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NORTHEAST3D
SOLUTIONS

SEE PAGE 3

**HMI Improves Forging
Control and Uptime**

SEE PAGE 15

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CONTENTS

OCTOBER 2021 | ISSUE 268

COMPANY SHOWCASE

03 Northeast 3D Solutions

INDUSTRY INSIGHTS

15 HMI Improves Forging Control and Uptime

INDUSTRY NEWS

23 Regional Press

27 Upcoming Events

In this issue of the Gateway you're holding in your hands, you'll find a feature with our friends at Northeast 3D. It was interesting to learn more about the craft of 3D printing and scanning. What seems like the work of mad scientists is actually revolutionizing the manufacturing industry. 3D printing is quick, flexible, able to fill in some gaps of the standard job cycle, and, depending on the application, can be quite cost effective. It's a good option for some amount of resource management and job functionality. So, check out Northeast 3D and get a better understanding of what 3D printing services can bring to the table, or, the production line, as it were...

We also took in another in depth industry spotlight, this time from William Goodwin, Vice President of Sales and Engineering at Ajax-CECO-Erie Press. His piece deals with the topic of HMI and how the technology is working to improve forging control and uptime in the manufacturing industry. We hope you dig it as much as we do.

As always, if you've got a story idea, or have a story you've got written and would like to share, reach out. The Gateway is your resource to spreading the tales of your company, and the industry at large. Together we're stronger.

We'll catch you next month!



October 2021

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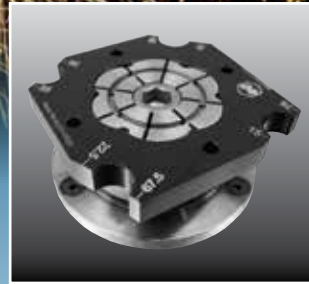


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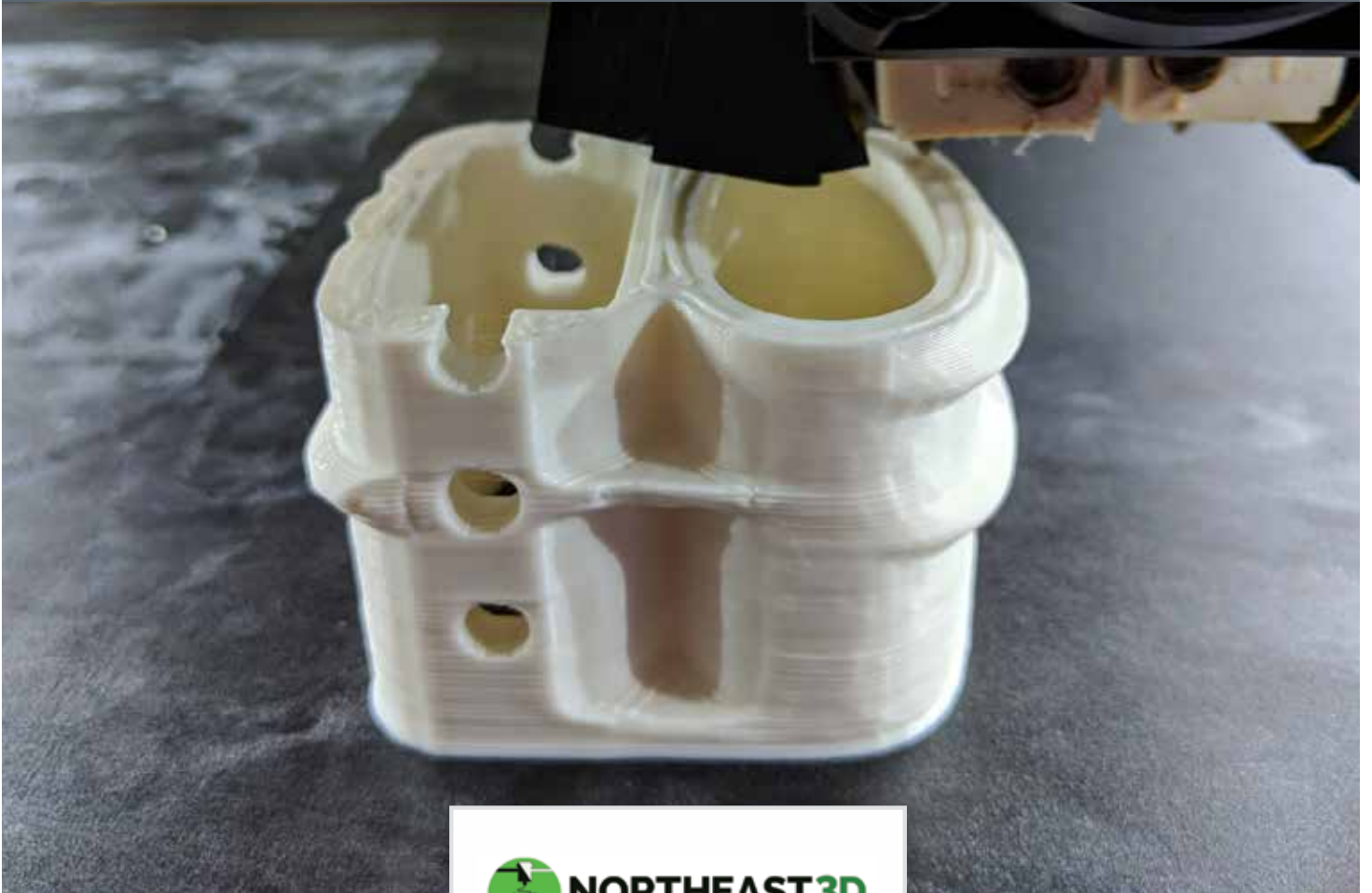
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A THREE DIMENSIONAL LOOK AT NORTHEAST 3D SOLUTIONS



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Northeast 3D printing services specializes in engineered tooling solutions like product prototyping, parts for end use, workholding for machining, automation parts (EOT, etc.), machinery wear parts, models for investment castings (lost wax), corrosion resistant upgrades, 3D part modeling, reverse engineering, architectural models, additive process development and the sale/integration of 3D printers that we resell and build. Northeast 3D provides scanning services for new product development, maintenance, replication/reproduction, quality control, visualization/animation, and sculpture and art. Additionally we offer post processing machining, CNC routing, CNC Waterjet, assembly, and coating/painting.

INDUSTRIES SERVED:

- **Original Equipment Manufacturers (OEM)**
- **Manufacturing companies**
- **Job shops**
- **Entrepreneurs**
- **Engineering firms**
- **Design engineers**
- **Educational**
- **Artists**

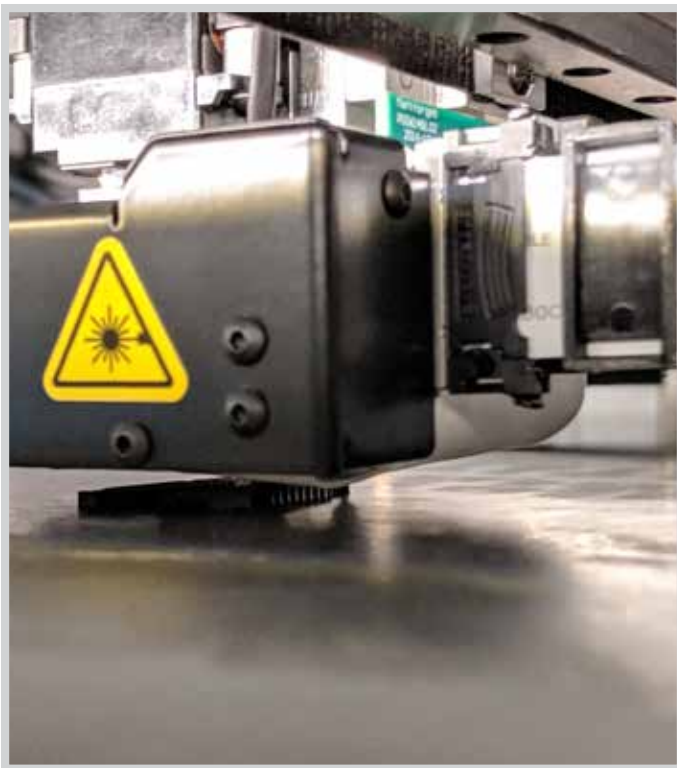
From the perspective of each of Northeast 3D’s service sets, let’s take a quick look at the three root offerings they extend to their best client pool to help them accomplish all of their 3D goals.

1. 3D PRINTING SERVICES:

- **Rapid Prototyping Parts**
- **Parts for End Use**
- **Workholding for Machining**
- **Machinery & Wear Parts**
- **Lost Wax Models**
- **Corrosion Resistant Upgrades**
- **3D Part Modeling**
- **Reverse Engineering**
- **Post Processing Machining Ops**
- **End-Of-Arm Tooling**

Part examples created utilizing Northeast 3D’s extensive services:

- | | |
|--------------------------------|---------------------------------------------|
| • Vise and chuck jaws | • Assembly jigs, clamps |
| • Machining fixtures | • Press brake tooling |
| • CMM fixtures | • Housings, pulleys, gears, brackets |
| • Robot grippers (EOAT) | • And so much more... |
| • Molds | |



Materials commonly used include:

- **ASA**
- **ABS**
- **Alloy 91**
- **Carbon fiber filled**
- **Nylon**
- **Onyx**
- **PETG**
- **PLA**
- **Polycarbonate Flex**
- **TPU**
- **PPE**
- **PCTPE**

Capacities include up to **19 x 19 x 19 inch** and **12 x 12 x 24 inch**.

2. 3D SCANNING SERVICES:

- **Laser- metrology level**
- **Structured light- full color**
- **Photogrammetry- large objects**
- **Scan to CAD**
- **Spare parts design**
- **3D/2D Inspection**
- **Surface deviation against CAD**
- **Section deviation analysis**
- **GD&T parameters check**
- **Alignment comparison**

As part of Northeast 3D's continued dedication and commitment to technology and expertise, they have added state-of-the-art ScanTech to their selection of 3D Scanners. This line of technology is cutting-edge and promises to be one the most advanced and helpful tools on the market. ScanTech is already vastly improving the capture speed and accuracy.

NORTHEAST 3D SPECIALIZES IN:

- New or replacement component design and development
- E.O.T. (grippers/work-holding)
- Non-contact measurement
- Quality inspection (CAD to physical part heat-mapping)
- Full color product or archival 3D scanning

Their new ScanTech KScan20 is a market leader with the only red/blue hybrid laser technology giving the best of both worlds, and also offers photogrammetry mode for large objects. It can achieve an accuracy of .020mm (0.00079").



3D scanning at a glance—

- Laser: Resolution - Red laser .050mm (.002"), Blue Laser (HD) .010mm (.0004)
 - Accuracy - .020mm (0.00079")
- Structured light: Resolution – Up to .16mm
 - (.006" Accuracy - Up to 0.040mm (.0016")
- Photogrammetry: Resolution – size dependent
 - Accuracy - Up to 0.040mm (.0016")

Scan to CAD (STL to Step surfacing or full solid model) conversion—

- Spare parts design
- 3D/2D Inspection - Physical part Inspection against CAD model.
- Inspection reports can be customized as per use case.
- Reverse engineering

Reports examples—

- **Surface deviation against nominal CAD**
- **Section deviation analysis**
- **GD&T parameters check**
- **Alignment comparison**

Scanning processes—

- **Structured Light – Full Color!**
- **Laser Scanning – High precision metrology**
- **Photogrammetry – Large objects**
- **3D Printing of scanned components!**

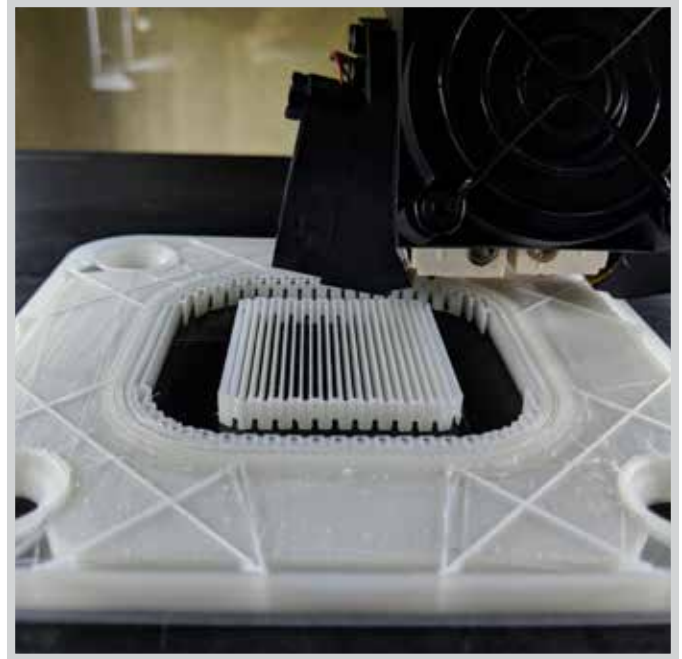
WHERE CAN 3D PRINTING SCANNING BE USED?

New Product Development

3D scanning provides the flexibility to create new products in CAD based directly on the geometry of the part from the real world. For example, an aftermarket adaptor or mount can be designed directly on the surface it is to be mounted using a scan object. This process enables engineers to design the system while making sure it does not collide with other parts where it's mounted, and all the mounting points align properly. Because the initial design is created in CAD, the design is ready for inspection if postproduction scanning is necessary.

Replication/Reproduction

The process of creating or recreating a CAD model for reproduction purposes requires some understanding of the original designer's thought process. 3D scanning is the ideal tool for capturing the output of that thought process. Once extracted, a designer utilizes the data captured by the 3D scanner to reverse engineer an object transferring the model into CAD. This can then be used for design changes or manufacturing replacements.



Maintenance

Mechanical wear is inevitable during the fabrication and application of mechanical products. Even small parts also cause huge losses; therefore, products' maintenance is indispensable. The latest 3D scanners can accurately obtain 3D data of mechanical products and can assist in correctly finding the wear parts and better understand how to maintain the products.

Quality Assurance/Quality Control

Compared with contact measurement, 3D laser scanning is much faster and more flexible with capturing full 3D data. The 3D data of complex curved surfaces, coaxiality and cylindricity can also be easily obtained, while the traditional solutions are difficult to achieve. However, handheld 3D scanners can get complete 3D data without mechanical contact or wear of parts and obtain deviation color maps.

“Amazing service, knowledgeable. All your needs, able to pick up filament and get some good advice. Would rate 10 stars if possible.” - Jeremy Bates



Visualization/Animation

3D scanning of people, props and environments can be used to easily generate models and components for the production of movies, commercials, events and shows. Some common examples include special effects, demo props, video games, animation and interactive displays. After the subject has been scanned, the mesh and texture can be cleaned up and modified and a skeleton can be added for animation. These assets can be used in any 3D modeling and animation software.

Sculpture and Art

Replicating a one-of-a-kind handmade piece of is nearly impossible. However, 3D scanning allows artist and designers to capture their work and bring it into the digital world. This use case can allow the scaling and replication of works from today or the past bringing works of art, back to life.

3. ENGINEERING SERVICES:

- *Design services*
- *Additive consulting*
- *Deviation analysis*
- *Reverse engineering*
- *Concept to design*
- *CAD Design and 3D Models*

Northeast 3D is happy to help you with any 3D printing or scanning need that you can think up. It can save money in the manufacturing industry and ought to be considered as a working solution if you have a need that fits your operative processes. Named “**Manufacturing Association of Maine Innovator of the Year,**” is reason enough to take the burgeoning technology very seriously.



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- Lost Wax Models
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- 3D Part Modeling
- Reverse Engineering
- Engineering Support

3D Scanning Services

- Product/Tool Inspection
- Tool and Die duplication
- Spare part development
- Scan to CAD Comparison
- Product Development
- Replication/Reproduction
- Quality Assurance/Control
- Visualization/Animation
- Sculpture and Art



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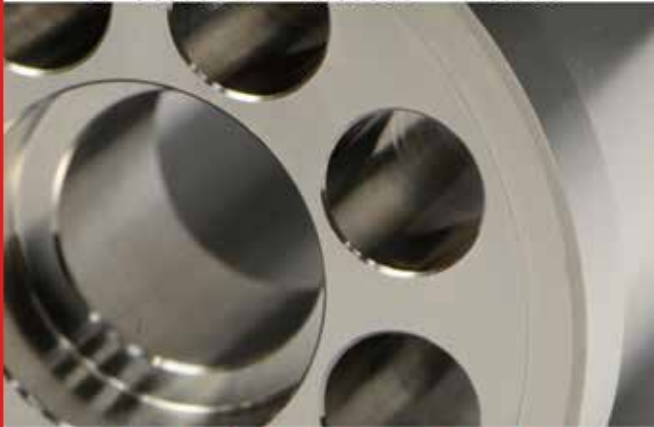
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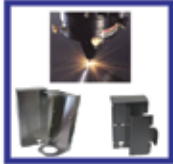
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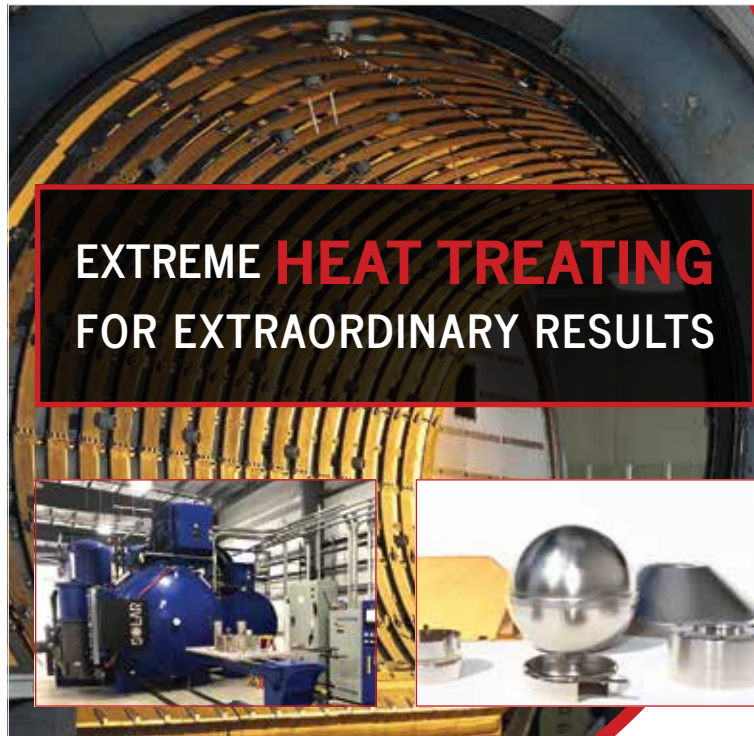


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INDUSTRIAL EQUIPMENT: HMI IMPROVES FORGING CONTROL AND UPTIME

This month's industry spotlight is brought to us by William Goodwin, vice president of Sales and Engineering for Ajax-CECO-Erie Press, out of Erie, Pennsylvania.

Graphic Human Machine Interface (HMI) capability enables operators to see how the machine is functioning and speeds local/remote diagnostics and troubleshooting. Forging presses with advanced HMI capabilities, software that graphically presents information to operators about the state of various processes, can help them monitor what is happening, troubleshoot, and quickly get equipment back online when required.

While HMIs are becoming popular in the industry, there are distinct differences in capability between basic and advanced, next-level options.

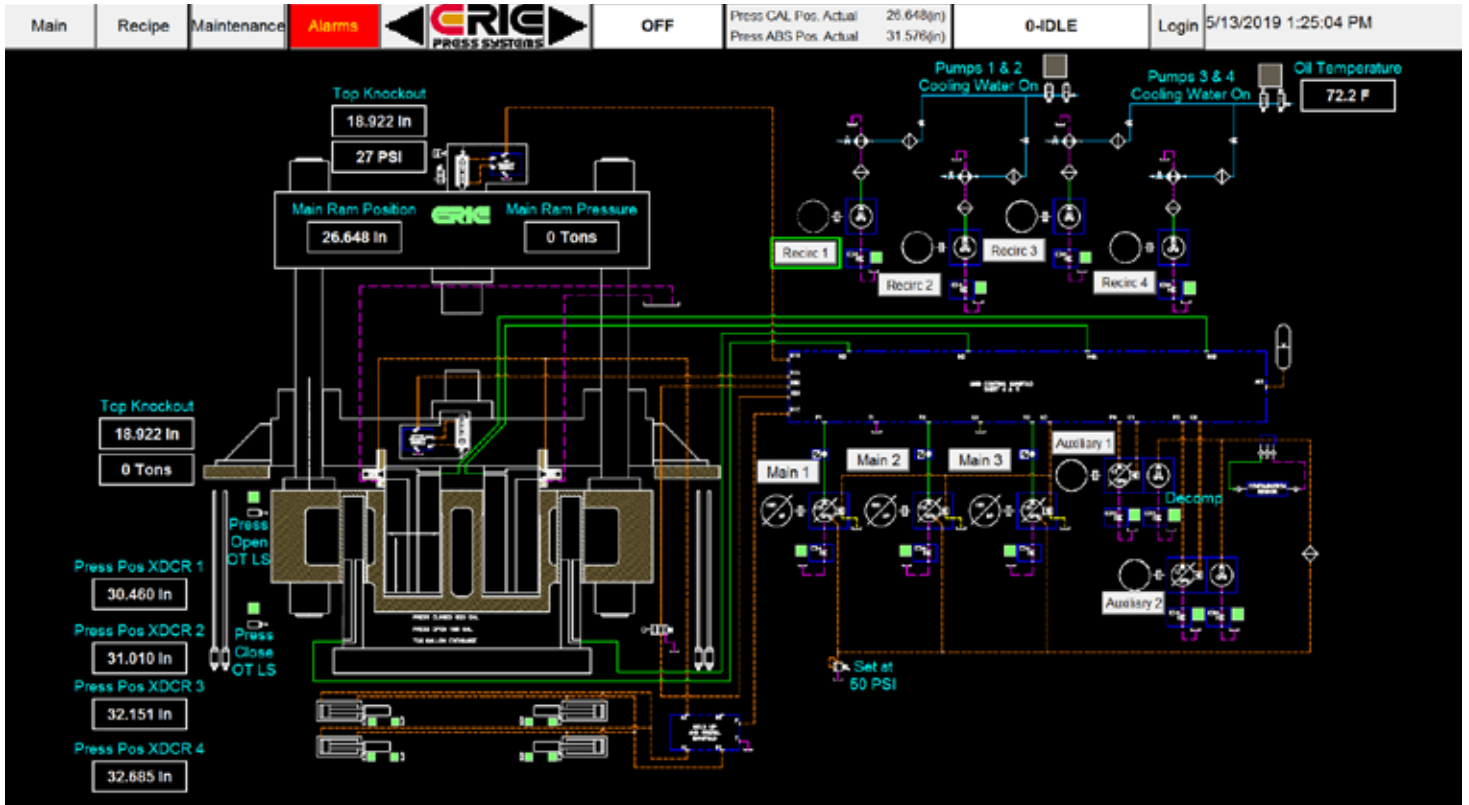
Rudimentary HMIs are visual terminals where information can be entered and data viewed, but no new information is stored.

In contrast, advanced HMIs enable saving/retrieving data, custom searches, and the display of historical trends. Far from rudimentary, up-to-date PDF technical documents and the schematics of each component on the machine are searchable and can be quickly displayed as needed. However, the most distinguishing capability of HMIs is how the software applications ease operator understanding and control of the forge press, along with any necessary troubleshooting.



Erie Press 3000 Ton High-Speed Forging Press with Servo Accumulator Drive

Massive forging presses like those from Ajax-CECO-Erie Press wield tons of force to shape workpieces for multiple industries, so maintaining production uptime and minimizing unexpected repairs and maintenance is critical.



Erie Press HMI Machine Overview Screen

Forging presses with the most advanced HMI capabilities help operators observe the forging equipment while it's running, and use dynamically animated schematics that provide insight for successful troubleshooting, to promptly get the equipment back online.

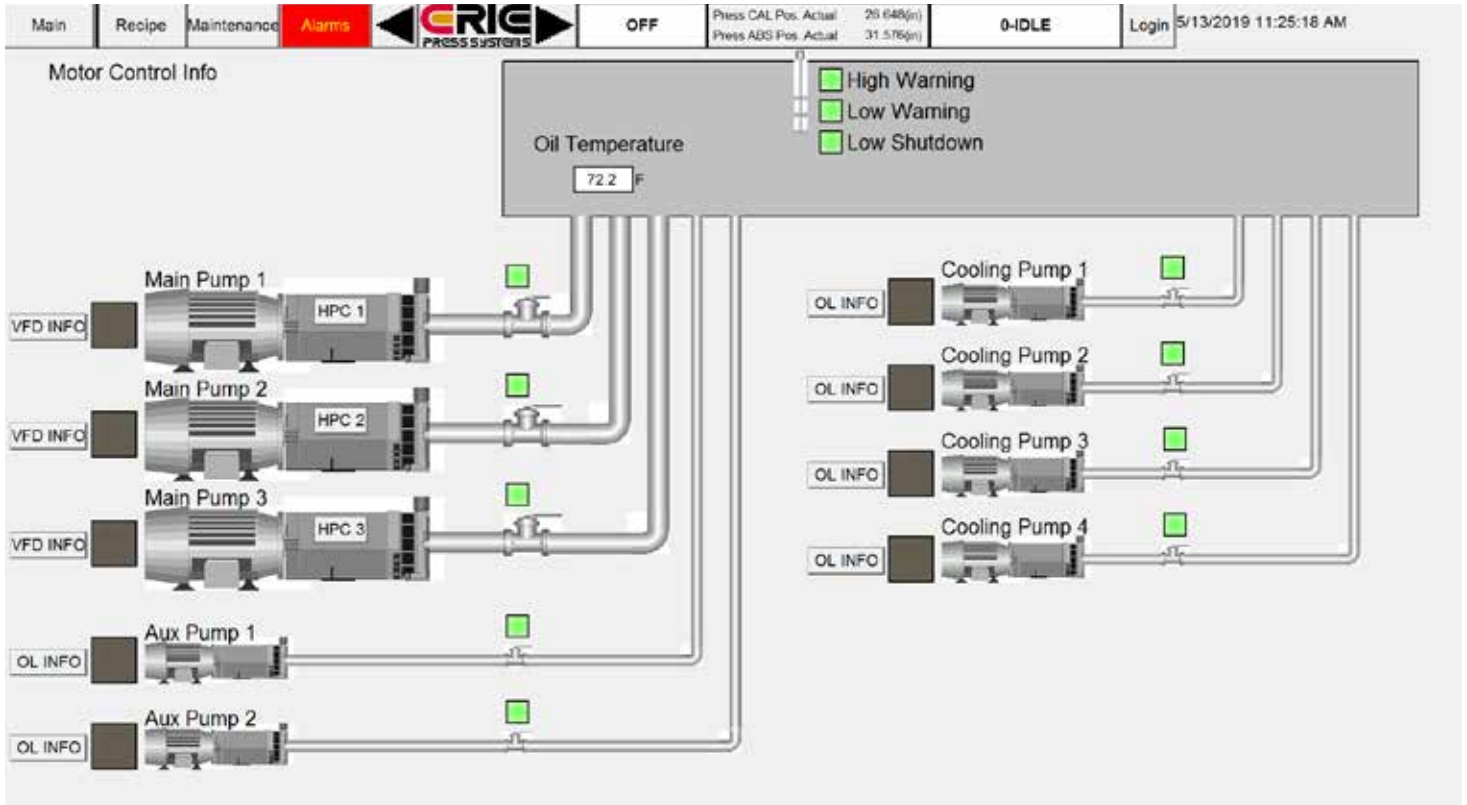
In fact, truly next level HMIs provide dynamically animated schematics that allow the operator to watch the forging equipment while it's running. Operators can quickly "drill down" from a top-level animated schematic to review the performance of specific components, such as valves and pumps, as well as to locate information on part numbers and wiring schemes.

For example, in the case of an animated hydraulic schematic the hydraulic pressure source from multiple pumps is displayed in one location for instant verification. The operator can monitor the current

press state displayed in a text box, as well as fields indicating the pressure in the main and pullback cylinders. The valve command and actual spool feedback are displayed for each proportional valve.

The press operator can also monitor main ram tonnage, main cylinder pressure, moving platen position, last cycle time, and current cycle time.

With this information, forge personnel can more effectively learn the press's internal operation by observing all this data as it cycles through operation to enable quick diagnosis and action if there is a potential issue.



Erie Press HMI Motor Control Information Screen

Using a well-designed HMI, operators can monitor live press data as the machine transitions through the production cycle. When something is out of sequence or stops abruptly mid-cycle, they can quickly troubleshoot because the HMI provides a graphical window into the machine control system and its processes, identifying problem areas.

Whether for the forge operator or OEM, in terms of preventive or troubleshooting diagnostics, the integration of HMIs, sensors, and online technical support has also advanced.

For instance, one manufacturer has developed an online diagnostic system for remote monitoring and support through a remote Ethernet diagnostic connection provided on all new equipment. The Ethernet-based control system provides OEM engineers with a platform to remotely view the machine's health as it is operating.

This capability – along with implementing some redundant components like electronic position transducers – can keep production online even if a component fails. If one fails, the manufacturer can dynamically switch to the good one. Traditionally, one failed transducer leads to downtime until a technician can acquire the correct part and change it out on site.

Such a system also enables the viewing of historical trends and up-to-date, searchable PDF technical documents and schematics, as well as dynamic animated schematics.

With historical data, if a component is starting to fail, maintenance can often identify and replace it before catastrophic failure.

Advanced HMIs also enable a historical review of how forging equipment functioned at specific dates and times. When the operator simply “pins” certain types of data or moves a graphic slider representing a slice in time that functions as an icon on a smartphone, the HMI displays the data on how the forging equipment was performed at the exact day and time.

Forge equipment with an HMI can include a library of datasheets for its electrical, mechanical and hydraulic devices. Electrical schematics, hydraulic schematics, and mechanical assembly drawings can be viewed and printed from an HMI. The data sheets are in PDF format, which enables keyword searching within the document.

Instead of spending days trying to locate the right technical documentation, and reading through data sheets or wiring schematics that can be 100 pages long, the data is searchable and immediately available to operators.

Next level HMIs, in fact, take search capability much farther by enabling the “drilling down” from a high-level, dynamic, graphic animation of the equipment to quickly “zero in” on the specific data, schematic, or drawing required.

As an example, at a dynamically animated schematic screen on the HMI, the operator can hover over the device to find the exact manufacturer’s part number or click on the device to access its specific datasheet.

Although forging presses are traditionally viewed as decades-old technology, advanced HMIs are becoming virtually as simple to monitor and use as an operator’s

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Erie Press HMI Recipe Screen

In the forging industry, Ajax-CECO-Erie Press next level HMIs are not only enabling operators to see how equipment is functioning but also to anticipate how it should be performing, utilizing dynamic animated models and schematics, live trending, and diagrams.

The screenshot shows the HMI interface for the Erie Press. At the top, there are navigation tabs: Main, Recipe, Maintenance, and Alarms (highlighted in yellow). To the right of the tabs is the ERIE PRESS SYSTEMS logo, a power status indicator (OFF), and a status display showing '0-IDLE'. Further right, it displays 'Press CAL Pos. Actual: 26.648(in)' and 'Press ABS Pos. Actual: 31.576(in)'. A 'Login' field shows the date and time: 5/13/2019 11:26:23 AM.

The main area is titled 'Recipe Screen' and contains two columns of setpoint parameters, each with a numerical input field and a unit indicator:

| | | | | | |
|----------------------------------------------|---------|--------|-----------------------------------------------|----------|--------|
| Press Preheat Position Setpoint [1] | 45.000 | | Press Forge Step 5 Begin Setpoint [96] | 18.000 | (IN) |
| Reheat Time after Lean on Stack [23] | 12.000 | (MIN) | Press Forge Step 5 Strain Rate Setpoint [97] | 1.000 | (IN/S) |
| Die Cavity Reference Height [24] | 10.000 | (IN) | Press Forge End Position Setpoint [98] | 15.000 | (IN) |
| Press Load Position Setpoint [61] | 40.000 | (IN) | Press Forge End Position Setpoint Offset [99] | 0.000 | (IN) |
| Press KO Sequence [62] | 2.000 | (XX) | Press Dwell Tonnage Setpoint [100] | 2000.000 | (TONS) |
| Press Load Max Transfer Time In [63] | 130.000 | (SEC) | Press Dwell Time Setpoint [101] | 10000.00 | (SEC) |
| Bottom KO Load Position Setpoint [68] | 11.000 | (IN) | Press Open KO Sequence [104] | 0.000 | (XX) |
| Bottom KO Load Tons Setpoint [69] | 7.000 | (TONS) | Bottom KO End Forge Tons Setpoint [105] | 25.000 | (TONS) |
| Top KO Load Tons Setpoint [70] | 2.500 | (TONS) | Top KO End Forge Tons Setpoint [106] | 20.000 | (TONS) |
| Press Equalize Position Setpoint [72] | 38.000 | (IN) | Press Inspection Position Setpoint [109] | 6.000 | (IN) |
| Bottom KO Equalize Position Setpoint [74] | 11.000 | (IN) | @Bottom KO Position to Inspect [110]@ | 0.875 | (IN) |
| Press Start Forge Position Setpoint [84] | 35.000 | (IN) | Bottom KO Rotate [111] | 1.000 | (XX) |
| Press Forge Step 1 Strain Rate Setpoint [85] | 1.000 | (IN/S) | Bottom KO Rotate Position Setpoint [112] | 2.000 | (IN) |
| Press Forge Step 1 Strain Ramp Time [86] | 1.000 | (SEC) | Bottom KO Rotate Degrees Setpoint [113] | 120.000 | (DEG) |
| Press Forge Step 2 Begin Setpoint [87] | 30.000 | (IN) | Press Forge Restrikes Setpoint [114] | 1.000 | (XX) |

favorite smartphone, while making critical performance data readily available as well.

So, for manufacturers relying on the efficient use of forging equipment new capabilities can significantly increase production uptime and profitability, providing an important competitive edge.

For more information:

Info: **Ajax/CECO/Erie Press**
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EXPANSION OF RE RANGE

With this recognition, Henkel has been able to expand its RE Designed For Recycling product range, whose products must fulfill certain external testing requirements in relation to sustainability.

“Many of our converting and brand partners are requesting circular economy solutions that enable the recyclability of flexible packages,” said Gary Rzonca, Vice President, Packaging & Consumer Goods, North America. “We are proud to receive this recognition, and we remain fully committed to the continual expansion of our RE range to provide our converting and brand partners with comprehensive solutions.”

Products in this range are designed particularly with recycling in mind, as they are able to effectively bond multiple compatible layers and have excellent mechanical recycling properties. This material compatibility is central to achieve the optimal result in the mechanical recycling process. The new Henkel RE adhesive range can even be used in a closed loop recycling process for flexible packaging.

“The APR recognition and subsequent addition to our RE range is the result of hard work and dedication by our technical team,” said Clay Kellam, Head of Product Development for Henkel Packaging Adhesives. “Compatibility with recycling is an important focus for Henkel innovations and we are proud of this recognition that enables our customers achievement of their sustainability targets.”

In the recognition letter, APR thanked Henkel for its cooperation in using this important protocol, which has global impact. As an integral player in the packaging value chain, Henkel is dedicated to driving innovations for more sustainability in production and packaging. Additionally, Henkel is a brand owner itself, with first-hand experience with regard to the industry’s needs.

“We can only achieve sustainability and a circular economy by working together across the entire packaging value chain,” added Colleen Zielske, Director of Technical Customer Service for Henkel Packaging Adhesive. “Henkel is committed to actively supporting a circular economy by making it possible to return high-quality materials into the loop after use, turning waste back into valuable resources. Adhesives are typically less than 5 percent of total package weight, but their properties make the difference when it comes to the overall recyclability of the material.”

For more information, contact us at bemore.sustainable@henkel.com.

HENKEL ADHESIVE SYSTEM RECOGNIZED BY THE ASSOCIATION OF PLASTIC RECYCLERS FOR RECYCLABILITY

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APR’s process required that the two-component system be tested against guidelines set forth in its Critical Guidance Protocol for PE Film and Flexible Packaging. The Henkel system was tested under challenging test conditions and strict guidance criteria, thus achieving this recognition.

“The Critical Guidance protocol, FPE-CG-01, is the product of multi-industry consensus of key issues related to the recycling of postconsumer polyethylene films,” Stephen Alexander, President and CEO of APR, noted in the recognition letter. “The protocol is intended to improve the quality of recycled PE films by helping innovators to make informed decisions about the consequences of PE film innovations. Meeting the Critical Guidance Protocol guidelines is a truly significant step in demonstrating overall recyclability of your product.”

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