

NETL ADVANCED ALLOYS SIGNATURE CENTER



NETL

NATIONAL ENERGY TECHNOLOGY LABORATORY

The National Energy Technology Laboratory (NETL) fills a critical gap in the alloy development research ecosystem by operating unique research facilities to prototype alloys at scales that accelerate commercialization. NETL is designing an expansion to its unique existing ingot metallurgy capabilities by creating an Advanced Alloys Signature Center (AASC) at its site in Albany, Oregon. The AASC will allow prototyping of diverse and specialty alloys at masses up to 500 pounds, which is a scale that is critically absent from the domestic alloy research and development ecosystem.

The AASC research facility will prototype specialty alloys to enable the production of advanced energy, defense, aerospace, national security, automotive, chemical processing, and biomedical devices and technologies. The AASC will produce the specialty alloys in ingots, castings, forgings, plate, tubes, rods and wire, depending on the demands of the technology development program. Prototyping at scales between 50 and 500 pounds is necessary to qualify advanced alloy concepts and accelerate the commercialization of new alloys.

NETL operates research infrastructure for prototyping next generation specialty alloys and feedstocks for advanced manufacturing on behalf of federal and industrial program sponsors. NETL can also partner with regional and national institutions and seeks to contribute its expertise for the public good by leveraging capabilities in partnership to accelerate the commercialization of innovative alloys to ensure the U.S. maintains its leadership in the critical specialty alloy sector.

IMPACT AND VALUE TO THE NORTHWEST REGION AND UNITED STATES

Advanced alloys and specialty metals are a \$32B market of high-value materials critical to national security. The nationally unique AASC facility will help the U.S. to maintain and grow global leadership in this area. Specialty alloys underpin the advancement of nearly all technologies, including those foundational to the energy, defense, aerospace, security, automotive, chemical processing and biomedical fields. The facility will accelerate the commercialization of advanced alloys that will enable advanced technology solutions and will be achieved by enabling alloy prototyping in partnership with industry at scales that easily translate to commercialization.

The State of Oregon Futures Commission has identified the specialty alloy market as a key industrial sector within the state. Leveraging the AASC, NETL would add value to a regional metals industry attractive to businesses that creates jobs and grows Oregon’s metals industry cluster. NETL can collaborate with regional partners—universities, private industry, workforce development and economic development organizations—to grow the metals-related technology community in Oregon.

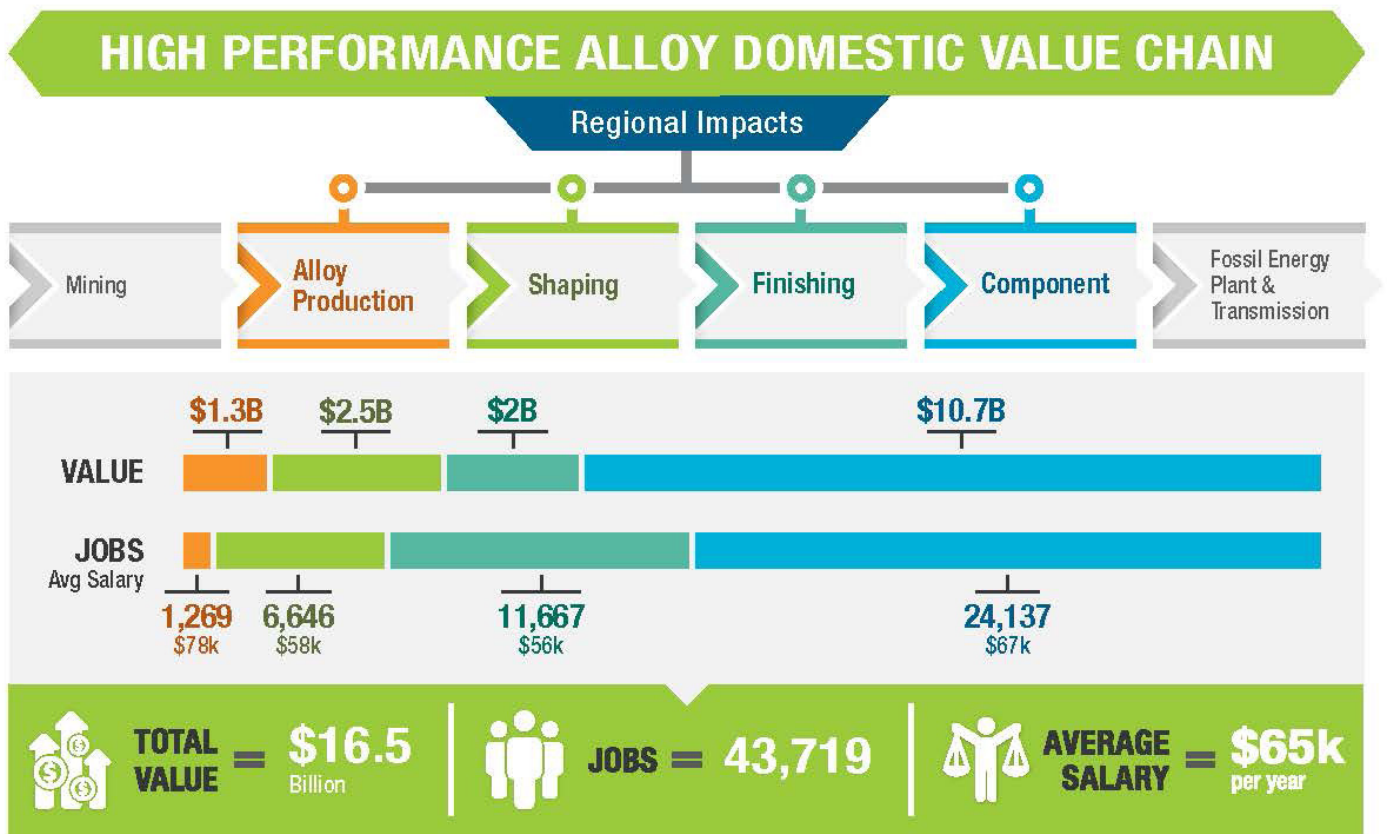


Figure 1. Advanced Alloys Market and impact on the economic landscape for the Heat-Resistant Alloy Segment of Specialty Alloy Sector. This figure represents the heat-resistant steels and superalloy segment of the specialty alloy sector.

CURRENT STATUS AND FUTURE SCOPE

NETL's alloy development capabilities are anchored by NETL alloy ingot metallurgy (melting) and thermal-mechanical processing (forging and rolling), which are unique in scale within the DOE complex and domestic industry. This unique capability allows researchers to efficiently and cost effectively prototype alloy concepts at scales that readily translate to industrial practices (at a scale between the laboratory and production scales). This manufacturing capability, coupled with NETL's capabilities in computational materials design and performance evaluation under real conditions allows NETL to provide alloy solutions that enable advanced energy systems and support the deployment of emerging technologies for U.S. industry. Many of NETL's sister National Laboratories (Pacific Northwest National Laboratory, Idaho National Laboratory, Los Alamos National Laboratory and Oak Ridge National Laboratory) and both small and large U.S. businesses have utilized NETL's alloy manufacturing capabilities to prototype advanced alloy concepts.

NETL's AASC facility design is nearly complete. The enhancements associated with the AASC would include upgrading the research infrastructure to allow for the melting of reactive metal (e.g., titanium) alloys, as well as refractory (e.g., niobium) and other ultra-high temperature alloys. This expansion would allow for academia, other government agencies and U.S. industry to prototype and accelerate the deployment of next-generation alloys for a variety of applications including energy, aerospace, biomedical and wire feedstocks and for additive manufacturing and welding needs.

TECHNICAL CAPABILITIES

- Prototype alloys at scales up to 500 pounds.
- Make and evaluate custom and experimental alloys of all types.
- Focus on ingot metallurgy, characterization, processing and prototyping.
- Prototype melting of reactive alloys.
- Wire feed additive manufacturing (AM) and big area additive manufacturing (BAAM).
- Weld wire for joining newer alloys.

BENEFITS

- Supports the \$32B U.S. specialty alloys manufacturing market.
- Advances cost-effective, high-performance alloys as key enablers for the defense, aerospace, security, automotive, chemical processing, and biomedical sectors.
- Maintains and grows U.S. global leadership in the critical advanced alloys sector.
- Creates sustainable, long-term, high-paying employment within the region.



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