



PRODUCTS AND SERVICES

Our customers have no room for waste or error. They often work in demanding, remote environments. Their equipment must stand up to extreme wear, impact, corrosion, cold, and heat, while meeting high standards for safety and productivity. And they're under increasing scrutiny for the environmental and social impact of their operations.

As the mining, dredging, and heavy construction industries evolve and these challenges grow more complex, we're pushing ourselves to find new ways of helping our customers adapt and thrive. Innovation is at the heart of ESCO culture, and shapes how we engage with customers. Our highest aim is to design products that improve the performance of our customers' machines, last longer, and are safer to use.

We're also innovating for the future. By applying a customer-centric approach to product development that considers the efficiency and impact of our products across their entire life cycle, we're fueling the next generation of breakthrough solutions from ESCO.

"Ideas have the power to transform, but it's the ability to harness these ideas that spawns true innovation."

—John Dillon, Vice President, Engineering and Technology Development

2012 HIGHLIGHTS

New Nemisys™ Lip System recognized for innovative design

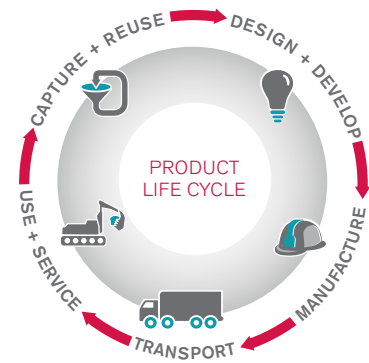
Mining Magazine Awards

Expanded global operations with new offices in South Africa, Russia, and Indonesia

Announced plans for a state-of-the-art innovation center, scheduled to open in 2013 in Portland, Oregon

CRADLE-TO-CRADLE LIFE CYCLE

We consider every stage of our products' life cycles:



Design and develop: We design and create innovative tooth systems, crusher parts, truck bodies, and other products that improve customer efficiency, enhance customer safety, reduce materials use, and last longer.

Manufacture: We collaborate internally to reduce the impact of product manufacturing, including increasing our use of recycled materials, cutting energy consumption, and reusing or recycling more of our materials waste.

Transport: We aspire to reduce greenhouse gas (GHG) emissions by reducing the weight of our products and the distance they travel when shipped to customer sites.

Use and service: We work closely with customers to improve the productivity and safety of our customers' operations while helping reduce their energy, transportation, and packaging needs.

Capture and reuse: We partner with customers and vendors to find new ways of reclaiming materials throughout the manufacturing process and after our products are no longer in use.

We're still in the early stages of this approach. But we believe aspiring to a cradle-to-cradle system is fundamental to our culture of continuous improvement, and helps us create enduring value for customers. For the purposes of this report, we categorized our efforts into three sections: Design and Manufacture, Use and Service, and Capture and Reuse.

DESIGN AND MANUFACTURE

ESCO has a proud history of customer-driven innovation. As of March 2013, ESCO and its subsidiaries had more than 600 patents and nearly 600 patent applications worldwide. We have also pioneered many practices in metallurgy and manufacturing techniques that are now industry standards and best practices. Upon our founding, for example, ESCO was the first U.S. company west of the Mississippi to power its melting furnace with electricity rather than coke or coal, and later spearheaded the use of an advanced steel-purifying process called argon oxygen decarburization (AOD) in our foundry.

New products are born from a desire to meet our customers' evolving needs, and fueled by our drive for creative, never-before-tried solutions. As a starting point for project design, we focus on several key customer priorities:

- Maximizing productivity and uptime, with products and processes that are faster, more efficient, and more reliable
- Protecting the safety and well-being of everyone who uses an ESCO product
- Extending the usable life of our products, saving materials and lowering operating costs
- Mitigating the direct environmental impacts of our products by reducing energy requirements and conserving resources

ESCO engineers are empowered to take risks, approach challenges unconventionally, and seek pioneering solutions that advance how our customers operate. The average ESCO product undergoes a multi-stage process that includes concept development, drafting and design, analysis, prototyping, and testing. In some cases, ESCO engineers are thinking far into the future, working on concepts that may not see production for 15 to 20 years.

The innovation continues once our designs move into production. Our foundries rely on a range of energy sources, materials, and production methods, making it challenging to improve the efficiency of our manufacturing processes across the board. We continue to research and implement new melting practices and technologies, helping us improve the yield of individual

facilities while reducing melting energy and producing less waste. We strive to scale the most successful solutions across our facilities. See the Environment section for more information on our manufacturing process.

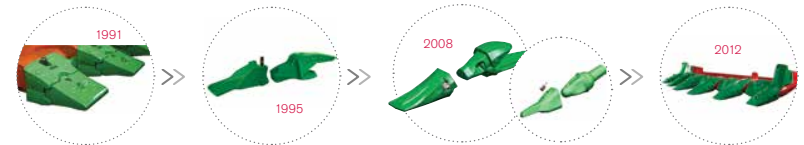
Once an ESCO product enters the market, we evaluate its performance in the field and identify opportunities for improvement. Our goal is to help our customers thrive in a demanding, competitive marketplace.

ENHANCING PRODUCTIVITY

ESCO wear parts are designed to fit excavators, shovels, dozers, loaders, and other large-scale earth-moving equipment. Improving our products' performance requires a deep understanding of our customers' operations, processes, and machinery, as well as the challenging environments in which they work.

The Nemisys™ Lip System is a prime example of ESCO rethinking traditional design approaches to address customer needs. Released in 2012, the combination mining lip, shroud, and three-piece tooth system is an ESCO first—a revolutionary all-in-one digging system that was designed from the ground up as an integrated unit. The outcome of a request from a key ESCO customer, the parts were engineered to fit and work in concert, translating to improved productivity, a longer wear life, and increased safety in the field.

In 2011, the Panama Canal Authority debuted its newest dredge, the Quibian 1, which was outfitted with an ESCO hard rock cutterhead. The Quibian 1 is the latest piece



RETHINKING HOW WE WORK

A key customer came to us with a challenge: Fit one of our tooth systems onto an existing lip while meeting a specific weight requirement. It ultimately proved too difficult for our engineers, who could not meet both the weight and strength requirements using the existing product.

So we did the customer one better: We challenged our two engineering teams to simultaneously design a mining lip, shroud, and three-piece tooth, and integrate them into a single system—the first of its kind for ESCO. The result was the Nemisys™ Lip System, which made its debut at MINExpo 2012.

The system's primary advantage is the very thing that made it so challenging to begin with: its interdependency. Facing a short timeline, engineers designed the components concurrently, which required exceptional coordination and collaboration. However, the integration provides a far better fit between components than traditional lip/tooth systems, which translates to improved performance and longer wear life.

“The technology we used to develop Nemisys™ allowed us to leap even further ahead of the competition.”

—Noah Cowgill, engineer on the Nemisys™ team



The across-the-board improvements of the Nemisys™ system are significant:

- A slim lip design and matching tooth system that requires 9.4 percent less force to penetrate (results are based on ESCO scale testing)
- Up to 19 percent more usable wear metal on the teeth, improving uptime and extending the life of the product
- Twenty percent larger thrust face area on the system nose for better reliability
- A contoured lip that reduces peak stresses up to 12 percent
- A hammerless locking system that's safer and faster to use while reducing maintenance costs

Winner of *Mining Magazine's* 2012 Surface Mining Award, the Nemisys™ system is the embodiment of the innovation process at ESCO: Identify a customer problem, challenge our teams to think beyond incremental changes, and look for transformative solutions, and deliver a product that exceeds everyone's expectations.

of equipment being used as part of a \$5.25 billion USD, multiyear project to expand and modernize the Panama Canal. The cutterheads for the Quibian 1, as with all cutterheads manufactured by ESCO, were designed to match the strict specifications of the new dredge.

One particular section of the Canal where the Quibian 1 operates is the Gaillard Cut, a narrow stretch of water that is an extension of the Rocky Mountain Range. The hard rock on the canal's floor is one of the most difficult places where ESCO's cutterheads work. It's not just ESCO cutterheads that have helped keep the canal working. The Canal Authority for decades has used ESCO shovel dippers, clamshell buckets and rigging products to keep commerce flowing through the critical shipping channel.

EXCEEDING SAFETY STANDARDS

Safety is a core value at ESCO, and an integral part of new product development. All ESCO products are required to undergo several safety evaluations throughout the development process, as defined in our Product Safety Manual. Our Product Safety Committee—which consists of engineering managers, product managers, and representatives from our legal department—leads the efforts to develop and communicate our safety procedures. The committee meets periodically to evaluate existing guidelines, establish new guidelines, and reinforce ESCO's commitment to product safety. Our engineering team puts these guidelines into action at several stages of the product development process.

Every ESCO product must have safeguards designed to minimize personal injury during the normal use of the product.

When evaluating the safety of a new product, ESCO engineers put potential designs through demanding in-house lab and field tests. When designing the Ultralok® Tooth System, for example, our engineers were challenged with conceiving a hammerless lock that's integrated into the tooth system, and that can be safely, easily, and reliably removed in all mining conditions. The ESCO team came up with two options, taking into account the force required to remove the lock and the body position of the user. We approved the option that proved safest in field trials—a clever mechanism that locks the tooth onto the adapter while allowing the user to maintain an ergonomically friendly body position.

INNOVATING FOR THE FUTURE

In the fall of 2013, we will bring together some of ESCO's brightest minds with the launch of a state-of-the-art, 20,000-square-foot innovation center at our headquarters in Portland, Oregon. The center will foster ongoing innovation and collaboration by pooling the expertise, creativity, and resources of our engineers and technicians, with an eye toward keeping ESCO on the leading edge of product development 15 to 20 years into the future. Plans will include everything from conceiving new technologies for future projects to anticipating the mine of the future. The center will also help drive ESCO's thinking on sustainable design, serving as a vehicle for fresh ideas on materials use, resource conservation, and cradle-to-cradle design strategies.

The innovation center is an expression of our culture of continuous improvement. We anticipate it will energize innovation within ESCO, accelerate the development of transformative technologies, and help us reduce the environmental impact of the industries we support.

GETTING CLOSER TO OUR CUSTOMERS

The Sossego copper mine is located in mountainous Pará, Brazil. Accessible only by an 85-kilometer road that runs to the city of Parauapebas, getting to and from the remote mine site isn't easy. When equipment goes down, the logistics of sending it to the nearest repair facility are daunting.

ESCO Betim, located more than 2,000 kilometers away, responded to our customers' needs by opening a branch in Parauapebas in 2010. Serving sites owned by the Vale mining company, the office deploys five maintenance trucks and skilled technicians—locally hired and trained—to tackle jobs such as bucket, truck body, stick and boom repair, and new truck body and bucket assembly.

"Our vision is to be closer to our customers, engage in their problems, understand their plans for the future, and create long-term business value," says José Rogério Silva, the managing director for ESCO Brazil. As of 2012, the Parauapebas site employed 112 people, nearly all hired from within the Pará region. Each employee receives three to six months of training depending on the job function—building skills, opening up new career opportunities, and giving a boost to the local economy.

After two years, Vale reports higher-quality service and lower maintenance costs thanks to our quicker response times. Our technicians are also trained specifically in the refurbishment of truck bodies—a major draw for Vale, which moved 109,000 metric tons of copper into the copper production chain in 2011.

ESCO is benefiting as well. We've cut driving distances, significantly reducing the carbon emissions associated with serving the Vale sites. Our engineers are also using feedback from the Sossego mine to inform the development of a new product we're manufacturing in partnership with Vale—a lightweight truck body that's safer to use, offers lower capital costs, and reduces environmental impact.

USE AND SERVICE

Field tested and trusted. That's the ultimate objective of every product manufacturer, but is especially true in industries like mining, dredging, and heavy construction. Even a small mistake can endanger the lives of equipment operators and cost tens of thousands of dollars in lost productivity.

Every ESCO product is designed and built to excel in demanding conditions, but we put a special emphasis on improving productivity, safety, and reliability in the field. For example, customers rely on massive trucks for loading, hauling, and dumping huge payloads—a rugged process that requires a truck body that can haul hundreds of tons of earth and rock at a time. ESCO responded by building a truck body with several enhanced features designed to protect workers, haul materials more efficiently, and reduce downtime at the site.

Some of the key features include:

- An extended, angled canopy that provides increased coverage of the truck's walkways, stairways, cabins, and mirrors, helping protect workers from loose debris
- A unique frame shape with a wide loading area, curved sidewalls, and a curved tail; the frame streamlines the loading process and reduces load spillage during travel, ensuring optimal payloads and fuel efficiency
- A two-stage dumping process that reduces materials friction and floor wear, extending the life of the product

REDUCING TRANSPORTATION NEEDS

The transportation phase of our products' life cycle represents another opportunity to benefit from innovative thinking and design. For example, by reducing the weight of a product, we can help cut the energy and carbon associated with shipping—which can be significant considering the size of our products and the distances we often need to transport them. When possible, we also consolidate shipments at our warehouses by shipping multiple products within a single container.

INCREASING SAFETY IN THE FIELD

Safety starts in the design of our products, but it's put to the test in the field, where many of our customers engage in demanding mining and construction activities. As part of our commitment to continuous improvement, we're always looking for ways to make these work environments safer. In 2012, for example, we began standardizing certain safety features across all our product lines. The improvements range from highly visible to hardly noticeable to the average customer, but can make a dramatic difference in reducing injuries. Following are some improvements starting in 2013.

- All new ESCO products weighing 10 kilograms or more will feature clear weight markings. The markings are intended to alert users to a product's estimated weight, so they know to seek assistance—human or mechanical—before lifting.
- Lifting eyes will come standard on all ESCO products weighing 20 kilograms or more, making it possible for users to move the parts with a standard lifting device and cable. Previously, individual product teams decided whether to incorporate lifting eyes.

We also perform regular safety assessments of our products to make sure they're continuing to meet our high safety standards. For example, we reevaluated the safety of our lifting jaws in 2011 through 2012, after a leading original equipment manufacturer released a new jaw-lifting product—a specialized tool for installing and removing jaws from crushers. Our safety report determined that 19 of our existing jaws didn't properly match the new lifting tool, potentially putting our jaw customers at risk. We immediately implemented corrective action, updating the lifting holes and reducing the weight of many of our jaws.

SUPPORTING CUSTOMERS GLOBALLY

Helping customers use our products to their full potential is vital to ESCO customer service. But it can be a major challenge. Our customers operate mining and industrial sites around the world.

At ESCO, we're expanding our business model by bringing our expertise directly to customers, launching ESCO sites in countries ranging from Brazil, Chile, Russia, China, and New Zealand. Each site fulfills a different role depending on the customer need. Some sites, such as the foundry we opened in Santiago, Chile, in May 2012, add a local manufacturing presence, reducing the time and expense of supplying products to our South American customers. The shorter distances speed up product delivery—improving customer productivity—while also reducing our transportation footprint.

Other ESCO sites act as regional service facilities. In South Africa, for example, we dispatch our maintenance and repair service teams out of branches located within different mine clusters, which include iron ore,

ESCO produces stainless steel



1931

Chief Executive Charles Frederick "Fred" Swigert, Jr.



1935–1953

ESCO expands outside the United States, opens offices in Vancouver, B.C.



1940

ESCO expands into Latin America



1945

ESCO awarded its first NAVY, "E" for Excellence for helping in the war effort. ESCO received this award on six subsequent occasions



1946

First successful two-part tooth system which became industry standard for the next 50 years



1949

1930



manganese, and limestone mines. Our teams consult onsite with local customers, allowing us to better anticipate their productivity and cost needs and make sure they're using the right ESCO product for each application. Our close proximity to customers also makes it possible to receive real-time feedback on our products' performance. We use this information to drive short-term product improvements and spur future innovation.

Our mobile service trucks are also outfitted with welding machines, diagnostic tools, and other tools technicians need for repair jobs. Our customers used to ship damaged equipment back to the nearest manufacturing facility, but now we can quickly troubleshoot and fix our products onsite to optimize customer uptime and safety.

CAPTURE AND REUSE

Eliminating waste is one of the great motivators of sustainable design, but it represents a fundamental challenge to the industries we support. Many customer sites are located in areas that lack vital infrastructure, making it extremely difficult to reclaim materials after our products are no longer in use. Even the addition of local support facilities doesn't solve the problem, since in many cases we would have to ship heavy scrap materials thousands of miles to the nearest recycling processors.

While we're still trying to wrap our arms around the scale of the challenge, we are making progress. One major area of emphasis is cultivating a stronger infrastructure

for the recycling of scrap metals. For more than 20 years, we've been producing hammers, anvils, grates, and other wear parts for the scrap metal shredders used by both small recycling yards and large multisite steel recyclers. However, as of 2013, we're moving beyond traditional wear parts to include production of drive feed rolls, shredder rotors, and other essential parts. As strategic objectives for 2013 and beyond, these initiatives will position ESCO as a provider of recycling system solutions rather than a mere parts supplier.

We're also attempting to recover a higher portion of the scrap metal from our worn parts. We've made arrangements with a scrap dealer in Duluth, Minnesota, to pick up scrap metal from our customers in the Iron Range, a mining region that spans several Midwest states. Each year we recover roughly 200 tons of scrap from the Iron Range—approximately one-third of which is worn ESCO parts—and ship it to our facility in Newton, Mississippi.

In addition, we're experimenting with a buy-back recycling program at six mine sites in Texas. Our ESCO facility in Kilgore, Texas, picks up the full scrap bins and sells the contents to a local scrap merchant. From November 2011 to December 2012, we were able to sell approximately 215,000 pounds of scrap from the Texas sites.

Over the next decade, we will explore the feasibility of capture and reuse at our facilities worldwide.

VOICE OF THE CUSTOMER

Our "voice of the customer" initiatives enable us to share a common language with our customers and gain a deeper understanding of their priorities. We employ a structured methodology consisting of hypothetical process models, in-depth interviews, site visits, customer feedback surveys, and more, with the goal of identifying and prioritizing all or most of a customer's spoken and unspoken needs. We then translate these needs into specific design requirements, always looking for ways to create more value through innovation and lean process improvements. In the future, we will incorporate analysis of sustainability needs and opportunities into our "voice of the customer" process.