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# Today's Industrial Products & Solutions

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**PRESIDENT**

Glen Hobson  
205-441-5591  
glen@tipsmag.net

**ASSOCIATE PUBLISHER**

Bart Beason  
205-624-2180  
bart@tipsmag.net

**ADMINISTRATIVE DIRECTOR**

Steven Hobson  
steven@tipsmag.net

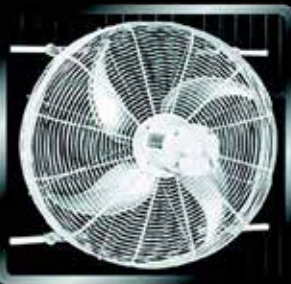
**EDITOR**

Brandon Greenhill  
brandon@handfmedia.net

**CREATIVE/ WEB DIRECTOR**

Jacklyn Greenhill  
jacklyn@handfmedia.net

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[info@tipsmag.net](mailto:info@tipsmag.net)



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## AIDA-America's May Blood Drive

AIDA-America, metal stamping press manufacturer in Dayton, OH, USA, held a blood drive on May 30, 2024. Participating in local blood drives is one way that AIDA-America employees continue to give back to their community. Several employees donated to Solvita during the May 30th blood drive. Twelve units of whole blood were collected. Solvita recently sent blood products to Texas to assist after devastating tornados there. This donation helped replenish their supply for local hospitals.

A huge thanks to all those who signed up to donate: Brian Arehart, Dave Blocher, Don Boyd, Tristin Conner, Steve Easterling, John Hubler, Tim Kaser, Denver Meade, Steve Mikels, Beth Percival, Mason Round, Matt Shetler, and Chris Tsibouris!

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# Purpose-Built Forged Parts Optimized for “End Use”

*By Royce Lowe*

Working with an experienced supplier of open die forgings, seamless and contoured rolled rings, and complex forged parts that prioritizes the “end use” of the part form in the early stages of the process helps ensure quality, performance, safety, and compliance in critical applications.

When forging seamless rolled rings for diverse sectors such as industrial machinery, pulp and paper, turbines, and oil & gas exploration, it is crucial to tailor components for their specific applications, or “end use.” In the realm of metal parts, this term commonly denotes the ultimate form and state of the final machined part, along with a comprehension of the operating conditions it will face during service.

“By understanding the final application or purpose – the end use – for which these parts are designed and manufactured, forged parts suppliers can determine the appropriate materials, manufacturing processes, and quality standards necessary to ensure that the metal parts perform effectively and reliably in their intended applications,” says Jeff Klein, Director of Sales for All Metals & Forge Group. The ISO 9001:2015 and AS9100D-certified manufacturer produces open die forgings, seamless and contoured rolled rings, and complex forged parts to industry standard specifications in 8-10 weeks.

According to Klein, open die and forgings and seamless rolled rings play a crucial role as components in gears, turbines, bearings, clutches, couplings, drives, flanges, valves, machines, and rollers for a wide variety of end uses. As such, these items must exhibit exceptional attributes such as strength, durability, precision, and resistance to fatigue, deformation, and harsh environments in saltwater or downhole uses to meet

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precise performance standards when deployed in the field.

In some cases, failing to consider the end use can even introduce serious risk, including catastrophic failure of a part while in operation.

For example, aircraft engines include seamless rolled rings. If such a part fails catastrophically during takeoff, flight, or landing, the engine can tear itself apart or explode, sending pieces of hot metal at high speed through the engine housing and into the plane wing, compromising structural integrity, or the passenger cabin, causing dangerous depressurization, passenger death, or an airliner crash.

In the oil and gas exploration industry, the failure of a forged part can occur more than a mile underground, causing a well shutdown and the withdrawal of the failed part that may be more than 10,000 feet below the surface. In machinery, a part failure can cripple production and a replacement part may not be obtainable for several months.

#### Consider End Use, from the Start

The consideration and planning to meet end use requirements should begin with the service requirements outlined during the engineering phase of design and conclude when the part is in its operating position, performing as intended.

“It is vital that the manufacturer specify the end use of each part and ensure it is communicated throughout the production chain, from the design engineer, through purchasing, the forging operation, heat treating, finish machining, and final assembly of the end use, including the mechanical property requirements and the heat or corrosive conditions in which the forged part will perform,” says Klein.

According to Klein, different industries, such as food processing, paper manufacturing, machinery building, oil and gas exploration, or energy have unique specifications and standards that metal parts must

meet. The specific function of the part will dictate its design, dimensions, material selection, forging, heat treating and finishing processes. In all cases, the part must be manufactured to industry standard specifications such as ASTM, AMS, AISI, or API unless the OEM has developed their own requirements by modifying one of those standards. In short, the finished product must comply with all quality, durability, chemistry, and mechanical properties within the selected standard.

Seamless rolled rings can be produced in a variety of alloys, sizes, and shapes specific to fit end use requirements. However, by collaborating closely with the forging supplier, engineers, buyers, and machinery builders can ensure the ideal selection of chemistry, mechanical properties, heat treatment, machining, and testing ultimately required for each part’s end use.

The process often begins with the selection of the alloy grade used in for open die forging or seamless rolled ring production, which can apply to many specific end uses. These range from low and medium carbon steels, through high-carbon steels, aluminum alloys, alloy steels, stainless steels, nickel alloys, tool steels and titanium alloys. The precise alloy for the intended end use should always be specified and stated in the purchasing process according to final mechanical property requirements and service conditions.

Material properties can also be altered for specific end uses by hot working as well as by using various chemistries, temperatures, heat treatment times, and cooling methods. This facilitates the production of seamless rolled rings or forged parts with optimized mechanical properties and structural integrity, before the part moves on to finish machining.

Each metal possesses unique alloy chemical compositions formed during the steel mill process, along with diverse production procedures for generating ingots or billets of different grades and purities tai-

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lored for industry specifications. Consequently, the quality of steel mill output is critical.

In the case of All Metals & Forge Group, end use is emphasized from the very beginning in the request for quote (RFQ) process. The company works with its steel mills to purchase the correct starting stock to achieve the specified properties and operating reliability required of every part. In addition, rough machined parts are tested at least three times to prove chemistry, mechanical properties, and soundness before shipping.

According to Klein, there are groups of alloys within each metal material that lend themselves to specific end uses.

High-nickel alloys (I625, I718, I825), for example, are used at high temperatures in such applications as jet engine parts, nuclear power generation, and heat-treated fixtures where high oxidation resistance is required. Other alloys within this group find use in the pulp and paper or oil and gas industries where corrosive conditions may be severe.

The Inconel 600 and 700 series were developed for specific end uses. Inconel 600 resists chloride-ion stress corrosion cracking. Inconel 690 resists sulfur-bearing gases. Inconel 718 is a precipitation-hardening alloy designed to give very high yield, ultimate tensile strengths, and resistance to creep rupture at temperatures up to 1300°F (705°C).

End use is equally important with stainless steels, where the various groups of martensitic (hardenable), ferritic, and austenitic cover a very wide range of properties and applications when resistance to corrosion and heat are critical.

Basic type 410 martensitic grade stainless, with around 13% chromium, is sufficient for mild corrosive conditions, whereas the ferritic type 430, with 17% chromium shows resistance to more severe en-

vironments. The performance of the austenitic stainless steels, based on the 18% chromium/10% nickel in type 304 is selected for certain end uses when correctly heat treated and not subject to carbide precipitation. The various additions to the base 304, such as molybdenum, improve resistance to pitting corrosion. The resultant molybdenum-containing grades are types 316 and 317, normally supplied in the low-carbon versions, 316L and 317L.

The range of stainless steels continues through types 329 and 2205 duplex alloys – austenite and ferrite – that provide good resistance to pitting and stress corrosion cracking, to precipitation hardening grades such as 13-8Mo, 15-5PH, 15-7Mo and 17-4PH. These latter grades reach high yield and ultimate tensile strengths from a single, low-temperature heat treatment following a solution anneal. This makes these types of stainless steels suitable for challenging applications such as oil field valve parts, chemical process equipment, forged aircraft fittings, nuclear reactor parts, and jet engine components.

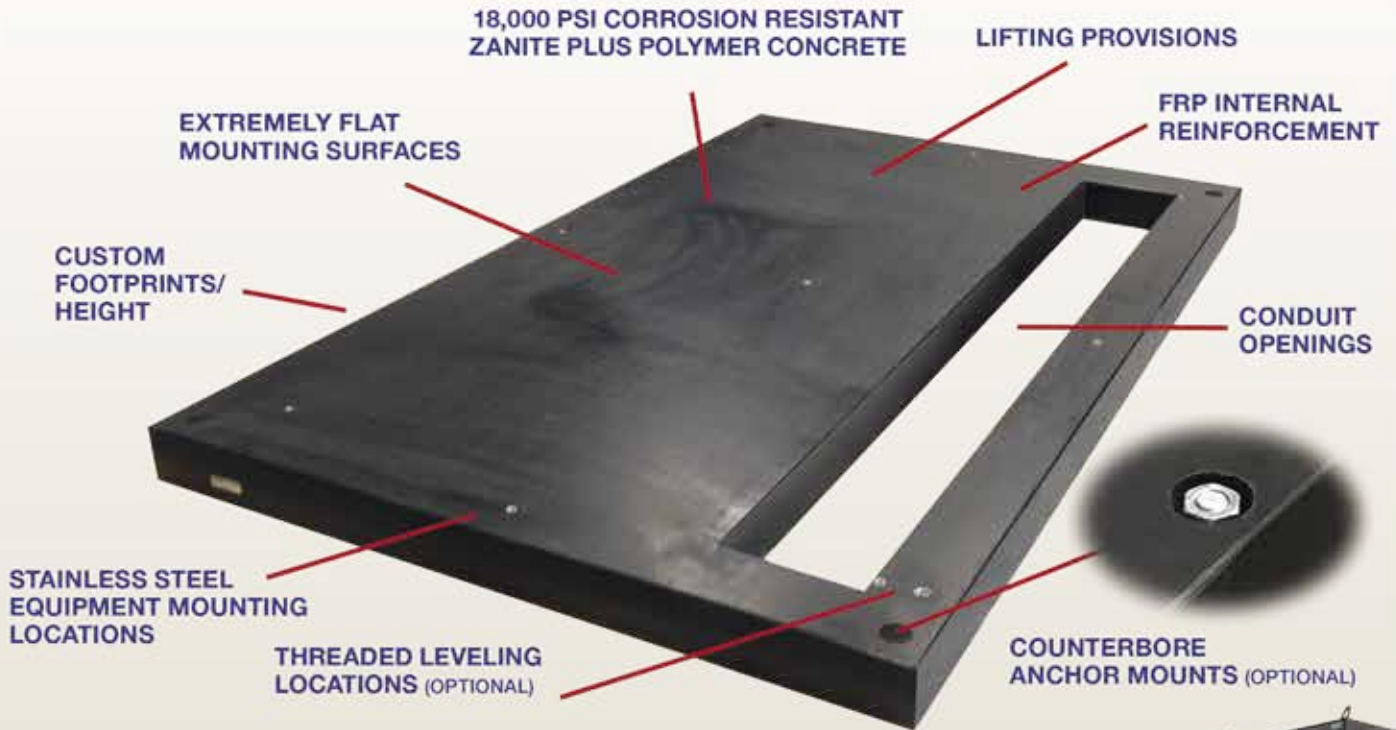
With so many options available, a thorough grasp of the end use is vital for establishing the correct material, dimensions, and properties needed during forging to guarantee peak performance in the eventual application.

By collaborating with an experienced seamless rolled ring manufacturer that can tailor the forging process to the specific end use, OEMs can ensure their final product meets all the necessary requirements and industry standards for their specific application.

For more information, contact All Metals & Forge Group, LLC at 75 Lane Road, NJ 07004; (973) 276-5000; Canada 416-363-2244, toll-free (800) 600-9290; fax (973) 276-5050.

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*Advanced Emergency Responder Communication Enhancement Systems (ERCES) eliminate potential dead zones in commercial buildings to help first responders stay connected*

First responders such as fire, EMS and police depend on reliable two-way radio communication when lives and property are at risk. That's not always an easy task in many buildings. In-building radio signals are often absorbed or blocked by structures that are larger, underground or constructed of concrete or metal. Additionally, building features designed to create more sustainable facilities such as low-E glass windows can attenuate the signal from public safety radio systems. When this occurs, weak or non-existent signals result in radio communication “dead zones” within commercial structures that can jeopardize coordination among and the safety of first responders during an emergency.

As a result, most fire codes now mandate the installation of Emergency Responder Communication Enhancement Systems (ERCES) for both new and existing commercial buildings. These advanced systems boost the signal inside the building, providing clear, two-way radio communication without dead spots.

“The challenge is that first responders operate on many different frequencies which vary significantly from city to city, so the ERCES equipment must be designed to amplify only the specific assigned channels,” says Trevor Mathews, Wireless Division Manager at Cosco Fire Protection, a provider of business fire suppression and life safety systems for more than 60 years. The company has offered dedicated in-building radio communication system installation services for the past four years.

Mathews adds that this design usually involves tuning the ERCES to prevent signal interference with other frequencies and avoid running afoul of the FCC, which can levy significant fines when violations occur. In addition, companies often must install the entire system before the certificate of occupancy is issued. To meet the tight deadlines, installers rely on ERCES OEMs to quickly deliver the system components.

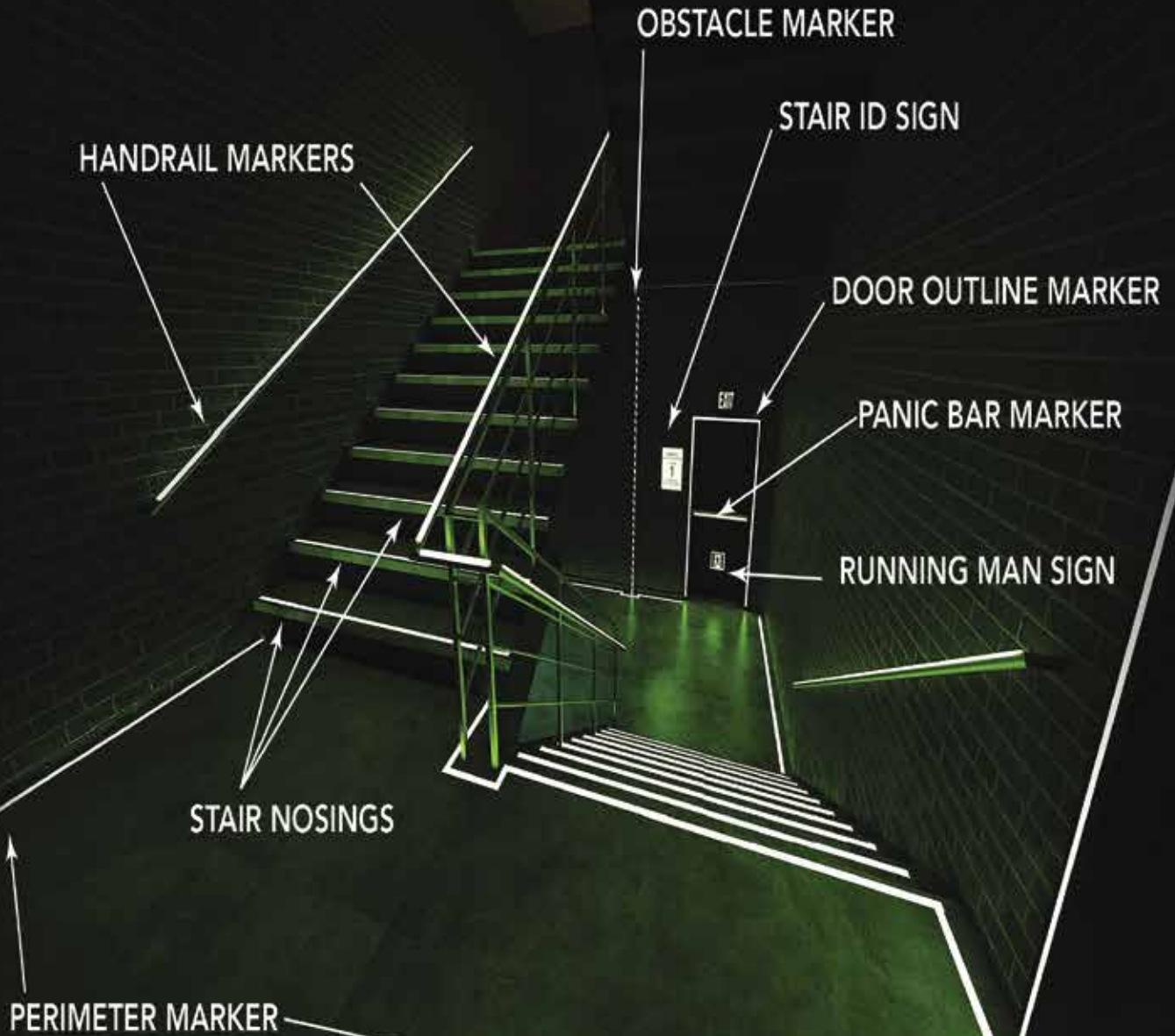
State-of-the-art ERCES are available that arrive “custom-tuned” by the OEM to the specific required UHF and/or VHF channel. The contractor can then further optimize the device onsite to the actual band



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frequencies with channel selective adjustments. The approach facilitates meeting all codes and requirements while reducing overall installation cost and complexity.

### *Effective ERCES Equipment*

ERCES were first introduced in the 2009 International Building Code. The latest codes – such as IBC 2021 Section 916, IFC 2021 Section 510, 2019 NFPA 1221 Section 9.6, NFPA 1 2021 Section 11.10, and 2022 NFPA 1225 Chapter 18 – require all buildings to have an approved level of emergency communication coverage for first responders.

ERCES systems function by connecting through an over-the-air link that the installer optimizes to the public safety radio communications tower network, using a rooftop directional antenna. This antenna is then connected via coaxial cable to a bi-directional amplifier (BDA), which increases the signal level to provide sufficient coverage within the building, based on life safety standards. The BDA is connected to a distributed antenna system (DAS), a network of relatively small antennas installed throughout the building that serve as repeaters to improve the signal coverage in any isolated areas.

In larger buildings of 350,000 square feet or more, multiple amplifiers may be required to drive an adequate signal level across the system. Besides the building's square footage, other criteria can also affect the number of amplifiers required, such as the building design, type of construction materials used, and the density of construction.

In a recent application, Cosco Fire Protection was tasked with installing an ERCES along with a comprehensive fire and life safety system at a large distribution center in Washington. To meet municipal requirements, Cosco Fire needed to install an ERCES tuned to VHF 150-170 MHz for the fire department and UHF 450-512 for police.

The building was due to receive its certificate of occupancy in several weeks, so installation needed to be completed quickly.

To streamline the process, Cosco Fire selected the Fiplex by Honeywell BDA and fiber DAS system, from a leading manufacturer of commercial building fire and life safety systems.

The compliant and certified system was developed to reliably provide superior RF amplification and coverage without noise, enhancing two-way radio signal strength inside buildings, tunnels and other structures. The system is specifically designed to meet NFPA and IBC/IFC code compliance with the UL2524 Second Edition listing.

According to Mathews, one vital aspect that sets the ERCES apart is the ability of the OEM to “tune” the device to the channels used before shipping. The contractor can then further optimize the BDA's RF tuning onsite to the precise frequency required with channel selective, software programmable or adjustable bandwidths. This eliminates the issue of wideband transmission in highly congested RF environments, which can otherwise cause outside interference and potentially lead to FCC fines.

Mathews points out another aspect that distinguishes Fiplex BDAs from other digital signal boosters: the availability of a dual-band option for dedicated UHF or VHF models.

“Combining the UHF and VHF amplifiers simplifies installation because you have one panel instead of two. It also reduces the necessary wall space, the power requirements, and potential points of failure. Annual testing is also easier,” says Mathews.

With conventional ERCES systems, fire and life safety companies must often source third party components to supplement the OEM's package.

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For a previous application, Mathews found it “difficult to get conventional ERCES equipment to work. We ultimately had to turn to a third party for the [signal] filters needed because the OEM wouldn’t provide them.” Mathews also said the lead time to receive the equipment was several months when he needed it in weeks.

In contrast, the Fiplex by Honeywell equipment

was delivered in only a few weeks.

“With other suppliers, it could take 8-14 weeks to receive an amplifier,” explains Mathews. “Now we can get a custom tuned amplifier and install it with the DAS in 5-6 weeks. That is a game changer for contractors, particularly when there is a tight window for the installation,” says Mathews.

For building developers, architects or engineering firms wondering if an ERCES will be required in a new or existing building, the first step is to consult with a fire protection/life safety company that can conduct an RF survey of the space.

The RF Survey is accomplished by measuring the downlink/uplink signal strengths in decibels-milliwatts (dBm) using special measuring devices. Results are submitted to the authority with jurisdiction to determine if an ERCES system is required or if a waiver is appropriate.

“Testing early is preferable to reduce cost, complexity and simplify installation if an ERCES is required. If the building fails an RF survey at any point in time, whether completed construction is at 50%, 80% or 100%, the ERCES system will have to be installed, so testing earlier is better before installation becomes more difficult,” says Mathews.

He notes there can be additional challenges when conducting RF testing in structures like warehouses. An empty warehouse



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may not require an ERCES, but the signal strength can change dramatically in areas of the facility after racking and other equipment is installed, and merchandise is added. If a system is installed once a warehouse is already operational, the fire and life safety company must work around the existing infrastructure and any personnel.

“It is much harder to install ERCES components in an occupied building versus an empty warehouse. Installers may need to use lifts to reach the ceiling, fix cable or place antennas, which is difficult to do at in a fully operational structure,” says Mathews.

If installation of the system interferes with the issuance of a certificate of occupancy, this bottleneck can significantly delay a project.

To avoid delays and technical challenges, commercial building developers, architects and engineering firms can benefit from an expert contractor’s familiarity with the ERCES requirements.

With quick shipment of an advanced ERCES tuned by the OEM to the required RF channel, a skilled contractor can install and further optimize the device to the specific local band frequencies used with channel selective adjustments. The approach expedites the project and compliance, enhancing safety during an emergency.

For more information, contact Dawn Wotapka, Director of External Communications at Honeywell, 715 Peachtree Street, N.E., Atlanta, GA 30308; email: dawn.wotapka@honeywell.com.

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