

Waste



Within the foundry industry, the casting process inevitably results in a considerable volume of spent foundry sand, a critical byproduct. Despite undergoing numerous recycling stages, the sand's quality eventually diminishes, making it unsuitable for high-quality castings.

Grede actively seeks avenues to repurpose this sand, aiming for its Beneficial Reuse in areas such as construction, agriculture, and geotechnical projects, substantially diminishing the sand's potential path to landfills. Although some landfills employ spent sand as cover material, a significant opportunity remains for Grede to augment recycling efforts and further curtail landfill disposals.

Environmental Management System (EMS)

Waste Stream Evaluation:

As a component of Grede's Environmental Management System (EMS), each facility consistently evaluates waste streams for potential recycling, reduction, and/or reuse opportunities. Every facility documents these assessments, which are then collectively reviewed and discussed annually during the EMS management review.

Hazardous Waste Elimination

- Our EMS review led to the identification and removal of the last parts washers containing solvents that were once deemed as hazardous waste. We are proud to announce that Grede now has zero hazardous waste.

Continuous Improvement – CIP Challenge

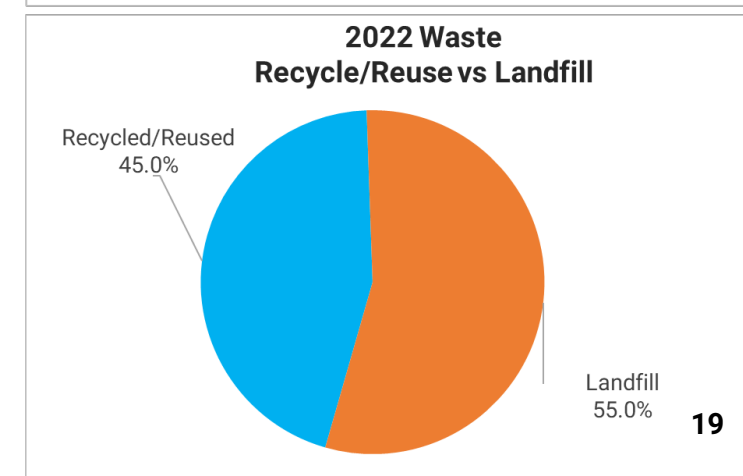
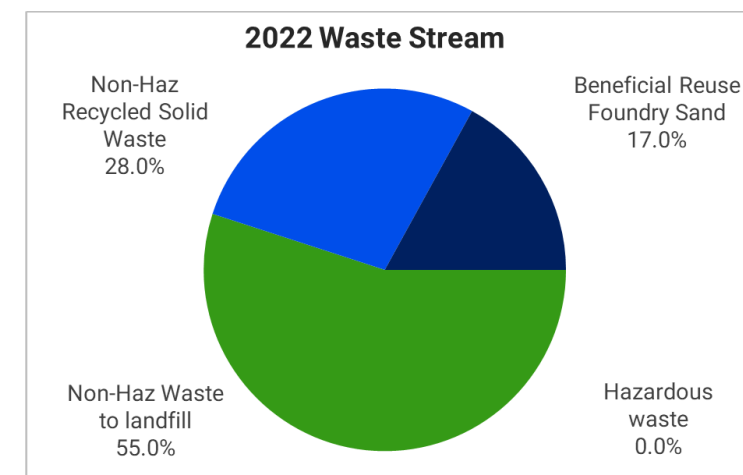
- Every facility is required to propose an environmental Continuous Improvement Project (CIP) focusing on reuse, reduce, or recycle objectives. These projects undergo evaluation by a cross-functional committee and are subsequently acknowledged at the annual Environmental, Health & Safety Summit.

Spill Control Best Practices

- 2022 marked a year with no reportable chemical spills.
- Every facility has a spill response plan in place.
- Monthly inspections are conducted on spill controls. Should a system test reveal any malfunctions, an immediate corrective action plan is activated.

Waste and Recycling Tracking:

- All waste streams are tracked and reported. This data forms a part of the Grede Monthly Operations System (MOS) and is also reviewed during our Quarterly on-site Management Review



Beneficial Reuse

Beneficial reuse of foundry sand refers to the practice of repurposing the spent sand, a byproduct of metal casting processes, for various beneficial applications instead of relegating it to waste. This sand is given new purpose in roads development, general construction, soil enhancement, agricultural applications, and as geotechnical fill.

Such an approach diminishes the environmental footprint of foundry operations while also yielding economic and sustainability advantages. In essence, the beneficial reuse of foundry sand not only diverts waste from landfills but also conserves natural resources, reduces costs, and is in line with broader sustainability goals.



Beneficial Reuse Highlights

Biscoe, NC **Potting Soil Project**

Grede Biscoe NC is partnering with a local potting soil manufacturer to creatively repurpose 100% of its spent foundry sand. By combining it with wood chips, they produce premium potting soil. This environmentally conscious effort has notably reduced landfill waste by approximately 10,000 tons, representing a remarkable 98% reduction in the facility's total waste output.

Wauwatosa, WI **Green Sand – Fly Ash Project**

In partnership with a local waste management company, Grede Wauwatosa WI actively repurposes 100% of the dust produced from their Green Sand Molding process. This dust is mixed with liquid waste at the landfill, serving as an alternative to fly ash. This initiative has led to a reduction of over 500 tons of waste being sent to the landfill, accounting for a 10% decrease in the facility's total landfill waste.

Browntown, WI **Airport Runway Project**

Grede Browntown is currently transporting beneficial reuse sand, including core butt sand and system sand, to the City of Monroe Airport for use as fill material in an upcoming taxiway project. The project is now in Phase 4, with engineering estimates predicting completion by December 2023. Notably, in 2022, the plant diverted 5,674 tons of sand from landfills. As of year-to-date 2023, they have diverted an additional 3,410 tons.

Meadville, PA **Site Clean Up Project**

Grede Meadville PA, in collaboration with a local waste management company, has achieved the beneficial reuse of 100% of their spent foundry sand. This effort was directed toward backfilling a former U.S. Steel cleanup site in the nearby area. All participants, including Grede Meadville PA, committed 100% of their waste sand, spent cores, and baghouse dust to this project. As a result, the facility saw a substantial 75% reduction in waste sent to the landfill. A commendable total of 8,000 tons were successfully repurposed through this initiative.

St Cloud, MN **Cement Project**

Grede St. Cloud MN entered a fruitful partnership with a Portland cement plant located in Mason City, Iowa, promoting the eco-friendly practice of beneficially reusing spent foundry sand in the cement plant's operations. Throughout 2022, as a part of this collaborative effort, a consistent monthly allocation of 500 tons of spent foundry sand was designated to this initiative.

New Castle, IN – Iron Mountain, MI – Reedsburg, WI **Road & Construction Projects**

Grede New Castle, Reedsburg, and Iron Mountain maintain collaborative relationships with local construction and municipal authorities. They contribute used foundry sand for uses such as underlayment or fill material in road projects and local building developments. While these projects vary in scale, they play a pivotal role in diverting a 40% to 60% of used sand away from landfills. Additionally, they bolster local infrastructure and construction.

ENVIRONMENTAL CIP

The Grede Continuous Improvement Program (CIP) inspires our employees to play an integral role in our ongoing quest for enhanced environmental sustainability. Under the CIP, every facility is required to submit proposals for environmental projects centered on reuse, recycling, or reduction. The goal is to disseminate these initiatives as standard best practices throughout all our facilities.

In 2022, we received 24 formal project submissions. Each proposal was meticulously evaluated based on criteria such as Project Analysis, innovation, effort, effectiveness, and long-term sustainability. The standout projects were recognized and celebrated at our annual Environmental, Health & Safety Summit.



Creating a safer and sustainable future, together

Environmental CIP #1

- Saint Cloud, MN
- Bentonite Recovery

The introduction of a Bentonite Recovery system is a significant milestone in our operations. Its primary aim is to reclaim bonding material from the dust generated by the Disa sand system. With this project, we've set an ambitious target to efficiently recover up to 90% of the annual dust output, equating to a notable 4,420 tons per year. Early results have shown the recovery of 1,500 tons of clay and 581 tons of carbon, totaling 2,081 tons of reclaimed material. The Bentonite Recovery system not only showcases our unwavering commitment to sustainability and resource optimization but also highlights our resolve to boost the efficiency of our production processes.



Environmental CIP #2

- Iron Mountain, MI
- Clean Water Discharge & Compressor Use

Our dedication to sustainability and efficiency is evident in two primary initiatives: Clean Water Discharge and Compressor Usage Reduction. In our quest to reduce energy consumption, we've optimized our plant's air compressor operations by integrating an automatic pressure regulation system. This system adjusts the compressors in real-time based on changing usage patterns. In tandem with this, we've made considerable strides in reducing wastewater generation from our air compressors and associated machinery. In the past, the presence of excessive oil and contaminants in the wastewater necessitated expensive third-party disposal. We've addressed this by introducing oil-water separators. These devices enable us to process and then release the treated water into the city's sewer system, adhering to permissible limits. This not only eradicates the need for third-party disposal but also obviates the requirement for secondary containment around compressor discharges.

Environmental CIP #3

- Biscoe, NC
- Coolant Recovery Systems

In a concerted effort to optimize our machining processes and reduce waste, we've implemented a comprehensive Coolant Recovery system. This system encompasses several key components, including the installation of coolant recovery systems on metal chip hoppers, the reprogramming of all machine chip conveyors and augers to run intermittently rather than continuously, the addition of drains to all chip hoppers, and the incorporation of skimmers to efficiently remove tramp oil. These collective measures have translated into tangible results, as we now successfully recover 950 gallons of coolant every two months.



Water Conservation

Grede has made considerable progress in water conservation within our manufacturing operations. Historically, foundries have been known for their high-water consumption, particularly the non-contact water employed for cooling machinery and Cupola exteriors.

Our significant reduction in water usage is attributed to two main strategies. The installation of closed-loop water cooling systems. And integration of water-efficient equipment.

These initiatives have led to a significant reduction in both water consumption and wastewater discharge. To strengthen our commitment to conservation, we have implemented training and best practice procedures to monitor, detect, and promptly address any leaks in our manufacturing processes, ensuring efficient water usage and minimized waste.



Water Facts 2022

- 779,214.15 cubic meters of water usage in 2022, up 10% from 2021 while production was up 11%
- Near-zero contaminated waste-water
- Over 95% of the water used at Grede is part of a closed-loop system
- No water used at Grede impacts high biodiversity water bodies

Water Savings Key Components

- Regularly monitor water usage and continually seek methods to reduce it, guided by the ISO 14001 system CIP program.
- Before using on-site water, contractors working on-site are required to discuss their planned water usage.
- Invest in water-efficient equipment and machinery to diminish water consumption during casting and other processes.
- Optimize sand processes to decrease water consumption used for sand conditioning and reclamation, thereby bolstering efficiency.

3D Sand Printing Technology 2022 Water Savings

- 5,600,000 gallons (approx. 21,197 cubic meters) of water saved annually.
- Based on two printers operating in 2022. Savings will increase by 50% with the addition of a third 3D Sand core printer

Water Conservation Achievements

Water Conservation Project #1

- Saint Cloud, MN
- Savings 2,900,000 gallons water annually

In our commitment to sustainable practices, we have launched a significant water reduction project at the St. Cloud plant. This project specifically targets the issue of single-pass water usage, which accounts for a substantial 39% of total annual water consumption, equating to 15,000,000 gallons annually. The project includes installing a cooler on core machine L40, which is expected to yield annual water savings of 1,500,000 gallons. Simultaneously, implementing a cooler on impactor hydraulics, which will save an additional 1,400,000 gallons per year. When combined, these measures will result in a total annual water savings of 2,900,000 gallons for the plant. This not only promotes water conservation but also contributes to significant financial savings.

Water Conservation Project #2

- Wauwatosa, WI
- Discharge water elimination

The Non-Contact Rerouting Project is designed to address the issue of discharging BAC non-contact cooling water into the stormwater system. To elevate our environmental stewardship, we've implemented a closed-loop system at the BAC facility. This new system channels the cooling water directly back into the cooling tower, negating any water discharge into the storm sewer. This proactive measure not only protects the stormwater from potential contamination but also underscores our dedication to sustainable and conscientious water management practices.

At the forefront of innovation, our electric vehicle engineering, design, testing and validation capabilities are driving the future of sustainable transportation



Leading the way – future ready