



# THE STAR

SUMMER 2016



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On the cover: Lloyd Jones, a Y-12 material controller in Production, represents one of many manufacturing jobs. Learn more about Y-12 Fabrication on page 12.

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Morgan Smith | President and Chief Executive Officer

Jason Bohne | Communications and Public Affairs Senior Director

Photographers | Larry Batchlear, John Ebling, Lance King

Writers | Christa Glasgow, Todd Jacobson, Patti Jones, Kathryn King, Amanda Meixel, Mig Owens, Megan Reed, and Eric Swanson

For more information visit: <http://cns-llc.us>. Follow Pantex and Y-12 on Facebook and Twitter.



Ben Flores from Pantex Maintenance checks the conductivity of a printed circuit board of an X-ray machine. Learn more about Pantex employees in the special Pantexan feature on page 14.



Material handler Jerome Kirk makes sure the right parts and materials get to the right locations to support general machining and metalworking operations. Learn more about Y-12 employees in the special Y-12 Report feature on page 12.

# Letter from Morgan Smith



More than two years ago, responsibility for the combined management and operation of the Pantex Plant northeast of Amarillo, Texas, and the Y-12 National Security Complex in Oak Ridge, Tennessee, was merged under one contractor. The new contract represented the first time two production sites within our nation's Nuclear Security Enterprise were brought together, and our challenge has been to improve performance in the delivery of our nuclear deterrence mission,

standardize working procedures for high-hazard operations, and create efficiencies that will help sustain the sites and our nuclear security for future generations.

As you'll read in this issue of *The Star*, we're doing exciting things, from important mission work like refurbishing the W76-1 warhead (page 6) to finding innovative ways to apply technologies such as additive manufacturing to our jobs (page 14), all while giving back to our communities (page 16).

But the environment surrounding our mission has changed significantly since the contract was first conceived. Our workload, once envisioned as flat over the next decade, has increased, and the National Nuclear Security Administration (NNSA) is planning for Pantex and Y-12 to perform a greater amount of mission work in the upcoming years. This increased workload will help ensure the safety and reliability of our nation's nuclear deterrent, provide capabilities to help secure vulnerable nuclear material around the world, reduce the spread of nuclear weapons and terrorism, and provide highly specialized fuel for the Nuclear Navy.

Part of our effort has included aggressively working to rebuild an infrastructure that has declined over the years, and we have made significant progress with NNSA on a series of projects that will support a modern production environment and transform the landscapes of both Pantex and Y-12 in the next decade.

Importantly, our focus on major projects is matched by our commitment to improving working conditions, upgrading equipment, and cleaning and restoring parts of the sites that have long been neglected.

As we move forward, it is the employees of Pantex, Y-12, and NNSA, along with the support of our local communities, that are propelling our future vision. I firmly believe we are well positioned to build upon the foundation we have established. Our nation is counting on us, and we plan to deliver. Thank you very much for your support of the nation during a year of challenge and progress. We have accomplished much, but as always, there is much yet to be done.

Morgan Smith  
CNS President and Chief Executive Officer

## News briefs

### Pantex ASC construction moves forward

In mid-June, NNSA granted CNS approval to pursue an operating lease for the Administrative Support Complex to be constructed near the Pantex Plant. The 343,000 -square-foot, state-of-the-art facility will provide office space for up to 1,100 federal and contractor employees. The facility will be developed by LawlerWood LLC.

“This milestone underscores our commitment to address the Pantex Plant’s aging infrastructure challenges and to invest in the site to position it for the future,” said CNS Deputy Enterprise Manager Michelle Reichert.



Construction of the new Pantex Administrative Support Complex (rendering above) is slated to begin in August.



PREP is estimated to reduce carbon dioxide emissions by more than 35,000 metric tons per year, the equivalent of removing 7,200 cars from the road each year or planting 850,000 trees.

### Pantex Wind Farm exceeds expectations

The Pantex Renewable Energy Project, or PREP, has been energizing the Pantex Plant for about two years with its five turbines towering 400 feet above the earth. PREP was estimated to generate approximately 60 percent of the annual electricity need for Pantex, but it has surpassed that goal. In the first 10 months, the wind farm

produced more than 43,043,000 kilowatt-hours — almost 63 percent of Pantex’s power needs.

PREP serves as the keystone for an ongoing collaboration with Texas Tech University to make Pantex a leader in innovation within the wind energy sector.

### W69 dismantlement completed

Y-12 completed dismantlement of W69 canned subassemblies earlier this year. The W69 was the warhead for the short-range attack missile and was retired from the U.S. nuclear stockpile in 1992 and disassembled at Pantex. The Y-12 site originally assembled the W69 canned subassemblies in the 1970s and began disassembly in 2012, thus completing the weapon’s life cycle.

“The employees of CNS are proud to have an integral role in accomplishing the NNSA’s nuclear weapon mission,” CNS President and CEO Morgan Smith said. “The work done at Y-12 on the W69 is yet another example of the important role we play in supporting our nation and making the world a safer place.”

Taking apart nuclear weapons is a complex process that involves almost all of the sites within the Nuclear Security Enterprise. Dismantlement not only prevents the potential misuse of nuclear material but also allows recycling of the material for national defense uses such as weapon refurbishment (Life Extension Program).

### Wildlife efforts recognized at Pantex

Wildlife efforts at Pantex were recognized by the Council for the Conservation of Migratory Birds as a finalist for its 2016 Presidential Migratory Bird Federal Stewardship Award.

Pantex initiated a comprehensive research program of multi-year projects collaborating with such entities as Texas Tech University (Lubbock), U.S. Geological Survey’s Texas Cooperative Fish & Wildlife Research Unit (Texas Tech), West Texas A&M University (Canyon), Canada’s York University, University of Manitoba, and the Purple Martin Conservation Association (Erie, Pennsylvania).

Projects have focused on the ecology of western burrowing owls in rural versus urban areas and influences of wind farms on migratory birds. This includes evaluating mortality, avoidance, lowered productivity, and use of data-loggers and GPS transmitters to allow for year-round monitoring of the ecology and conservation needs facing Swainson’s hawks and declining Purple Martin populations.

### Y-12 projects win two DOE Secretary’s Achievement Awards

U.S. Department of Energy (DOE) Deputy Secretary of Energy Elizabeth Sherwood-Randall recently presented two DOE Secretary’s Achievement Awards to NNSA for projects at the Y-12 National Security Complex.

NNSA was recognized for delivering the Y-12 Nuclear Facility Risk Reduction Project \$5.7 million under budget and 11 months ahead of schedule and for completing the Uranium Processing Facility Site Readiness subproject on time and \$20 million under budget.

The Nuclear Facilities Risk Reduction Project included upgrades to mechanical, electrical, ventilation, and heating/cooling systems in key production facilities at Y-12.



## ACCOMPLISHMENTS

### Y-12 receives six NNSA Sustainability Awards

NNSA recognized Y-12 with six 2016 Sustainability Awards. The awards recognize exemplary individual and team performance. Sites are honored for achieving sustainability objectives through innovative and effective programs and projects that increase energy and water efficiency and reduce greenhouse gases, pollution, and waste.

Y-12 Site Manager Bill Tindal applauded those who helped make the awards possible. "To receive four of the six Best in Class Awards and six of the 12 total awards is huge for us. While I am excited and proud, I am not surprised



because we've got a solid group of dedicated employees who have made this a priority for years. We're honored to share this wealth of expertise with the rest of the enterprise and others to make our world a better place."

The Uranium Processing Facility recycled or reused more than 74.4 million pounds of materials in 2015, earning an NNSA Sustainability Award.

### CNS-sponsored teams compete at National Science Bowl

Three of the teams at the U.S. Department of Energy's 26th National Science Bowl® were sponsored by CNS: Amarillo High School and Ascension Academy (middle school) from Texas and Cedar Springs Home School (high school) from Tennessee. CNS employees Darla Fish and Allison Roberts, coordinators of the Pantex Regional Science Bowls, joined hundreds of other volunteers to make the event a success. The event, held in April, included 116 regional winning teams.

Pantex executed the regional science bowl competitions in Amarillo. Pantex, with about 200 volunteers staffing the event over two Saturdays at the middle and high school competitions, has sponsored the regional competitions for 24 years with the goal of educating students and promoting science, technology, engineering, and mathematics.



The team from Amarillo's Ascension Academy won \$1,000 for the school science department and an all-expenses-paid trip to Washington, D.C., and the national competition. Far right, Mark Padilla, NNSA Production Office assistant manager for Programs and Projects, congratulates Ascension Academy for placing first at the Pantex Regional Science Bowl in Texas.

### Local school children Dream it. Do it.®

Anderson County Chamber's inaugural "Dream It. Do It.®" Competition exceeded expectations, as four Anderson County, Tennessee, middle school teams, working with local businesses, created industrial videos that received more than 12,000 online votes. The program involved putting eighth-grade students in real-life work environments.

Equipped with GoPro® cameras, they got a first-hand look at a manufacturing world they might not have considered as a future career. CNS provided the students at Clinton, Lake City, Norris, and Norwood middle schools with the cameras and the mission to capture the diversity of careers and technical innovations in manufacturing by producing a short video.



The Anderson County Chamber and CNS present awards at the Roane State Community College's Oak Ridge campus to the Clinton Middle School team that won the inaugural Dream It. Do It.® Competition.

### UPF takes Polar Plunge for Special Olympics

Nine managers from the Uranium Processing Facility (UPF) project raised nearly \$9,000 for Special Olympics Tennessee by leaping into ice cold water as part of the Polar Plunge, an annual fundraising effort held earlier this year.

UPF was the top fundraising team in Knoxville, contributing 45 percent of the total amount raised in the city, and four UPF managers were the top individual fundraisers. At UPF, participation in the Polar Plunge was sponsored by NextGen, an employee resource group that supports the orientation, development, retention, and empowerment of employees as they begin and build their careers.

"Thanks to good-natured competition and the generosity of UPF personnel, we led the city in fundraising for this great cause," said NextGen President Amit Patel.



UPF employees collected donations to determine who would take the Polar Plunge, a leap into the University of Tennessee's outdoor swimming pool.

## Introduction to W76

Pantex and Y-12 continue to make progress on the W76-1 Life Extension Program (LEP), which, according to Adm. Cecil D. Haney, commander of U.S. Strategic Command, is “particularly important, as the W76 represents the majority of our survivable strategic deterrent force.”

The refurbished W76-1 warhead is a submarine-launched ballistic missile deployed by the U.S. Navy on the Trident II delivery system, shown here. The sea-based leg of the U.S. nuclear triad provides an agile, roving, survivable platform for weapon delivery.



An effective U.S. nuclear deterrent depends on all three legs of a triad — air, land, and sea — each offering its own advantages and drawbacks.

Air-dropped bombs, for example, take longer to deploy and are limited in size by the aircraft that carry them, but they can be a strong visible deterrent and offer time for decision-making and recall as situations change.

Land-launched intercontinental ballistic missiles, like the Minuteman III, are essentially three-stage rockets capable of carrying nuclear weapons thousands of miles at a moment's notice. They are long-range, accurate, and quick, but considerably less agile.

The sea-based leg fills in the gaps. It provides an agile, roving platform for long-range ballistic missiles, such as the U.S. Navy's Trident II D5. Importantly, submarines are far less susceptible to attack.

“Submarines are mobile, harder to detect, and more ‘survivable’ if someone else were to strike first,” noted Dan Linehan, CNS's Life Extension Programs director.

Only two stockpile warheads are capable of being launched from a submarine: the W88 — which is currently undergoing preparations for an alteration — and the W76.

First introduced into the stockpile in 1978, the W76 is deployed on the Navy's

Ohio-class submarines, each of which can carry up to 24 Trident II missiles. The W76-1 LEP will increase the original warhead's service life by 20-plus years, while incorporating nuclear safety upgrades and addressing aging issues identified during earlier surveillance activities.

Following years of preparations — involving engineers, scientists, and technicians at Pantex, Y-12, Savannah River Site, Kansas City National Security Campus, Los Alamos National Laboratory, and Sandia National Laboratories — the NNSA delivered the first W76-1 to the Navy in 2009.

“At both Pantex and Y-12, we had to modernize our capabilities, many of which hadn't been used in several years,” Linehan said. Those

efforts included everything from tooling and equipment upgrades to design and construction of a new facility.

“One particular material hadn't been manufactured in over a decade,” Linehan noted. “In the early 2000s, when the W76 LEP became real and we realized we'd need more of this material, we built a brand-new facility at Y-12 and got it operational in time to support the program.”

The nearly 10 years of preparatory work is paying off. In a recent congressional hearing, NNSA Administrator Frank G. Klotz stated that by the end of 2016, NNSA will

have produced more than 70 percent of the total number of W76-1 warheads to be provided to the Navy. Additionally, the program is on schedule to be completed in fiscal year 2019.

“This is indeed a significant milestone for our nation and our Navy,” Vice Adm. Terry Benedict, director of the Strategic Systems Program, said. “The combination of the Ohio-class ballistic missile submarine and the Trident II D5 Strategic Weapon System operated by our dedicated sailors forms the backbone of our nation's nuclear deterrent.”

**The W76-1 Life Extension Program is a key step toward ensuring America's smaller nuclear arsenal remains safe, secure, and effective.**

Throughout the program, employees at both sites have found ways to improve processes and increase efficiencies to meet the Navy's needs. The W76-1 program uses the first tooling

created through additive manufacturing ever involved in producing stockpile components. Elsewhere, implementation of digital — rather than film — radiography has reduced the time needed to inspect and certify the quality of the weapons, and live video feeds now send real-time surveillance results to the design agency.

All of this progress has occurred in spite of a number of infrastructure challenges. For example, many facilities are long overdue for modernization. “There are always challenges with old facilities and equipment,” Linehan said, “but they've all been overcome by a lot of

very capable people working extremely hard to make sure we keep our country safe and secure.”

Upon completion of the program, the Navy will have a life-extended warhead for its ballistic missile submarine fleet that will last for at least another 30 years and will enable an almost 50 percent reduction of the total number of W76 warheads currently in the inventory.

### Quality weapons mean fewer weapons

Despite the apparent contradiction, successful LEP rebuilds are crucial to the nation's strategy to reduce the overall stockpile.

DOE's Fiscal Year 2016 Stockpile Stewardship and Management Plan notes, “A well-planned and well-executed stockpile life extension strategy will improve safety and security, while enabling [the U.S. Department of Defense] to implement a deployment and hedge strategy consistent with the Administration's goal of a smaller, yet still effective deterrent.”

In fact, for every W76-0 refurbished into a W76-1, roughly two of the original -0s are retired from the stockpile and dismantled. But that tradeoff is only effective if the remaining warheads are credible and high quality.

“With a refurbished weapon that you've got a lot of confidence in, you can afford to have fewer deployed,” Linehan said.

## Upside of downtime

The biggest challenge in delivering the mission safely and securely is our sites' aging infrastructure. Together, the sites are implementing best practices to keep production operations running smoothly.

Both Pantex and Y-12 have decades-old facilities that require continual maintenance. Fewer equipment breakdowns and repairs mean increased efficiency and reliability of electrical, natural gas, steam, air, alarm, fire protection, and other systems. Through planned outages and integrated scheduling, the sites are moving from reactive to preventive maintenance.

### Best practices

Pantex has conducted plant-wide outages for several years, performing preventive maintenance over a period of a week once or twice a year. The outage approach isolates entire systems at a time and addresses all possible corrective and preventive maintenance issues before returning the system to operation.

"This helps us to improve the health of our utility systems, thereby reducing downtime, improving production utilization of facilities, and ensuring the overall safety of our employees due to unexpected failures," said Pantex Acting Maintenance Manager David McCown.

Outages like this, though, require months of planning and integration with the plant's production schedule.

"Project and technical teams begin planning and procedure

development as much as four months in advance of the outage," McCown said.

Y-12 has conducted plant-wide outages of some scale for many years, typically performing most corrective and preventive maintenance outages over weekends multiple times a year. The last five or six years have seen a larger-scale, more integrated outage effort between Infrastructure and Operations. Despite the disruptions these outages cause, Infrastructure & Projects Management Manager Dan Glenn sees long-term value in the efforts.

"I know that outages are often perceived as interruptions or inconveniences by those who are affected, but the condition of our distribution systems demands that

we continue to have them," Glenn said. "Working together we can balance the needs of each site as we work toward improving the overall material condition and reliability of our facilities and distribution systems."

Along with corrective and preventive maintenance, actions are being implemented to improve the efficiency of future outages.

"Large outages are difficult at Y-12 but have been needed in the past several years so that we can have more focused outages in the future," Y-12 Production Operations Manager Reed Mullins said. "For example, we have been installing more isolation valves during these outages so that, in the future, the entire steam plant doesn't have to be shut down. Instead, we'll be able to isolate specific facilities for maintenance."



Y-12 Integrated Scheduling Lead Sherry Wagner works in the field during an outage.

To further reduce impact to mission operations and increase efficiency, Y-12 introduced a site-wide integrated scheduling outage calendar that tracks all types of outages in one location and keeps everyone informed up front.

"Requests for outages come from different organizations from all over the plant," Y-12 Integrated Scheduling Lead Sherry Wagner said. "There might be several outages going on at the same time in multiple facilities and could include all sorts of work, such as maintenance, utilities, construction, energy savings program, network maintenance, and alarm testing. These are now all coordinated at a site level, which reduces overall impact."

Other CNS preventive maintenance initiatives include developing a critical spare parts list, work packages that include drawings and models, and corrective maintenance templates (learn more in sidebar on page 11).

### Seeing results

Since implementing a more integrated approach to performing outages, Y-12 is seeing significant improvements in efficiency.

In the past, Y-12 would experience unplanned outages that required corrective maintenance because of inoperable equipment. This equated to hours of downtime during which Production could not complete mission work. With more repairs and upgrades being performed during outages, Y-12 now has fewer unplanned equipment outages and less downtime from mission work.

"These outages have a big impact on the plant, but they are paying big

dividends," Y-12 Infrastructure Manager Scott Underwood said. "It is a huge amount of work to get done, but it improves plant conditions for all."

Y-12's most recent planned outage lasted three days and included power, steam, air, and natural gas systems. The weekend outage allowed a small army of Y-12 infrastructure, facilities, and utilities workers to make repairs and perform preventive maintenance that will help avert unexpected outages and costly damage to equipment.

During this weekend outage, 70 skilled workers completed more than 50 work orders. These workers repaired steam leaks and replaced steam traps, pressure controllers, steam valves, steam stations, boilers, electrical poles, and air work valves. They also performed multiple other corrective and preventive maintenance jobs on the power, steam, air, and natural gas systems.

"It's hard to find windows of time to do this work," Wagner admitted. "We need to upgrade facilities to keep them working but also have minimal impact to production schedules. Even though these proactive, strategic outages shut down production for a short time, the long-term benefits are important for us to achieve our mission."

For Y-12 Site Manager Bill Tindal, it's a simple matter of conducting maintenance according to a detailed plan rather than the whims of decades-old equipment.

"This new philosophy of preventive maintenance to improve infrastructure and reliability is clearly paying off," Tindal said. "Now we fix equipment before it fails, which allows us to continue our mission work as planned, and it's just more efficient for the plant. We understand we have buildings and equipment that are getting older and will require refurbishment over the coming decades. We must not only continue to schedule outages but also continue to get better at performing these outages. Learning lessons from both sites will help us to continuously improve."



Y-12's Ed Crowder checks for absence of voltage in a 4,160-volt switchgear using the appropriate electrical personal protective equipment.

**Revitalizing the infrastructure: Building 9995**

Y-12 also is working to revitalize the infrastructure in other ways, including completing \$10 million in upgrades to the analytical chemistry facility to improve mission capability and reliability. Upgrades included improvements to critical heating, ventilation and air condition systems; electrical system upgrades; and replacement of obsolete radiochemistry hoods. These improvements have greatly upgraded Building 9995's work environment by reducing risk to operations and enabling the facility to continue to meet the extensive analytical chemistry needs for Y-12. The year-long effort was completed on schedule and within budget.



The Y-12 team shows NNSA Uranium Program Manager Tim Driscoll, front, infrastructure upgrades during a tour of Building 9995.

**Y-12 recognized as DOE Best Practice**

Since 2006, Y-12 has been working to address facilities that are being used beyond their design life. These efforts were recognized by the DOE as a Best Practice for a holistic approach to infrastructure. It is expected that several production buildings will need to continue operations after the Uranium Processing Facility is completed, so Y-12 developed a strategy for enriched uranium operations and prioritized facility infrastructure needs. Through its Extended Life Program, Y-12 focuses improvements on regulatory requirements, material condition, and operational cycle.

CNS also established a Plant Health Review Committee that looks beyond enriched uranium and

reviews all required processes and infrastructure at Y-12. Systems engineers perform periodic health assessments of facilities.

NNSA Production Office Manager Geoff Beausoleil said, "CNS's holistic approach to managing our aging infrastructure is highlighted as a success story in a way that can be leveraged to address enterprise needs."

This approach increases the ability to sustain safe operations and has been successfully implemented since 2009, allowing Production to reduce risks and boost mission reliability.

**Go behind the scenes and meet Michael Howell**

There are people who work behind the scenes, and without whom, the plants would not function. Some of those people belong to the maintenance crews that help keep the machines, computers, and other electronics running. One of the many members of this team is Michael Howell, a Pantex electronics technician.

"I am a small part of a highly skilled team of craft workers here at Pantex that keeps the plant operational," Howell said. "It's our life, and we take pride in the work we do."



Michael Howell at Pantex is part of the maintenance crews that help keep the site's electronics and other machines working.

**A template for success — More improvements at Pantex**

While Pantex has performed large, full-scale plant outages successfully for a long time, there is always room for improvement.

"We are continually looking for ways we can do things better," said Pantex Acting Maintenance Manager David McCown.

Pantexans are working to incorporate planning templates for recurring equipment problems.

"We are currently evaluating the maintenance history of our equipment and developing pre-approved work orders that cover scope of the repairs, instructions, and required parts, allowing prompt response when routine failures occur," McCown said. "This allows us to reduce downtime even more for this equipment and enables increased facility availability for production operations."

Pantex Site Manager Todd Ailes added, "Modernized and refreshed infrastructure ensures increased mission capability requirements are met and sustained for the future. Planned outages are important to Pantex to help us meet our production mission and to extend the life of our facilities."



Frankie Diaz at Pantex cleans the interior of a de-energized 12,470/480-volt transformer.

## Made in America

Some of the most unique – and important – manufacturing jobs in America reside inside the well-protected boundaries of the Y-12 National Security Complex, where the site’s machinists, welders, metalworkers, and chemical operators play a crucial role in the nation’s defense.

On her first day as a machinist apprentice, Rachel Bachorek walked into one of Y-12’s general manufacturing facilities, inhaled the industrial atmosphere, and thought to herself, “I’m home.”

Her parents worked in machine shops when she was younger, but it took years for Bachorek to arrive in a similar place. With a bachelor’s degree in psychology, she worked in police departments and then Y-12’s security police force before deciding to apply for the recently restarted Y-12 Apprentice Program in 2012.

“I’ve always wanted to be a part of something,” Bachorek said of her decision to apply for the program. As a machinist apprentice, Bachorek is a part of Y-12’s Fabrication Operations organization, which has a vital, if simply stated, mission.

“We make things,” said Fabrication Operations Production Manager Susan Baker. “In fact, I think we make some of the most important things in the world. Whatever the nation needs for nuclear defense, our skilled craftspeople can make it.”

They make numerous products for the site and the nation, including:

- parts that go into stockpile weapons and test assemblies,

- tooling that allows machinists to accurately machine each part,
- tooling that allows Assembly/Disassembly Operations to assemble final secondaries,
- gauges and tooling for quality inspection operations,
- material and component samples for quality evaluation and surveillance activities,
- components and prototypes for other government agencies, and
- one-off parts to solve specific CNS needs.

Thanks to the unique apprentice program, Bachorek is experiencing it all. She and her fellow apprentices rotate through maintenance, production, and quality assurance operations, working with nearly all of the different materials on site — from standard industrial metals like aluminum and stainless steel to materials like uranium and lithium — and all of the different machines.

“We operate a lot of equipment,” Baker said, “from incredibly large five-axis, computer-controlled mills to tabletop manual jig borers, and just about everything in between.”

Bachorek enjoys the challenges and complexities of the various machines and operations. Most design

drawings, she said, specify only the type of material and the final dimensions, which, in many cases, allow for deviances of a mere  $\pm 0.002$  inches — roughly half the diameter of a human hair. “These are very expensive, valuable parts that have to be machined exactly as designed,” Bachorek explained. “They require extreme attention to detail.”

With the material and design in hand, it’s up to the machinists to figure out the best and safest way to get to the final product.

“We’ve got to think about the atomic structure of the materials and whether certain operations will cause the material to expand or contract, decide which machine and cutting tools to use, and then determine the best way to position and hold the blanks to ultimately get the most efficient cuts,” explained Bachorek. “I’m not just the monkey that pushes a green button and everything goes. There are so many intricacies.”

Beyond the intricacies of each individual operation, she’s learning how interconnected they all are — and how crucial each is to Y-12’s global security mission.

“When we toured through other facilities, I could see all the tooling and parts and realize that I’ve had a hand in



As a machinist apprentice, Rachel Bachorek has worked in many production facilities. She will graduate and become a journeyman machinist this summer. She’s shown here in front of a Haas milling machine used for stainless steel and aluminum parts and tooling.

making just about everything in there,” Bachorek said. “It’s a humbling experience. When you see the impact that we truly have on the site, it’s overwhelming.”

That impact will be felt for years to come. Fabrication has been busy re-establishing long-dormant processes that will be essential for future mission work. They’ve recently re-started rolling mill operations, which includes a pre-heat salt bath and in-line shear, using equipment that was

last used in production eight years ago.

Once parts have been rolled and cut into smaller plates, they are formed on the newly operational 3,500-ton press, which requires its own pre-heat salt bath, natural gas system for pre-heating the tooling, quench tank, and post-forming vacuum furnace for heat treating.

“We spent a lot of time the last few years testing and proving in various components and training our

operators,” said Luke Thomas, Production Support manager. “These operations will be crucial for us.”

Bachorek currently works on the receiving end of those operations, machining the rolled and formed metal into parts for current and future mission work.

“With this job, 50 years from now I’ll be able to look back and know that I played a part,” she said. “I kept people safe.”



## 3-D printing at Pantex

Early Iron Man suits and prosthetic limbs are just some of the ways additive manufacturing, or 3-D printing, has been used by mainstream companies, but few may know that a group at Pantex has been applying it to their work.

Pantexans have been using the non-traditional process of additive manufacturing to create fixtures for the past five years. Their success is evident across the plant in the hundreds of fixtures created and in use, resulting in the team being recognized for their additive manufacturing work with a Defense Programs Award of Excellence.

One of the many advantages of using additive manufacturing is the ability to significantly reduce the cost and time associated with developing and manufacturing fixtures, in certain cases. A major difference between additive manufacturing and the traditional, subtractive manufacturing, is in the way fixtures are created.

“Additive manufacturing is defined as the process of joining materials to make objects from 3-D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies,” said Tek Ferguson, an applied technology specialist. “There are many different types of additive manufacturing techniques, such as UV [ultraviolet] resin curing, fused deposition modeling, and selective laser.”

With the many fixtures created in the past few years, there are too many accomplishments to list, but some of the latest projects are the vacuum holding fixture, used by Pantex

Explosive Technology, and the introduction of topology optimization.

### Vacuum holding fixture

In the past, holding fixtures used to test high explosives samples introduced an issue when it came to their disposal and required multiple expensive parts. Disposal was a tedious process that required the removal of glue, acrylic, and the sampled material. Also, the average cost of the pads used was more than \$30 each. Ferguson created a holding fixture using additive manufacturing to improve the process. The newly created fixture eliminates the need for pads and glue, is reusable, and is expected to save more than \$300,000 per year as well as thousands of work hours.

“The vacuum holding fixture is a good example of how additive manufacturing at Pantex has really allowed for the Explosive Technology department to become more efficient with the production of fixtures used for manufacturing and testing,” said Robert McClary, High Explosives department manager.

Not only is the holding fixture a huge cost saver, but it also improves the safety of the process.

“We designed it so that it grips the high explosives piece, thus lowering the risk of a part coming dislodged

during the machining process,” said Ferguson.

### Topology optimization

The additive manufacturing team has also ventured into topology optimization – a mathematical approach to create a stronger tool with less material. Pieces are analyzed, and anything non-essential is eliminated.

“Basically, it optimizes material layout within a given design space, which, in turn, will save material and time, reduce weight, and even increase safety margins,” said Jason Jeffers, a mechanical engineer.

How does topology optimization help with safety? A lighter fixture is easier to handle. Not only is lighter better, but designers are able to create fixtures that ergonomically meet the needs of the workers. Topology optimization is one of many methods that allow the designers to find the best concept design that still meets the design requirements and is more desirable and efficient. For example, a fixture for one weapon program was selected for testing to evaluate how the fixture could be improved and to develop a strategy for introducing additive manufacturing technology into current work practices.

“The fixture we were working with is currently manufactured via conventional methods using standard

equipment, such as mills and lathes, as well as using multiple fasteners to assemble all of the individual fabricated tools,” Jeffers said.

By using this mathematical approach, Jeffers and his team were able to manufacture a new version of the fixture that works just as well, if not better, and significantly reduces the associated manufacturing and development costs, weight, and time.

### Future of additive manufacturing at Pantex

Proven additive manufacturing success at Pantex has enabled the group to branch out into other types of additive manufacturing, and the program is getting two more printers

that will allow for even more printing possibilities.

“We are in the process of procuring some of the most advanced machines on the market that will give Pantex the ability to additively manufacture everything from plastics and metals to mock explosives,” said Jeffers.

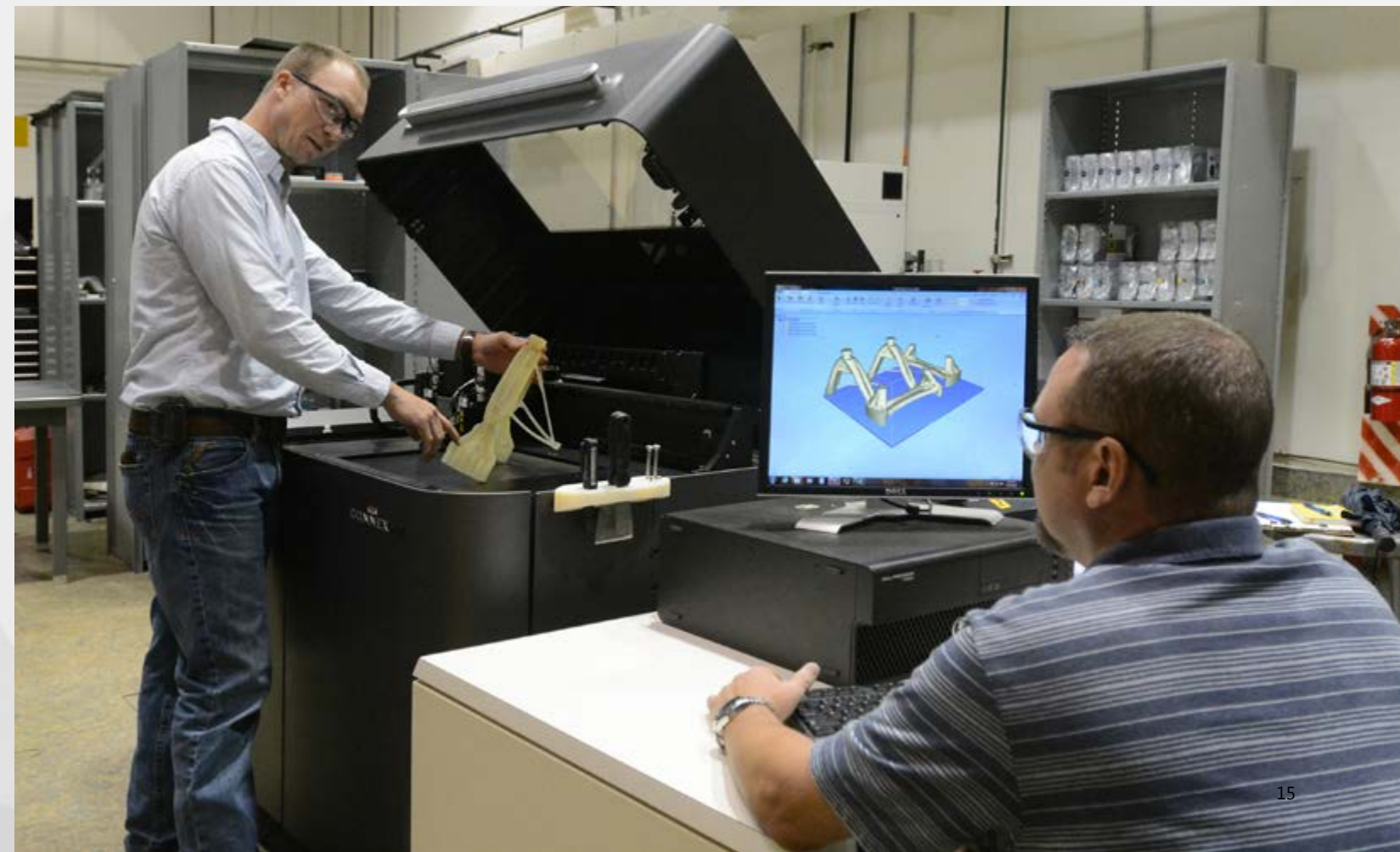
Designers and engineers analyze all of the components or fixtures to see what type of manufacturing will produce the best outcome, sometimes using only additive manufacturing, and other times mixing additive and subtractive.

“The point is that additive manufacturing is another method we

will use to save money and time, increase safety, and enhance our technical knowledge in the field of engineering and manufacturing,” said Jeffers.

Not only will the department be able to create fixtures out of plastics and composites using the new machines, they will be able to work with different types of metals as well. A wider range of materials will allow the group to venture into different types of work. More work is already coming in from all areas of the plant, including the Tooling department, where currently additive manufacturing is being considered not only as a proof-of-concept for tool designs, but eventually for safety-critical tooling.

Jason Jeffers, a mechanical engineer, and Tek Ferguson, an applied technology specialist, use a mathematical approach to design a better part by using less material. The results are fixtures that are safer and more user friendly.



## CNS gives back with grant program

CNS established an employee-directed advisory fund at both sites. In Texas, 19 grants were distributed to non-profit organizations through the Amarillo Area Foundation as part of its commitment to the communities in the Panhandle. At Y-12, the employee-directed advisory fund was managed by the East Tennessee Foundation, as part of its commitment to Oak Ridge and its surrounding counties. CNS distributed those grants to non-profit organizations within the 20-county service area.

### Another Chance House continues “helping others one man at a time”

Many people in Amarillo have driven up and down Third Avenue on their way to and from the historic downtown area, but few realized that in the two blocks between Jackson Street and Harrison Street sits a haven of hope.

More than 1,400 men in Amarillo are homeless. But now, 69 of those men have been given another chance.

For almost 30 years, Another Chance House has provided shelter to homeless males under the direction of Sandy Fenberg, or “Mama” as she is sometimes referred.

Sandy doesn’t get her nickname because of her comforting gestures, but more from the respect that has come about because of her discipline.

“You cannot fix the family until you fix the man,” said Fenberg. “We are tough. But we get structure back into their lives, and we have a high success rate.”

Walk into any one of the 18 buildings and living quarters spanning the two-block compound and you’ll instantly catch a whiff of pine scent or other cleaning products from early morning chores. And it doesn’t stop there. Sandy’s rules include being out of bed at 6 a.m., tidying their area, maintaining their grooming, and acquiring a steady job within 10 days of becoming a resident.

“Sandy’s a diamond in the rough,” said Steve Hodges, board president for Another Chance House.

The Pantex Community Investment Fund provided Another Chance House with a \$10,000 grant to help alleviate costs to house, feed, and provide recovery meetings for these men.

Another Chance House is unique and innovative because it offers several types of housing for long-term efforts toward self-sufficiency as well as program services, such as case management, Alcoholics Anonymous, Narcotics Anonymous, recovery programs,

respect programs, family orientation, employment referral, vocational training, and transportation.

When explaining where he would be today if it weren’t for Another Chance House, resident Juan Alvarado was succinct: “I would be dead.”

Another Chance House is continually expanding its housing services by acquiring more properties that can be offered as low-income housing to assist more men, eliminate drug neighborhoods, and minimize poverty.

“This contribution was important to me because I feel as if we were making an investment for the men and also for their children,” said Gabina Rojas, Pantex Community Investment Fund advisory committee member. “Investing in them would affect generations to come, which is good for all of us.”

For more on Another Chance House, visit [www.AnotherChanceHouse.org](http://www.AnotherChanceHouse.org).

### Monroe County Boxing Club gets youth off the ropes and back into the ring

At best, sports are a metaphor for life. At the Monroe County Boxing Club, sports actually are improving lives for local youth.

Started as the Tellico Boxing Club by Don Eddington and Poke Byers in 1992, the club produced a national Golden Gloves champion. That champion, Jesse Byers, is now the head coach for the club, which now is located in Madisonville, Tennessee.

The club is open Monday, Tuesday, and Thursday afternoons September through June. On a typical afternoon, 20 to 30 youth will be jumping rope, shadow boxing, and sparring in the 6,000-square-foot gym.

Both Byers men were professional boxers. Poke won titles in Oklahoma and Kansas before moving his family to Tellico Plains. Jesse initially was coached by his dad and later moved to Knoxville to work with legendary trainer Ace Miller.

Jesse admitted to making some bad life choices, and that’s part of his motivation for coaching. Boxing was a positive outlet for him, and that’s what he wants to make it for the youth in his gym. Many of his boxers come from broken and low-income families, and he doesn’t want to tell anyone “no.”

In that spirit, the club covers registration fees for those who cannot afford it, and all equipment, uniforms, and travel expenses also are covered. The club provides meals for all of the

boxers before matches and sparring events, which, for some, is the only meal they have for the day. The Y-12 Community Investment Fund recognized the need and provided the club with a grant of \$6,830, which will be used to buy equipment and cover travel expenses for the youth.

One youth benefitting from those funds is Gabriel Beck. As the reigning 2016 Regional Junior Olympic Boxing Champion, the 13-year-old was preparing for the National Junior Olympics in Dallas. He credited boxing for teaching him discipline and pushing him to be a better person and said his coach influenced him a lot.

But the club is about much more than boxing, which is evident in Jesse’s motto: “In the ring and out of the ring, we’re here for them for everything.”

Gabriel’s mom, Tammy, agreed. She said the gym has given her son a place to grow up and gain confidence. Of Jesse, she noted, “The people you trust with your children and your children’s hearts are very rare.”

Brayden Kirkland, who has been boxing for two and half years, said he started at the club because he was close to developing diabetes and needed to get fit. In the process, he developed a passion for the sport. He called the gym his “home away from home” and said his peers are his second family. “We have each other’s backs all the time ... at the gym and away from the gym.”

Of course Jesse would like to develop champions, but he said, “The big picture is about lives being changed.” As evidenced by these young boxers, Jesse and Poke are certainly accomplishing that goal.



Coach Jesse Byers (right) trains a young pugilist at the Monroe County Boxing Club.



Coach Poke Byers demonstrates technique to a boxer at the Monroe County Boxing Club.



Applied Technology Specialist Tek Ferguson uses additive manufacturing to design a new fixture that is used for holding samples when testing high explosives. Find out more on page 14.