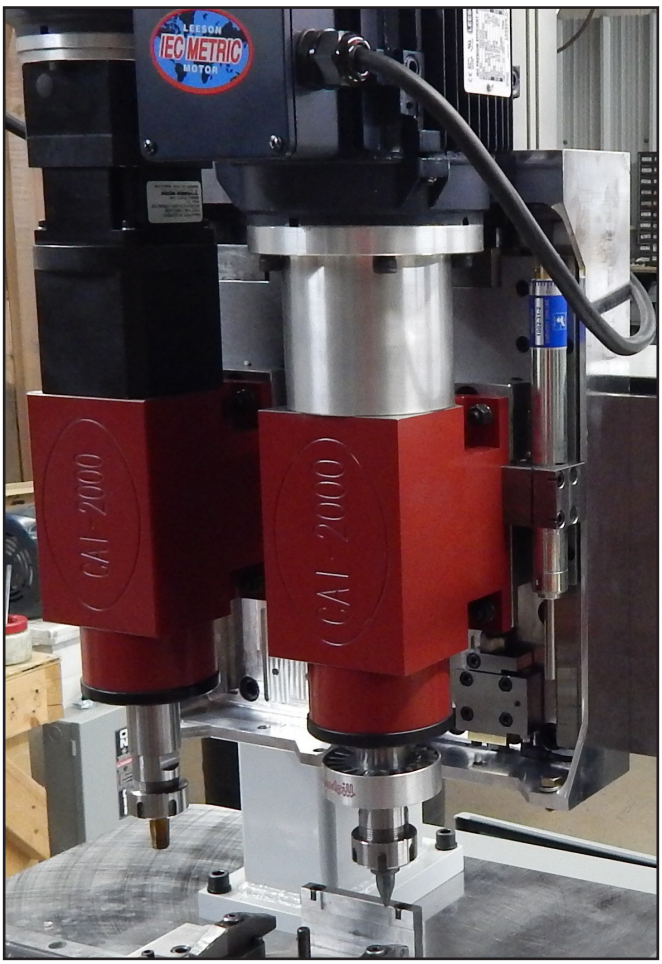
Flowdrill is currently distributed in over 40 countries around the world, bringing the Flowdrill process to all industries both large and small. From the very largest automotive manufacturer to the smallest, single individual shop, both will receive the same benefits from the Flowdrill process.

Optimistic about the future.

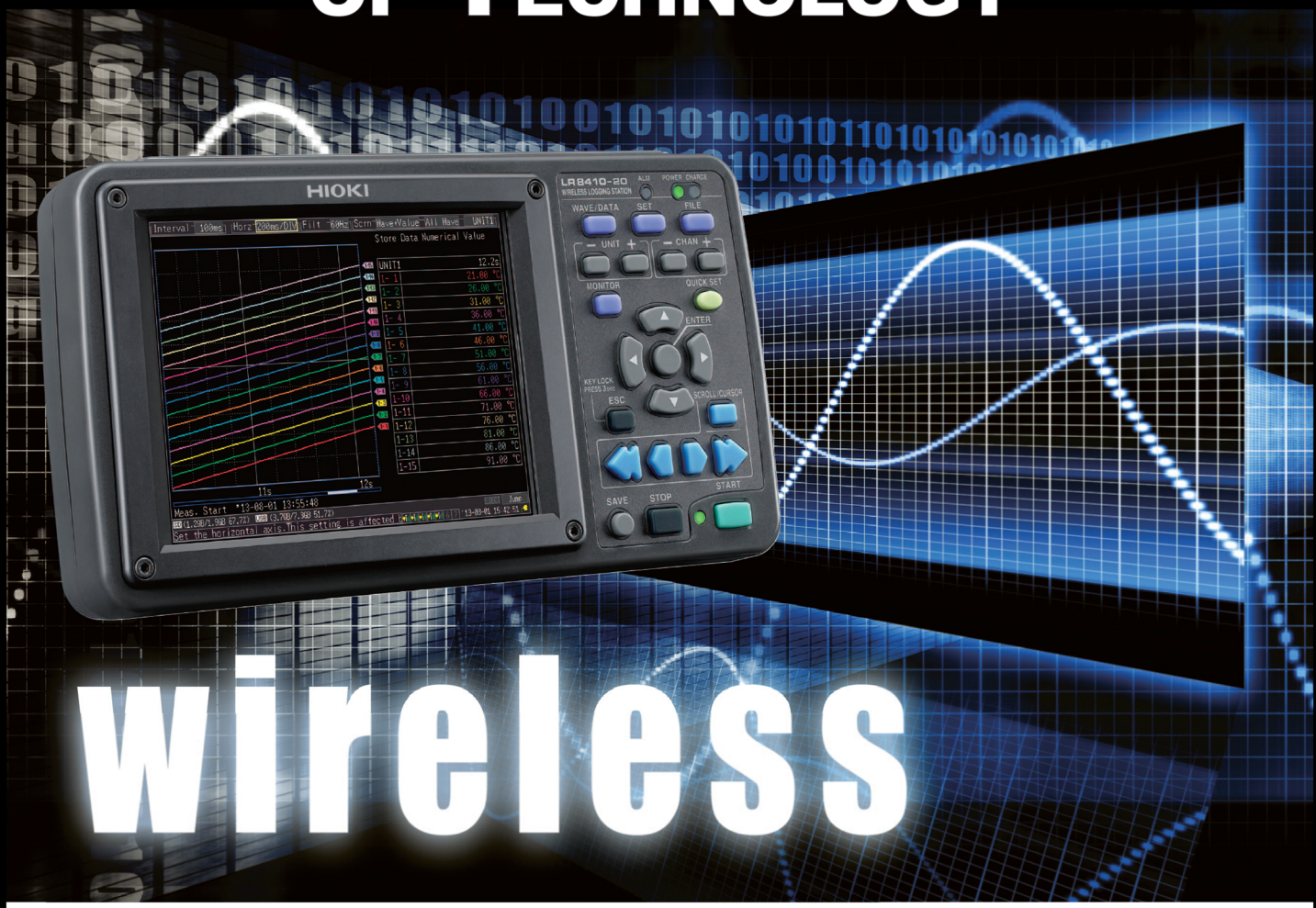
As they continue to reach new customers-- as well as provide problem solving skills to existing customers, Flowdrill has seen several clients return from overseas facilities and re-establish the production here in the USA. By working closely with customers, they strive to continue developing alternative production methods that allow for this to continue into the future.

The need for automated equipment is growing at a rapid pace. Even the small shops typically invest in some type of automation. By recently joining forces with Cullman Automation, Flowdrill is providing customers with a complete turn-key piece of equipment. Developing a working relationship with Cullman over that past several years, they have developed an automated work cell specific to the Flowdrill process.

"The relationship between Flowdrill, Inc. and Cullman Automation," according to Flowdrill president Mitch Ray," was created in order to provide our customers with everything they need to successfully complete the Flowdrill process.....the complete thermal drilling package."



Welcome to the New Age of Technology



Hioki LR8410-20 Wireless Bluetooth Datalogger Station

Bluetooth®

- Up to 105 Channels
- Recording Speed as fast as 100 ms
- Easy to Use
- Multiple Measurement Types - VOLTAGE, THERMOCOUPLE, RESISTANCE, HUMIDITY
- Bluetooth® range up to 100 feet

Producing High Quality Products Since 1935

HIOKI

6 CORPORATE DRIVE•CRANBURY, NJ
PHONE: 609.409-9109
FAX: 609.409-9108
www.hiokiusa.com

ISO 9001
ISO 14001

Company In Focus • Cullman Automation

Founded in April 2000, Cullman Automation, Inc. is dedicated to helping customers increase productivity, produce higher quality products, and increase profits by solving problem areas in the production process. These problems may be quality related, ergonomic problems or excessive personnel in the manufacturing process.

To accomplish this, Cullman Automation uses state-of-the-art control methods, innovative designs, and a commitment to build only low maintenance heavy-duty machinery, such as custom automated Flowdrill and Flowtap machinery.

Flowdrill spindles and heavy duty slide assemblies were designedby Cullman Automation especially for Flowdrill/ Flowtap applications, but work well for heavy drilling applications. Initially they were only used in custom Flowdrill/ Flowtap machines produced by Cullman. As they grew in popularity throughout the industry, other design/build companies purchased these spindles, along with our heavy-duty slides and control packages, for use on their projects.

Feed options for the HD Slides include: air feed, servo-motor and ball screw feed, or servo hydraulic feed. We also offer a complete control package for all of the above including programming.

Customers Rely on Cullman because they know every member of their team has a solid background in manufacturing, with years of training and experience in all types of motion control utilizing servo-motor, servo-hydraulics and air systems. Before joining the team, the current shop supervisor had over 20 years experience as a lead machinist in the aerospace industry. And he's still a beginner in the eyes of the Chief Engineer, with over 40 years' experience in machine design and programming.

Cullman made a name for themselves with the development of the CAI-2000 series Flowdrill spindles. Later they added thru-the-spindle coolant to the CAI-2000 spindles for high speed carbide drilling applications. Cullman incorporated new, low cost, vector drive ball screw feed system for the CAI-2000 spindle/slide assemblies. Throughout its14 year history Cullman has been recognized in several industrial publications for achievements in innovation and Flowdrill applications.

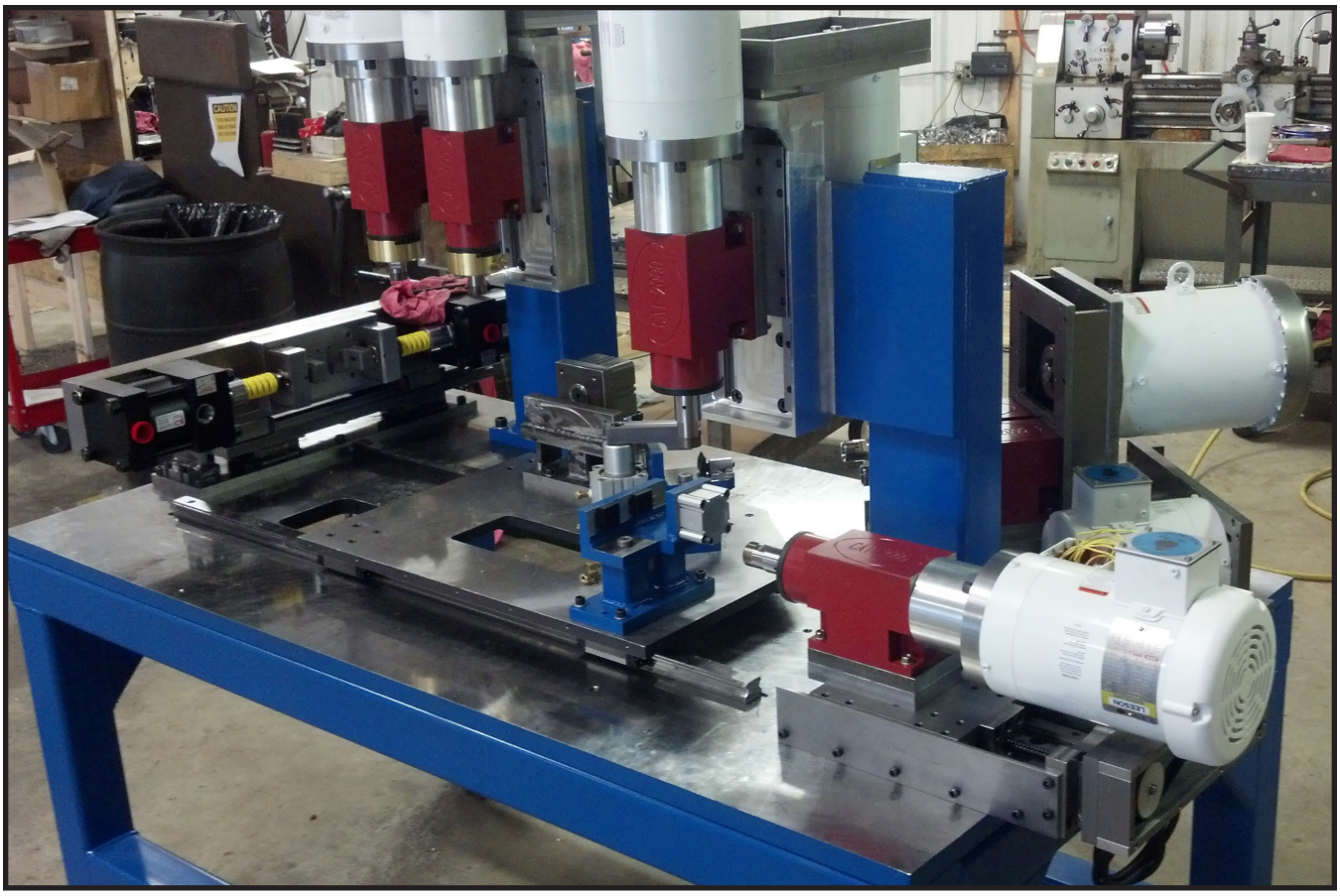
Company founder Keith DeMonia is responsible for development of a servo-hydraulic feed system used to Flowdrill 2.625" dia. holes. This is to-date the largest Flowdrill bit ever made.

CAI is a growing company adding personnel every year for the last 4 years. 2014 will be no exception. The company looks forward to adding at least 2 more technical positions this year along with more equipment. Its 5-year plan is to work with the local community to build a new plant in the new industrial park located approximately 3 miles from the company's current location. The property will offer the ability to expand for years to come.

The business climate in industrial manufacturing is constantly changing. With every change comes opportunity. For several years, the trend within American industry has been to move labor-intensive manufacturing to other countries in an effort to increase profits. At CAI, they feel they have a unique ability to offer automated machinery to reduce cost without expensive relocation.

"Cullman Automation, Inc. is dedicated to helping our customers increase productivity, produce higher quality products, and increase profits by solving problem areas in production lines. These problems may be quality related, ergonomic problems, process issues, higher production quantities needed or excessive personnel in the manufacturing process," says Cullman Automation president Keith DeMonia.

"We achieve this by designing and building custom machinery and equipment tailored for our customers' specific needs. We utilize state-of-the-art control methods and innovative design techniques along with a commitment to build only low maintenance, heavy-duty machinery."



Professional Fabricators choose CARELL®

Angle Rolls
½" to 10" Capacity

Plate Rolls
20Ga to 6" Sizes

Vertical Systems
for Tank Production™

Production Cells
for High Speed Rolling

Consistent Performance comes from the Most Dependable Components

Universal Roll Benders • Ornamental Fabrication • Rebar Bender & Shears
Leading Edge Technology • Superior *PLATINUM* Warranties • Machines for any budget

CARELL® CORPORATION
FABRICATING MACHINERY

www.carellcorp.com
251-937-0948

CARELL CORPORATION 20 YEARS OF INNOVATION & SERVICE IN THE AMERICAS

CAD/CAM Software and High Speed Machining

By Chris R Corbell

What is CAD/CAM Software?

Computer Aided Design. In reference to software, it is the means of designing and creating geometry and models that can be used in the process of product manufacturing. Computer Aided Manufacturing. In reference to software, it is the means of processing a designed part model, creating machine toolpath for its various components and creating an NC program that is then sent to a CNC Machine tool to be made. The CAD and the CAM are integrated into one system. CAD/CAM software is also highly referred to as CNC Software as well. The heavily searched term, "CNC Software" will also include pc-based cnc controller software as well. This is where you can turn your computer into a controller for your machine that supports up to 6 axis programs. An excellent example of this is Mach 3 controller software provided by ArtSoft.

The purpose of CAD/CAM is to automate and streamline CNC programming allow innovators, designers and CNC businesses to manufacture products, bringing them to market faster and more profitably than ever before. It is the concept of producing goods Faster... Smarter & Easier.

Traditional Offset versus High Speed Toolpaths

The term, "Toolpath" is used to visually display and describe the route in which the CAM side of the software tells the cutting tool to machine the geometric regions of the part model. It's the path that the tool takes when machining. Toolpath is going to be basically being defined by the part or areas that the user has chosen to machine, the size of the tool being used, the cutting regions for those tools and the type of machining strategy that is used. That is toolpath whether it's for a mill, router, laser, burning machine, waterjet or cnc lathe. There is a lot of other data that is included in the creation of a NC Program that has to do with post processing parameters such as speeds and feed rates based on strategy, material and tool data and more. Machine controllers can be different in how they want to see the g-code for the program to be read properly by the controller. That is

A New and EZ way to Change Oil!

Regular oil changes are an important part of equipment maintenance— but draining the oil can be very messy, and if you're not careful, you might cross thread the drain hole when reinstalling the plug. Take the pain out of the drain by using the EZ Oil Drain Valve!

The EZ Oil Drain Valve simply replaces your stock oil drain plug for fast, clean and easy oil changes. No need for tools — just lift and turn the lever of this nickel-plated brass ball valve to drain oil, and then return the lever to its original locked position when finished.

An optional hose end makes it easy to connect a hose to drain the oil into a remote receptacle, if desired. The EZ Oil Drain Valve is available in 30 different sizes for all engines.

For more information, visit www.EZoildrain.com or email us at EZoildrain@msn.com

Global Sales Group
2537 152nd Ave. NE
Redmond WA 98052
Phone: (425)999-1200
Fax: (425)658-7909

toolpath.

More than one toolpath is typically used to perform machining operations. Generally this will be a "Roughing" and a "Finishing" operation. Roughing is generally the first stage of machining.

This is where multiple step downs by the tool, remove the bulk of the material.

The second operation will be the finishing operation to complete the machining phase. There is also "Semi-Finishing". An example of this would be the use of a Z-Level Roughing operation to remove the bulk of the material. Then a Z-Level Finishing operation to "semi-finish" the part and lastly a "Equi-Distant Offset contour" operation to finish the part off. By employing the use of High Speed toolpaths into your machining operations you can achieve excellent results faster than by using traditional offset toolpaths. Even in the world of 3D machining. BobCAD-CAM software offers a unique Advanced Roughing operation that includes the option to use an Adaptive High Speed machining technique. This was specifically added to give the programmer an advantage in roughing out 2D or 3D regions of a part, or the entire part.

Boundaries can be created and used to segregate the toolpaths into specific regions of the part, deep cavities or regions that require a smaller tool to machine. This would not be used to replace a REST operation. An advanced REST machining operation would be used as a part of the finishing process to clean up areas where the larger tools were unable to machine. Traditional offset toolpath has been the most common form of toolpath in use since the advent of CAM software. However, as more and more shops begin to use HSM they are trusting it more, becoming less criticaland beginning to enjoy the benefits of it. The goal of using a trochoidal form of machine path is to limit the number of collisions that the cutting edge of the tool has with the material, reducing chip load, better utilize the cutting tool itself by using more of it while taking deeper cut depths and all while at much higher speeds.

There are distinct differences in toolpath operations, planar, offset and high speed (HSM).

Planar (1) is the most fundamental of the three and is basically a back and forth slice across the material. Options for this style of toolpath would include the ability to machine in one direction (zig) and back and forth (zig-zag). You should also be able to determine a cut direction (climb or conventional), determine a "Lace Angle" parameter and a step over for the cutter. Some CAM systems will allow you to include a side allowance and a bottom allowance so that material can be left over for a finish pass. Tool lead-ins and lead-outs will often times be limited to a plunge, ramp or a spiral lead-in when using this type of strategy, each option definable through input parameters. In addition, compensation controls can be available for the finish pass. These options would include the availability of a complete tool database/library with tool crib and tool holder libraries as well as a complete material database/library. CAM software is designed to organize these strategies and associated variables. BobCAD-CAM has developed each machining operation into "wizards" that step the operator through the procedure so that the features are organized and no variable is left behind. This makes the process easy to understand and get through.

In addition, the CAM software allows for the overwriting of system tool parameters so that the experienced operator is not limited. These would include the use, or not, of system tools, tool height and offset values, speeds and feed parameters for the operation. These operations should also allow for the slowing down of the tool when entering an arc corner (when not using HSM).

Offset (2) is most common in cnc machining open or closed wall pockets and slots in a 2D/2.5 Axis (X, Y and Z step down) program. Very similar to planar, this type of operation in a CAM system is going to have the same variable inputs. The difference is whether you want to create anoffset IN or an offset OUT. These concentric offsets will either start outside working their way toward the center of the specified cutting area or start in the center and work their way toward the outer wall or defined area.

All of these operations in a CAM program will also include single step or multiple step options. This is where a total depth is either automatically calculated based off of the part model or manually input by the programmer. A depth of cut is entered and the CAM program should automatically calculate the number of Z-Cuts needed to machine (rough) the part region.

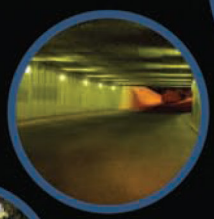
The offset toolpath will typically have many right or left turns where there can be a lot of stop and go occurring with the tool while machining. The more times this happens the more wear and tear there will be on the tool. Often times this type of toolpath will produce higher levels of vibration as well and require spending more money on tooling for jobs that have cutter designs that minimize heat in the cutting zone in order to reduce power consumption as well. Offset toolpath can lead to higher rates of tool deflection which can also lead to parts being cut out of tolerance and poor surface finish results. This means that higher speeds and feeds often times cannot be used. While offset toolpath can be very useful, it is the High Speed toolpath strategies that provide the greatest benefit.

High Speed (3) machine toolpath strategies, also known as "Trochoidal" machining toolpaths open the door to a number of important benefits.

- The controlled arc of engagement generates low cutting forces which enable high axial depths of cut. Multi-edged tools can be used which enable high table feeds with secure tool life. In other words, deeper cuts can be achieved easily.
- The whole cutting edge length can be utilized ensuring that the heat and wear are uniform and spread out, leading to longer tool life.
- There is a constant tool engagement, deeper cutting and NO stop and go.
- High Speed toolpaths are excellent for slotting and pocketing when vibration is a problem.
- Much higher speeds are used resulting in superior finishes due to a number of factors (reduced tool deflection, vibration/chatter etc.)while machine cycle times are vastly reduced. Shorter cycle times on jobs.

Most shops are cutting faster today than they did ten years ago. Albert Einstein said it first and best, "All motion is relative." From that perspective, incremental improvements in "rate" mean that a shop is machining at high speeds relative to what it did previously. Increasing the feed rate of a ball-nose end mill in tool steel from 12 to 24 ipm and spindle speed from 4,000 to 8,000 rpm is a 100 percent increase in cutting speed and well within the capability generally found on most CNC machining centers.

In addition, as the cutter creates a chip, the heat generated by that action is transferred to the chip. When the chip breaks and leaves the cutting zone, the heat is carried away with it. A big advantage of high speed machining is that at elevated rates of speed and feed, the chip is cut and evacuated so fast it tends to transfer little or no heat to the green workpiece. In many cases this eliminates the need



Architectural
LED Lighting

Roadway &
Area Lights

Lamps for Post &
Pendant Luminaires




LEDtronics.com

The Future of Light. Today.

LED Tube Lights

LED Strip/String
/Path Lighting

Miniature &
Intermediate
Based LED Bulbs


LED®
LEDTRONICS, INC.®
Designed in the USA
800.579.4875 webmaster@LEDtronics.com

for coolant. At conventional machining speeds, there is time for heat to move from chip to uncut metal and create a work-hardening condition.

This increases the force needed to create a chip, which creates more heat, and so forth. Coolant mitigates the cycle by reducing the temperature in the cut zone and flushing away the chips. However, at very high rpms, the tool rotation throws coolant away from the cut zone so without very high pressure or through-the-tool piping, it never reaches the cutting zone. Trapped chips can remain in the cut, allowing them to be re-cut by the tool. Therefore, an air blast is very efficient for evacuating chips in high speed applications.

High speed machining can certainly help a shop manufacture more accurate parts with better surface finishes. And often, because a machine tool and workpiece setup has to be very rigid for high speed machining, the results are more consistent workpieces. All of this together amounting to higher efficiency in CNC programs, machining and in the end, increased profitability for a CNC business.

SOME HISTORY...

Years ago, in the beginning of NC, each block of data was executed in order, one at a time. Speeds were sufficiently slow that this was a workable arrangement, especially for drilling and 2D linear milling operations. It was when the machine needed to execute a curve or contour that the need arose for seeing what kind of data was ahead in the program. Otherwise machine momentum would cause the cutter to overshoot or undershoot a programmed change in cutter direction, wreaking havoc on the workpiece. That need lead to the development of look-ahead, which is requisite for high speed machining of any geometry except for linear, single-axis moves. If your CNC controller doesn't have a look-ahead feature, it needs to be upgraded for high speed machining. In 2013 there are many affordable solutions to this such as Mach3 by Artsoft that can help ramp up those older machines.

Taking The High Speed Route To CNC Profitability

We really do not see a training book that specifically addresses high speed machining and CAD/CAM together. However, CAD/CAM software is an absolute necessity for the creation of these types of machining toolpaths. Without CAD-CAM software they wouldn't exist today. The benefits listed in this paper outline all of the reasons why shops should take advantage of this technology. And now, high speed adaptive roughing strategies being available through BobCAD-CAM for Multiaxis cnc machining for the first time, opens the door for even more complex cnc work to take advantage of its powerful abilities and profit-building results. Machine time is money and the reduction in cycle times that lead to faster turnaround, happier customers, better finish results, reduced tooling expenses and a longer life for your cnc machine tool all equal profit and better business practices.

For more information high speed (HSM) CAD/CAM machining technology, you can contact BobCAD-CAM directly at 877-262-2231 or 727-442-3554. You can also visit them online at http://www.bobcad.com for a free demo of their latest cnc software with high speed machining capabilities.

PHASE CONVERTERS

RUN THREE-PHASE EQUIPMENT FROM SINGLE-PHASE POWER SOURCE

STATIC CONVERTER

- 2/3 POWER
- MOTORS ONLY

THE *STATIC CONVERTER* RUNS MOTOR LOADS ONLY - AT 2/3* RATED HP. IT IS THE WORKHORSE FOR COUNTLESS THOUSANDS OF REGULAR SHOP MACHINES SUCH AS MILLS, LATHES, ETC. THE STATIC CONVERTER IS A GREAT CHOICE WHEN FULL POWER IS *NOT* NEEDED.

CONSULT PHASE-A-MATIC, INC. TO SEE IF THIS IS THE RIGHT CHOICE FOR YOUR APPLICATION

*50% FOR DELTA WOUND MOTORS

Need 3-phase power?

GET CONVERTED

WE'LL HELP YOU!

SINCE 1965
OVER 45 YEARS
EXPERIENCE IN PHASE
CONVERTER SYSTEMS

★★★★★

MOST MODELS
IMMEDIATE DELIVERY
FROM STOCK

RUN ANY THREE-PHASE
MACHINE AT ANY
SINGLE-PHASE LOCATION.
GREATER OPPORTUNITIES
FOR YOUR BUSINESS,
YOUR FUTURE

661-947-8485

FOR 46 YEARS
PHASE-A-MATIC, INC. HAS BEEN
PROVIDING PHASE CONVERSION
FOR THE HOME SHOP MACHINIST,
THE INDUSTRIAL MACHINIST,
THE FARMER IN AGRICULTURAL USE,
FOR FOOD PROCESSING EQUIPMENT,
THE WOODWORKING INDUSTRY,
THE METALWORKING INDUSTRY,
MEDICAL EQUIPMENT, ELEVATORS,
RADIO/ TV TRANSMITTERS - FOR
VIRTUALLY ANY THREE PHASE
LOAD TYPE.

ROTARY CONVERTER

- FULL POWER
- ANY 3-PHASE LOAD
- CNC AVAILABLE

THE *ROTARY CONVERTER* PROVIDES THE FULL POWER NECESSARY TO RUN ALL LOAD TYPES, WHETHER MOTOR, RESISTIVE, INDUCTION OR TRANSFORMER LOAD, OUR ROTARY CONVERTER WILL POWER IT.

THE *CNC ROTARY CONVERTER* IS AVAILABLE TO RUN EQUIPMENT THAT IS VOLTAGE-SENSITIVE SUCH AS CNC / PLC APPLICATIONS.

PHASE-A-MATIC

QUALITY GUARANTEE USA MADE IN USA

www.phase-a-matic.com **1-800-962-6976**

NFPA70E, Arc Flash & Safe & Efficient Thermography Practices

By Josh L. White

What is an Arc Flash?

An arc flash is like a bolt of lightning that occurs around energized electrical equipment. It can occur spontaneously and is often triggered simply by the movement of air when an electrical enclosure is opened. The NFPA has recognized the significant hazard of arc flash and is attempting to protect workers via the latest implementation of NFPA 70E-The Standard for Employee Safety in the Workplace.

About 10-15 serious arc flash incidents occur in the US each day. Most causes of arc flash are operator induced.

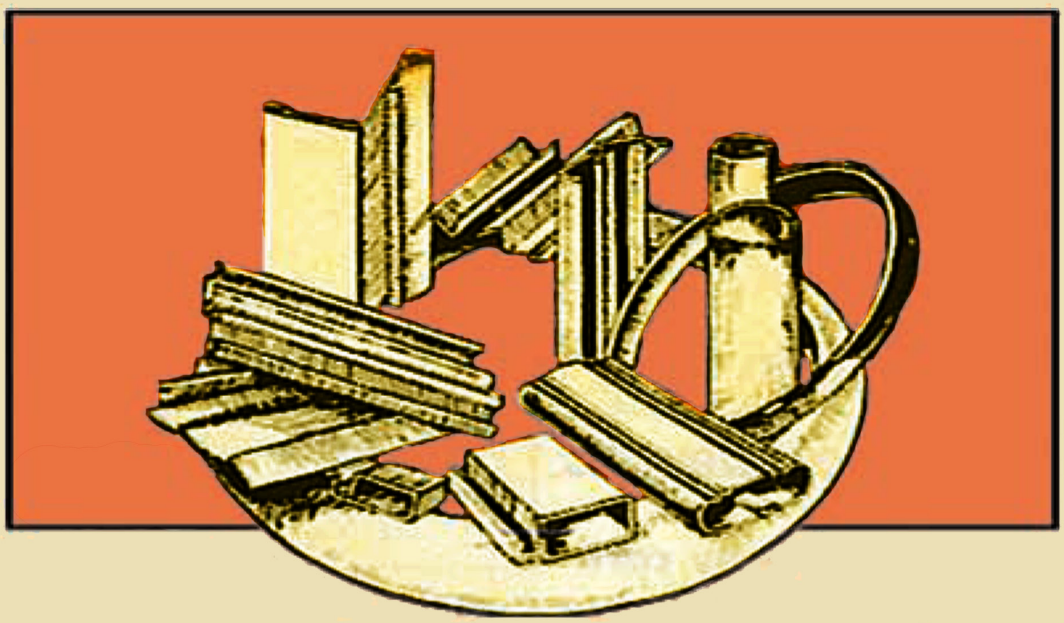
Most technicians who routinely work around energized electrical equipment are familiar with arc flash-having seen it firsthand. It is thought of like a major automobile accident: no one really expects it to happen to them, so people have a tendency to drive with significantly less caution than they should. So it is with arc flash, only worse. Similar to driving you can make a mistake, or you can be doing everything right when someone slams into you.

Specifically, what is an arc flash?

An arc flash is electric current flowing through an arc outside its normal path where air becomes the conductor of high thermal energy (5000ºC %2B) and generates highly-conductive plasma. An arc flash will conduct all available energy and generate an explosive volumetric increase of gases which blows electrical system doors off and potentially generates shrapnel.

What are the causes of Arc Flash?

An arc flash occurs when the gap between conductors or conductors and ground is momentarily bridged. There is always a trigger event which almost always involves human intervention.



ROLL FORMED SHAPES IN ALL METALS

ANGLES • CHANNELS • TUBING • (Lock seam and Open seam)
SPECIAL SHAPES * RINGS • FRAMES
Roll Formed from Plain, Prepainted, Prelaminated, Preplated, Ferrous and Nonferrous Metals

COMPLETE PRE & POSTFABRICATION OF ROLL FORMED SECTIONS
Large Stock of Open Dies and Our Own Engineering and Tooling Departments Ensures Prompt Delivery and Low Prices With Guaranteed Quality

WWW.JOHNSONROLLFORMING.COM

JOHNSON BROS. METAL FORMING CO.

5520 McDermott Drive Berkeley, IL 60163
PH:708.449.7050 FAX: 708.449.0042

Typical causes and contributing factors include:

- Accidental contact with energized parts
- Inadequate short circuit ratings
- Tracking across insulation surfaces
- Tools dropped on energized parts
- Wiring errors
- Contamination, such as dust on insulating surfaces
- Corrosion of equipment parts and contacts
- Improper work procedures

An arc flash is electric current flowing in an arc outside its normal path where air becomes the conductor.

The vast majority of arc flash faults occur when the door is open or being opened. The National Fire Protection Agency (NFPA) is the author of NFPA 70, also known as the National Electric Code (NEC). This paper is not intended to provide a comprehensive review of the information available in the code, but merely to highlight some of the information that may be related to thermography.

NFPA 70E is the standard for safe electrical work practices.

The NEC is an electrical design, installation and inspection standard. It does not specifically address topics like electrical maintenance and safe work practices. A national consensus was needed for safety while working around live electrical equipment. NFPA 70E is the standard for safe electrical work practices. NFPA 70E addresses four specific topics: safety related work practices, safety related maintenance requirements, safety requirements for special equipment and installation safety requirements. NFPA 70 suggests that a Hazard/Risk analysis must be conducted prior to working on electrical equipment. The core of the analysis is based on shock and arc flash boundaries which must be done by a qualified electrical engineer.

Shock Hazards, Flash Hazards and Personal Protective Equipment (PPE) Selection

Prior to beginning work around live electrical components, an Energized Electrical Work Permit must be obtained and should include but not be limited to the following:

- A description of the circuit, the equipment to be worked on and the location
- Justification for why the work must be performed in an energized condition
- Description of the safe work practices to be performed
- Results of the Shock Hazard Analysis
- Determination of the Shock Protection Boundaries
- Results of the Flash Hazard Analysis
- The Flash Protection Boundary
- Identify the necessary Personal Protective Equipment (PPE) required to safely perform the assigned task
- Means employed to restrict unqualified personnel from entering the work area
- Evidence of completion of a job briefing
- Energized work approval from responsible management, safety officer and owner

Prior to working with live components, the correct Personal Protective Equipment and safe working practice must be determined.

NFPA 70E allows for an exemption to the safe work permit for qualified personnel who are performing tasks such as testing, troubleshooting, voltage measuring, etc. so long as they utilize safe work practices and the proper PPE. Prior to working with live components, the correct personal protective equipment and safe working practice must be determined by carrying out a Shock Hazard and a Flash Hazard Analysis. A Shock Hazard Analysis will determine the voltage to which personnel are exposed, boundary requirements and the proper PPE necessary to minimize the possibility of shock to personnel. The shock protection boundaries are identified as limited, restricted, and prohibited for the distances associated with various voltages.

Unqualified personnel should be notified and warned of hazards by qualified personnel when working at or near the limited approach boundary. When an unqualified person must work inside the restricted boundary, it is important that they be further notified of the risks and hazards and continuously escorted by a qualified person. Under no circumstances should they be allowed inside the prohibited boundary. It is important that a Flash Hazard Analysis be conducted in order to protect personnel from being injured by an arc flash. The analysis will determine the Flash protection boundary and determine the proper PPE. In so doing, the Flash protection boundary is calculated at the distance from energized parts where a burn will be "recoverable" (2nd Degree) and "incurable" (3rd Degree). The guidelines dictate that the Flash protection boundary for systems that are 600 volts or less be 4' for clearing times of 6 cycles (0.1 second) and available bolted fault current of 50kA or any combination not exceeding 300kA cycles. For all other clearing times and bolted fault currents, the flash protection boundary is normally determined based on the calculated incident energy of an arc fault taking into account system voltage, available current, and clearing time (where incident energy is the measure of thermal energy at a specific distance from the fault). Where it is not possible to perform these analyses (or they have not been performed), NFPA 70 provides guidelines (NFPA 70 Table 130.7-C9a) that can be used to determine the required PPE based on the task conducted. In lieu of a Flash Hazard study, selection of PPE by task is normally allowed. However, for tasks not listed in the table and for clearing times different then those listed there, a complete Flash Hazard Analysis is required. Using Flash Hazard Analysis or Task Risk Assessment, the following table can be used to identify the correct PPE:

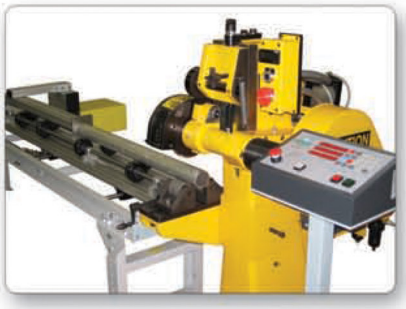
Thermography Inspection Practices Infrared cameras have been used to identify problems in electrical systems for many years. Problems in electrical systems manifest themselves by connections and conductors becoming overheated as the result of increased resistance, the result of loose or corroded connections, or load imbalances. An infrared camera can readily identify these problems in a thermal image and is an excellent method for identifying failing or problem components prior to a failure. A failure can disable an electrical system and cause significant lost production, equipment damage and bodily injury. Insurance companies use infrared electrical inspection to help determine risk profiles and rates for industrial customers. More recently, thermographers have found that they can use IR to prevent and predict failures to help further reduce down time equipment failure and increase overall safety.

CUT COST DRAMATICALLY

Continental
A DIVISION OF
HIGH-SPEED ROTARY
PIPE & TUBE CUT-OFF MACHINES
KIENE DIESEL ACCESSORIES, INC.

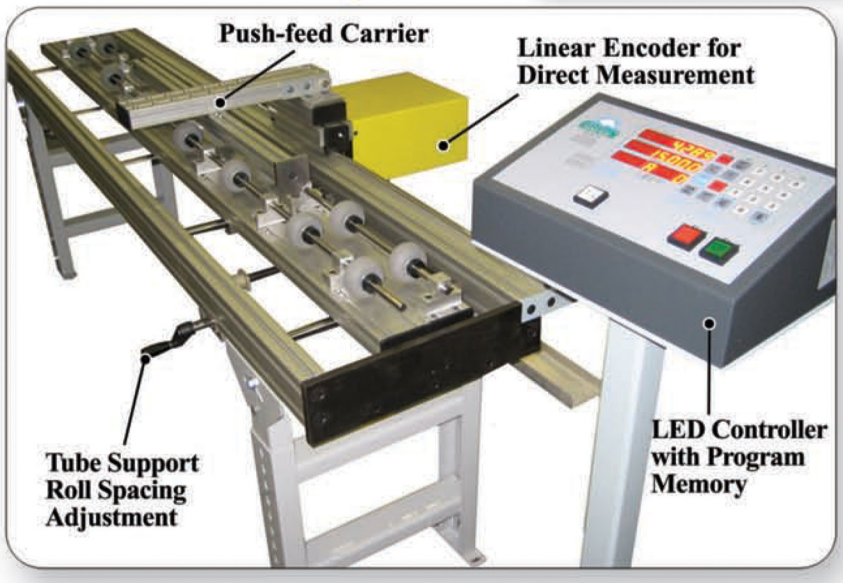
- **Eliminate scrap loss**
- **Deliver up to 900 cuts per hour**
- **Handle variety of pipe and tube diameters and lengths**
- **Air or hand operated machines to choose from**

Unique rotary cutting method eliminates waste. Machine set-up is easy and fast. Cut-off blades deliver thousands of cuts between sharpening. The easiest and most economical way to cut pipe and tube. And, ***Continental*** high-speed rotary cut-off machines are backed by over 90 years of proven reliability.



Introducing the Kentucky Gauge PDS Series Programmable Feeders

for Continental Pipe & Tube Cutoff Machines. Improve the quality and productivity of your cutting operations plus, free the operator for other tasks!



These PDS Series features will improve your pipe and tube cutting operation:

- **Provides fast, consistent cuts**
- **Frees operator for other tasks**
- **Easy to set-up, easy to program**
- **Fast changeover to different tube diameters**

ASK US TO QUOTE ON A FEEDER FOR YOUR EXISTING MACHINE, OR QUOTE A COMPLETE FEEDER/CUTOFF MACHINE SYSTEM...

Continental
A DIVISION OF
HIGH-SPEED ROTARY
PIPE & TUBE CUT-OFF MACHINES
KIENE DIESEL ACCESSORIES, INC.

CONTINENTAL **Pipe & Tube Cut-Off Machines**

A Division of Kiene Diesel Accessories, Inc. • 325 South Fairbanks Street • Addison, Illinois 60101

800-264-5950 • Local 630-543-7170 • Fax 630-543-5953 | info@continentalcutoff.com • www.continentalcutoff.com

Often, during thermography inspections, panel covers are removed and subsequently replaced, a method that conflicts with the requirements of NFPA70E.

Like visible cameras, infrared cameras require a direct-line-of-site view of an object. In most cases surveys are hampered by cabinet designs that obscure the target components being inspected and thermographers are put at risk by having to open cabinets or doors in an attempt to gain access to the internal components. IR surveys of electrical systems are best conducted when the system is under heavy if not peak electrical load, which requires the thermographer to perform the inspection in and around live electrical components. Typically, electrical system covers are removed during thermography inspections and subsequently replaced. This working method conflicts with the requirements of NFPA 70E.

Recommendations of NFPA70E as they relate to Thermography Inspection

NFPA 70E recommends that only "qualified" personnel be allowed to perform work inside the flash protection boundary. Thermographers must be accompanied by "qualified" individuals if they intend to have panel covers removed. Both the thermographer and the additional person should be in full PPE. One way NFPA 70E determines Hazard and Risk and the required PPE is based on the activity that you are conducting around the equipment. Risk potentials are determined on a scale from 0-4, where 4 indicates the highest risk potential. For example, removal of a bolted cover on 600V equipment carries a hazard/risk classification of 3 and that goes up to a rating of 4 on voltages greater than 600V. As this work occurs within the Flash Protection boundary, the appropriate PPE must be worn. The required minimum PPE for Hazard/Risk Classification 3 work is to withstand 104.6 J/cm^2, and the required minimum PPE for Hazard/Risk Classification 4 work is to withstand 167.36 J/cm^2. As much of the work performed for an IR inspection requires removal of bolted covers, this would be the PPE that is required.

Infrared Windows: Eliminate the Controllable Risk

The first rule in any risk assessment is to eliminate the risk if possible. Infrared Windows eliminate many of the risks associated with live inspections since they enable an infrared camera direct view of live electrical components without the need to open electrical enclosures. They provide an excellent means of accessing electrical equipment efficiently and safely. In addition, a second qualified technician is not required to open and unbolt enclosures. An IR viewing window is basically an infrared transparent material with a holder/mounting body. Thermographers may even decide to not use a window when inspecting energized components at some distance from the cover and use a protective grill in place of a window. The grill must be IP2X certified (the grill size must offer protection against foreign objects with diameters larger than 12mm). This method can significantly reduce the window cost and also has the additional benefit of allowing ultra sound inspections of the electrical switchgear. However when using grills, operators will be exposed to live electrical components and they must wear the appropriate level of PPE identified from the Arc Flash Hazard Analysis of the switchgear. Infrared Windows eliminate many of the risks associated with live infrared inspections since they enable an infrared camera direct view of live electrical components without the need to open electrical enclosures. The optics holder design depends upon a number of parameters: the field of view, equipment lens and window size are all functions of the design and must meet all the parameters that the thermographer requires before a holder is manufactured. Also, a protective cover should be included in the design as crystals are very expensive and in some cases, extremely fragile. Infrared Windows are available in multiple sizes and can be custom made to retrofit dead fronts on distribution and isolator boards. The larger the size of the window, the greater the field of view one can see with their IR camera.

Considerations in Installing Infrared Windows

To correctly install infrared windows, the targets that require inspection must be identified. Typically, traditional surveys only look at the bolted connections within the switchgear. These are generally considered to be the "weakest points" or "points most likely to fail." These may include:

- Cable connections
- Bus Bar Connections
- Isolator or Circuit breaker connections

The formula for calculating the field visible through an Infrared Window is: FoV = 2 x tan (angle/2) x D, where FoV is the width of the object area that will be viewed, the "angle" is the angular field-of-view of the camera, and "D" is the distance from the camera (ostensibly the window) to the objects being viewed. Once a decision has been made about what objects are to be inspected through the infrared window, the number of windows and appropriate size must be determined as well as where they need to be installed to ensure best coverage (and therefore maximum efficiency). The size of the infrared window will depend on several factors, including the infrared camera's clear aperture, its ability to focus on close objects, its ability to be placed as close as possible to the window, the camera's angular field-of-view and the amount of manipulation is possible with the camera when viewing through the window. An important consideration is how the infrared camera can be manipulated when looking through an infrared window. A high degree of manipulation can have the effect of increasing the size of the inspection area by up to a factor of 3. This means that if the object under observation is 12 inches across, depending on several factors, it is possible that a window diameter of 4 inches (for IR window size calculation purposes) can still be used if the operator manipulates the camera from left to right or up and down.

The required size of the window will depend on the following:

- the size of the objects to be viewed and their distance from the panel cover;
- the infrared camera's angular field-of-view and clear aperture;
- the camera's ability to focus on close objects and to be placed close to the window.

Typically, infrared cameras have a horizontal field of view of 25°. Those infrared cameras that offer a wide-angle lens option (for example 50°) permit the user to have a substantially wider field of view, resulting in an increase in viewing area through the same infrared window size. This can be a great advantage in certain situations, reducing the size and possibly the number of windows. Other useful infrared camera features are close focus capability, small lens diameter resulting in a small clear aper-

ENGINEERED TRACK SYSTEMS

GRIFFIN™
BY RIGID LIFELINES®

Totally Portable Fall Protection

Wheeled or Skid-Mounted systems available.

- Excellent for temporary applications, indoors or outdoors
- Fully assembled system can be lifted with large forklift or, with the proper options, rolled or towed

NEW! Griffin™ Portable Monorails from Rigid Lifelines® provide rigid track fall protection with coverage up to 30° off plumb. 1 or 2-person systems.

See a video of the Griffin™ Monorail in action: http://grfn.co/tifall13

Use for:

- Trucks – Loading, Securing & Tarping
- Maintaining Large Vehicles & Equipment
- Aircraft
- Railcars

RIGID LIFELINES®

866-990-1008
http://grfn.co/tifall13

©2013. All rights reserved.

ture, motorized focus (eliminating the need to get fingers on the lens focus ring and moving the camera away from the window) and a chassis design that facilitates movement at the window such as an articulating camera head that allows the user to look into windows above eye level or at near floor level.

The View through an Infrared Window

An infrared window allows a camera operator to inspect the inside of an electrical cabinet to check the physical condition of the components that you have chosen to inspect. As with traditional thermographic inspections we can see temperature differences very clearly. You need to have the confidence in the infrared windows that you are using. They are designed to allow infrared energy to transmit through them at a known transmission rate; therefore, if there is even a slight temperature difference you will be able to see that with your IR camera, and be able to record images for the IR inspection program.

Considerations for Installing Infrared Windows

Installing an infrared window requires cutting holes into very expensive switchgear. Therefore, it is very important to be very sure that they are installed in the correct location and that the switchgear ratings are not degraded in any way. Before installation, the following factors need to be considered:

- NEMA or IP rating of the switchgear and IR windows: Remember to never install an IR window of a lower rating than the rating of the switchgear.
- Test Certifications: Ensure that the IR windows have been tested and approved by the certification bodies as the switchgear for which they are intended (i.e. UL, IEEE. Lloyds).
- Internal obstacles: Before removing internal Perspex/ Plexiglas covers or cables, ensure that the local safety manager›s approval is sought first. In some cases you may not be able to totally remove the covers and may only be able to modify them by drilling or punching holes to retain the IP2X requirement for some switchgear.
- Explosion Ratings (if applicable): Some panels are positioned in intrinsically safe areas and as such can never be modified in the field.
- Dielectric Clearances: Where IR windows use grills or inspection orifices, they must comply with IP2X (13mm 0.5»), and clients must be made aware of the safe dielectric clearances for the type of switchgear that they intend to install the window into. The table shown at the left (from IEEE C37.20.2 table A.3) specifies minimum distances from live components, and it is recommended that these be considered as a standard for grills/ inspection orifices.

When using Infrared Windows, it is important to correct for the transmission specification of the window and the emissivity of the component that is to be inspected through the IR window. One way of correcting for the effects of the window is by adjusting the camera's emissivity value for an object of known temperature until the camera's reading is correct. For objects at the same ambient temperature and emissivity, the new emissivity value can be used.

When using Infrared Windows, it is important to correct for the transmission loss of the window and the emissivity of the component that is to be inspected through the IR window.

Another way of using IR windows is to prepare all components that are to be inspected so that they have the same emissivity (for example, with electrical tape, emissivity paint, IR-ID Labels). In this case, all components being inspected will have the same transmission rate and emissivity readings; consequently, the results gathered will be far easier to compare.

Can IR Windows Carry a Generic Arc Rating?

Electrical switchgear takes on many different shapes and sizes. The surface areas and volumetric elements of the cabinets are different with each model, type and rating. Each cabinet is subjected to the testing that is laid down by the certification bodies such as UL, IEEE, etc. This test is completed on the cabinet assemblies and not the components that make up the assembly. Electrical cabinet designs and dimensions are infinite, and we therefore CANNOT or MUST NOT use the data from one cabinet design for another design unless they are identical in every way. This is why components never carry a generic arc rating and must be subjected to industry standard tests to confirm that they conform to the minimum required level of mechanical strength and environmental properties for the electrical cabinets and assemblies which they are going to be fitted into.

Conclusion

Because of the frequent occurrence of arc flash in industry, it is extremely important to be aware of the risks associated with inspection of high voltage switchgear and related items. Concerns about operator safety due to an arc-flash event are causing inspectors to adopt new practices in accordance with NFPA 70E, the standard for safe electrical work practices. Shock and Flash Hazard analyses are required in many situations. Personal Protective Equipment recommendations are also available. One new common safety practice involves the use of infrared transparent windows which eliminate many of the risks associated with live infrared inspections since they enable an infrared camera to have a direct view of live electrical components without the need to open electrical enclosures.

Please visit us at http://www.electrophysics.com For more comprehensive White Papers visit our online Knowledge Center www.electrophysics.com/thermal-imaging Electrophysics - IR Cameras for Thermography Professionals 373 Route 46, Fairfield, NJ 07004 Phone: 973-882-0211 Fax: 973-882-0997

TANK MANUFACTURING EQUIPMENT

- Tank Turning Rolls
- Plate Rolls
- Fit-Up Rolls
- Off-Set Joggle Machines
- Side Beam Track Supports
- Tank Assembly and Girth Welding Machines

TURNING ROLL

SLIP ROLL

FOUR ROLL
HYDRAULIC PLATE ROLL

The WEBB Corp.

402 E. Broadway, P.O. Box 549, Webb City, MO 64870
Phone: (417) 673-4646 • Fax: (417) 673-4649
www.webbcorporation.com

Employing Lifting Magnets For Material Handling Operations

By Patrick Stox

Magnetic lifters are a lightweight and cost-effective way of transporting heavy materials in situations where another method of material handling would be difficult, dangerous, or expensive.

These lifters use magnets to hold heavy materials securely without requiring clamps, slings and other holding equipment. They are most beneficial in situations in which another method of material handling would be difficult, dangerous, or expensive.

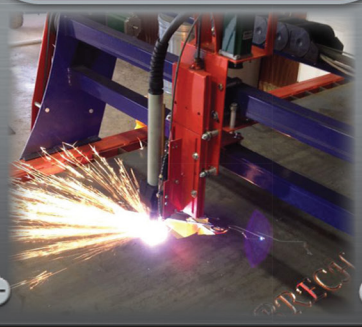
Lifting magnets vary widely in size. Usually, the larger ones are hung from a chain on a crane that is able to move the lifting magnet into the location necessary to retrieve the material. This type of lifter can be used for a wide variety of purposes, including automobile junking, construction, and demolition and cleanup.

How Lifting Magnets Work

There are two types of lifting magnets: permanent magnets and electromagnets. Permanent magnets use permanently magnetized material to create a magnetic field. They can be used to lift loads up to 2,200 pounds. These lifters can be moved easily to various work locations. However, one disadvantage of permanent magnets is that they have a restricted lifting capacity. If a variable lifting capacity is required, the optimum choice is the electromagnetic lifter.

The Only *Affordable* CNC Tables That Do It All!

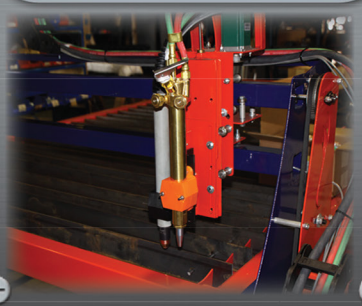
CNC Plasma Tables



CNC Router Tables

CNC Plasma / Engraver Tables

Acetylene Torch Tables



Water Jet Tables

CNC Vertical Tables

The catalyst to unleash your inner designer, take control of your production schedule, and enable ideas to grow your business.

BURNTABLES

Dream, Design, Make it.

BurnTables | 512-843-CNC1 (2621) | www.BurnTables.com

Electromagnetic lifters use an energized electrical coil wound around a steel core to orient magnetic domains within ferrous materials in a common direction, thus, creating a magnetic field. Unlike permanent magnets, electromagnets require a constant DC power source. Hence, a power failure can be a safety issue with electromagnets unless an emergency power or backup supply is integrated with this type of lifting system.

Permanent magnets are favored (1) when electricity is not available, (2) when power failures are a common occurrence, or (3) when adjustable magnetic force is not necessary. Electromagnets are the choice for applications where varying strength or remote magnet control is required.

Suitable Applications for Lifting Magnets

Smooth, Flat Surfaces: Permanent lifting magnets are manually operated. They create a very strong but low magnetic field so they are sensitive to air gaps between the magnet and the load. When an air gap increases, the magnetic force will be significantly reduced. They work best on smooth, flat surfaces rather than rough and irregular ones.

Type of Material: While ferromagnetic materials are inherently magnetize-able, paramagnetic materials, such as aluminum and magnesium are not. (Diamagnetic materials, such as copper, lead, and silver, do not magnetize.) For materials other than iron-based materials, a reduction factor must be calculated to determine the effective holding force.

Thickness of Material: The thickness of the material to be lifted also plays a role factor in selecting a lifting magnet. Thick materials are the best candidates. Materials thinner than the specification for the lifting magnet will have a much lower level of holding force.

Benefits

Lifting magnets save time by reducing and sometimes eliminating blocking and slinging. They can also eliminate or decrease waste. They reduce product damage commonly caused by chains, hooks, and other mechanical grabs. But the significant advantages of lifting magnets are ease of operation and cost-effectiveness.

Electro-Permanent Magnetic Lifters: Failsafe and Variable Holding Power

Electro-permanent magnetic lifters counter the limitations of permanent and electromagnets by combining the advantages of both.

The restricted lifting capacity of permanent magnetic lifters and the non-failsafe operation of electromagnetic lifters are two limitations of these types of lifters. To overcome these limitations, lifting magnet designers have created the electro-permanent magnetic lifter, which combines the advantages of both the permanent and electromagnetic lifters in one module.

Types of Magnets

There are three types of magnetic lifter technologies: permanent magnetic, electro-magnetic and electro-permanent magnets. The permanent lifting magnets use failsafe, permanent magnets, but they do not have a variable holding power capability, which restricts both their load capacities and the variety of applications they are best suited for.

Electro-magnetic lifters use a controller to generate a DC voltage in a coil embedded within the lifter module to generate the magnetic work holding force. The DC controller's voltage can be adjusted to vary the magnetic flux field, which, in turn, varies the holding force of the electromagnetic lifter. This feature makes electromagnetic lifters flexible holding devices and very cost-effective as well. But electromagnetic lifters require continuous electrical power to operate. A power failure will de-energize the electromagnet, shut down the magnetic field, and create a potential safety hazard. Electro-permanent magnetic lifters counter these limitations.

Electro-permanent Lifter Operation

Electro-permanent magnetic lifters (commonly called electroperms) are a hybrid of the permanent and electromagnetic types. They are constructed with a coil wound around a magnetic material that is permanent, embedded in the lifter module. When a DC voltage is applied, the material is charged, which takes about 1 second, and attracts the material to the lifter even after power is removed. The lifter will hold the load until the electro-permanent magnet is turned off. This features gives electro-perms a failsafe operation.

Another function of the electroperm's coil is to control the amount of magnetic force of the lifter. This feature gives it a variable holding power capability similar to electromagnetic lifters. This feature extends the types of applications the electroperm is suited for. Electroperms can be used in tandem for beam lifting operations as well as for light load, pick and place, robotic operations. For pick and place operations, the electroperm is modified to be lightweight for maximizing end-of-arm capacity. They are constructed with special coil configurations for fast switching with minimum dwell times and soft pole shoes contoured to provide the easiest access to the part.

Battery Operation

Electro-permanent magnetic lifters are sometimes called battery lifters because a battery instead of a D.C. controller is used to provide the power for the electroperm switching cycle. The battery gives the lifter portability. It also makes for a simpler system design because a complex D.C. controller is not necessary. However, the battery will require maintenance and periodic charging.

Improving Productivity With Magnetic Lifters

Magnetic lifters eliminate the time-consuming use of blocks, chains, slings and taps in material handling operations.

WERE ON FACEBOOK!

https://www.facebook.com/TodaysIndustrialProductsandSolutionsMag

The most common discourse regarding magnetic lifters are the technical features, construction, materials, versatility, and wide variety of applications these workhorses are most suited for. What is less often discussed is how they change a machining operation's work processes and productivity with man-hour savings. In this respect, the adoption of magnetic lifting extends much beyond the shop floor. Magnetic lifters make good business sense.

Moving steel plates or tons of scrap in shipbuilding yards, warehouses or machine shops can be a time-consuming endeavor. Typically, the material is either collected in a container, which is moved, or the material is gathered together, stacked by hand, and bound with blocks, chains or slings and finally attached to a crane. These tasks often require more than one worker as well as extra preparation time so the material can be transported safely. Magnetic lifters can change this labor-intensive task with the turn of a lever or the flip of a switch.

The Ways Magnetic Lifters Improve Productivity

No More Eyebolts: Magnetic lifters eliminate the need for drilling and tapping holes in materials, parts or end products prior to their being moved; this saves a lot of time. To attach the material to a lifting magnet only requires energizing the magnet either manually or electrically, depending on what type of magnetic lifter is used, permanent magnetic or electromagnetic, respectively.

Vertical Lifting Capability: Lifting Magnets allow vertical lifting in confined locations. An example of how this can positively impact productivity might involve a crate of parts that require machining. Often the parts are stacked side by side in a container. If the parts are located so that the operator can only access the parts from above, a lifting magnet can be applied to a single part, lifting it vertically out of the container.

Replacing Straps and Chains: Magnetic lifters can replace the need of straps and chains. For example, if a container is filled with round shafts packaged horizontally, using a strap or chain would require one end of the part to be lifted manually so that the strap or chain could be passed underneath. This operation would need to be repeated for every bar in the container. By using a lifting magnet attached to a crane, it could be lifted out of the container with minimal effort.

Eliminate Blocking and Slinging: Magnets further save time by eliminating blocking and slinging. They also reduce waste. Magnets won't mar metal surfaces. They decrease the potential for the kind of product damage often caused by chains, hooks and other mechanical grabs.

The Built-In Safety of Permanent Lifting Magnets

Failsafe operation is the unique advantage of permanent lifting magnets. They are immune to power failures.

Permanent lifting magnets provide a quick and efficient way to lift, lower and vertically or horizontally transport sheet, flat and round steel, such as plates, forgings and die castings. Since they do not require electricity to operate, they have a built in failsafe feature that eliminates the work safety hazards caused by power failures.

Overview of Permanent Lifting Magnets

Permanent magnet lifters are made from two types of magnets: Rare Earth and Ceramic. Lifting magnets have a very strong but low magnetic field and are capable of safely lifting loads in excess of 2,000 pounds, which can be diminished under certain load conditions. These magnets are sensitive to air gaps between the magnet and the load. This means that when the air gap increases, the magnetic holding force will be reduced due to a lower density of magnetic flux between the magnet and the load. Air gaps are created in different ways. A few examples are paint, dust, and heavy mill scale. Badly machined surfaces also create air gaps. Full lifting capacity can only be obtained when the magnet makes full contact with the material being lifted.

Operation

Permanent lifting magnets do not require electrical power to operate. They are operated manually with a lever mounted on the lifter. However, they cannot be operated remotely. Permanent lifting magnets are easy to operate. With the lever in the off position, the load should be placed on the lifter, eliminating as many air gaps as possible. When the magnetizing lever is placed in the "on" position, the load will be magnetized and ready for lifting. Attempt a trial lift to ensure the load can be lifted safely. When the lift is completed, and the load has been placed completely and safely in a resting position, move the lever to the "off" position to release the load from the lifter. For long and heavy loads, multiple magnets can be used in tandem to extend the lifting capacity.

Immune to Power Failures

Failsafe operation is the unique advantage of permanent lifting magnets. They are immune to power failures. The electromagnetic lifter does not have this safety feature because electromagnets require continuous electrical power to operate. Electromagnetic lifters would require the integration of an uninterruptible power supply to produce a failsafe operation. This would, of course, increase start up, maintenance and operating costs. On the other hand, the electromagnetic lifter is the most cost-effective "magnets per pound of lift" since they can extend the lifting capacity beyond what permanent magnetic lifters can handle. The electro-permanent magnetic lifter also possesses the failsafe feature but this type of lifter requires electrical power to turn the lifter on or off. The power can be supplied by a battery. The amount of power consumption to turn the electro-permanent lifter "on" or "off" is nominal. However, the battery will need to be charged periodically.

DocMagnet Inc. designs and supplies Magnetic Material Handling equipment. DocMagnet offers a full line of Permanent Lifting Magnets and Electromagnetic Lifters for most applications.

RUGGED PROTECTION

FOR YOUR FORKLIFT'S BATTERY

RUGGEDIZED SHUT DOWN TIMER

- Designed to protect your vehicle's battery from over discharge
- Programmed to automatically turn off electrical loads at a low voltage battery level, or at a preset time after the vehicle's ignition has been shut off
- No special tools required for installation
- Potted to protect against heat, moisture and humidity
- Can be installed in a vehicle or forklift's engine compartment (12V or 24V inputs)

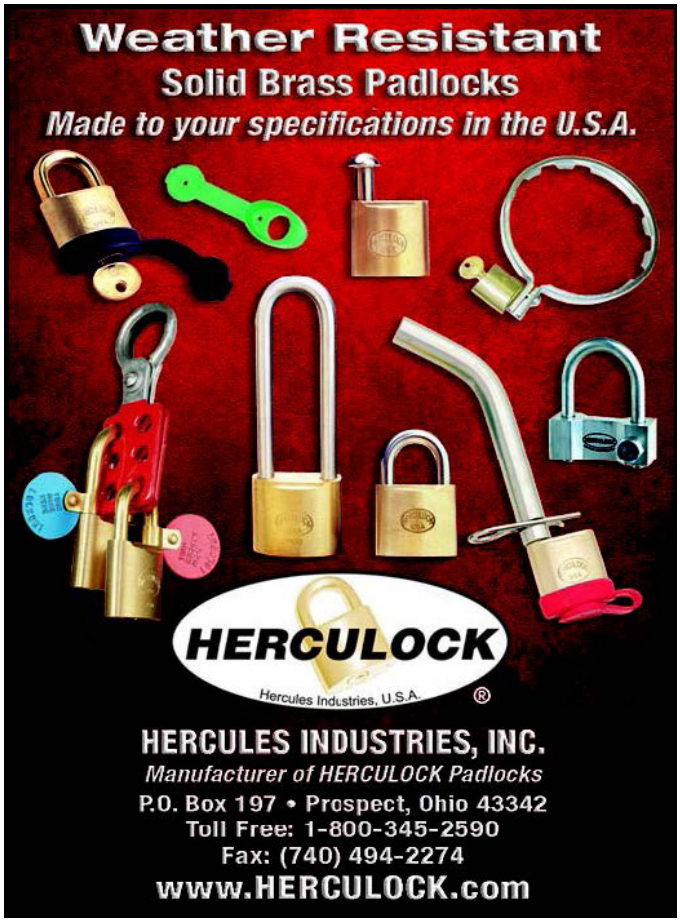
To learn more about how Lind's **Ruggedized Shut Down Timer** can meet your mobile power needs, contact Lind at **1.800.897.8995**, via email at **info@lindelectronics.com** or visit us online at **www.lindelectronics.com**.

LIND

POWER SPECIALISTS FOR MOBILE COMPUTING

1.800.697.3701 **info@lindelectronics.com** **www.lindelectronics.com**

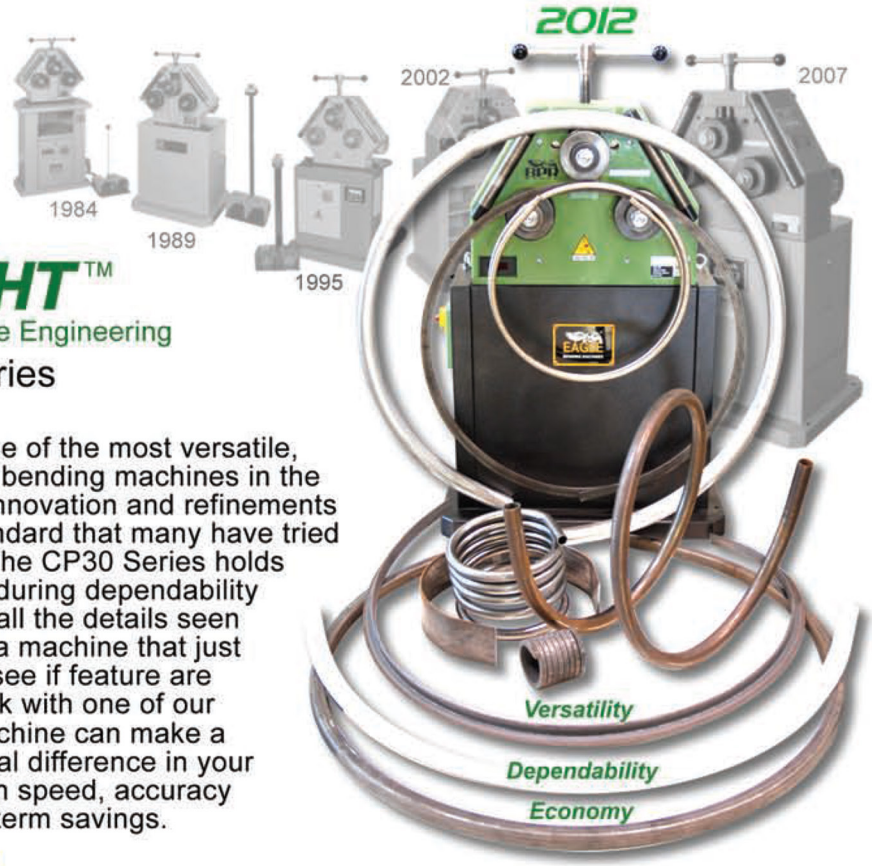
Ad INDEX



EAGLE
BENDING MACHINES

BEND IT RIGHT™

Superior Precision thru Innovative Engineering



World Famous *CP30* Series

Built on a 27 Year Heritage

The CP30 Series stand as one of the most versatile, dependable, and economical bending machines in the world. A 27 year heritage of innovation and refinements have made it the popular standard that many have tried to duplicate unsuccessfully. The CP30 Series holds great value because of its enduring dependability created by close attention to all the details seen and unseen. Before you buy a machine that just looks like an Eagle check to see if feature are compareable to an Eagle. Talk with one of our application experts Eagle machine can make a substancial difference in your production speed, accuracy and long term savings.

SCAN TO WATCH WORKING VIDEO!
Get the free mobile app
http://gettag.mobi

Call 251-937-0947 Today!
DEALER INQUIRIES WELCOME!
visit www.eaglebendingmachines.com for worthwhile machine details.

Plate Rolls / Angle Rolls / Tube & Pipe Benders

DEALERS WELCOME

Superior Features are found on all Carell 2, 3, and 4 Roll Double Pinch Plate Rolls, *High Speed* Plate Rolls, *Automatic* Plate Rolls, *Vertical* Plate Rolls, *CNC* Plate Rolls, *Hydraulic* Angle Rolls, *CNC* Angle Rolls, Rebar Benders & Shears, Stirrup Benders, Tube/Pipe Benders, Ornamental Benders, Vertical Tank Systems, In-house Custom Tooling.

CARELL®
CORPORATION
FABRICATING MACHINERY

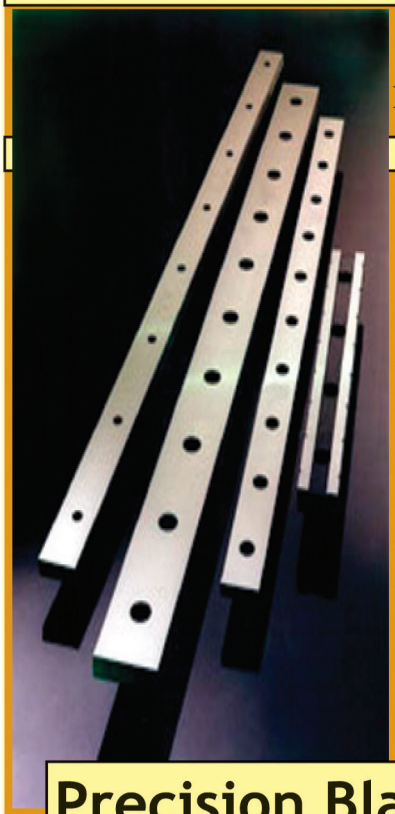
TRUE QUALITY IS ALWAYS FOUND IN THE DETAILS...
WWW.CARELLCORP.COM

Phone: 251-937-0948 Fax: 251-937-0957
P.O. Box 850, Stapleton, AL 36578 sales@carellcorp.com

SCAN TO SEE MORE!
Get the free mobile scanning app at http://gettag.mobi

FEDERAL KNIFE, INC.

Industrial Cutting Knives



1-800-23-KNIFE (800-235-6433) • 812-364-1418 (fax)
P.O. Box 509 • 785 County Line Road • Palmyra, IN 47164

REPLACEMENT SHEAR BLADES DELIVERED FROM STOCK

Shear Blades or All Equipment Makes:

CINCINNATI • WYSONG & MILES • HTC • ACCUR-SHEAR • PACIFIC • AMERICAN HERCULES • NIAGARA • PEXTO • AMADA • STEELWELD/CLEVELAND CRANE • BETENBENDER • ATLANTIC / HACO • LODGE & SHIPLEY / COLUMBIA • CENTURY • HERR-VOSS • STANDARD • EDWARDS/ PEARSON • ADIRA • GATTI • LVD • DI-ACRO / ELGA-HYDRA • HYDRAPOWER • STAMCO • BERTSCH • GUIFIL • SAFAN • DARLEY • RHODES • MORGAN •SUMMIT • DREIS & MANY OTHERS

Precision Blade Sharpening Is Our Specialty!!

Shear blades made from high quality tool steels "performance matched" to your unique cutting application.

Call one of our product specialists for more information.

www.federalknife.com

sales@federalknife.com

WE WILL BEAT

ANY

COMPETITOR'S QUOTED PRICE FOR NEW REPLACEMENT SHEAR BLADES

BY 5% OR MORE *GUARANTEED* *

**** PRESS BRAKE TOOLING * METAL SLITTERS * SLITTING SUPPLIES* 1-800-23-KNIFE ****