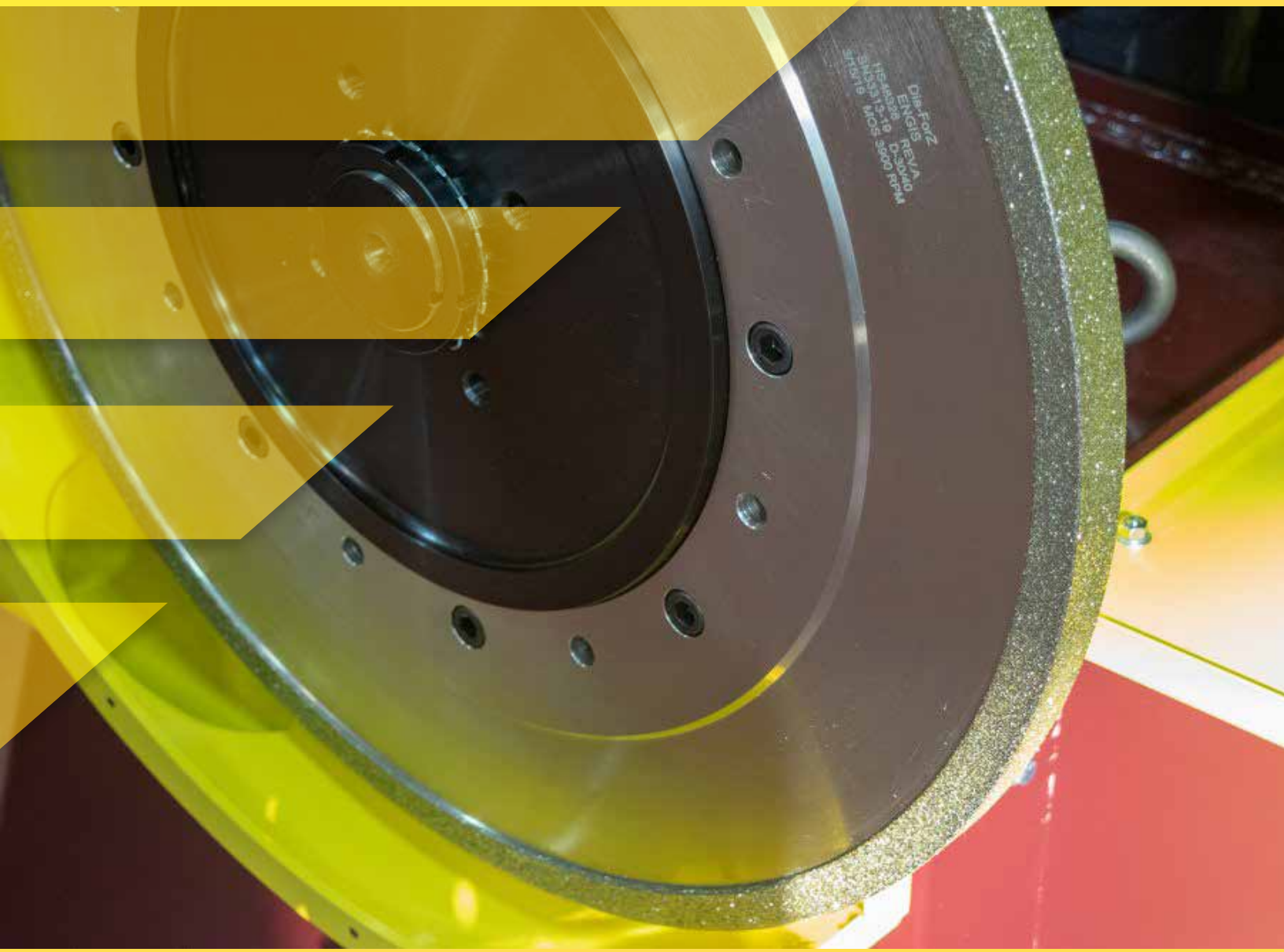
ENGINEERED CRAFTSMANSHIP

World Leader in Superabrasive Finishing Systems



ATS, Engis® Corporation

Advancing Foundry Grinding

Diamond Wheel Stand Grinders Increase Safety and ROI

Brian Luebke, ATS - *Vice President*
John Mariani, Engis Corporation - *Market Manager of Foundry Products*

Foundry environments are among the most demanding in the manufacturing world. Grinding is a common finishing technique in foundry work and used to remove- flash, gates, risers and parting lines from castings. However, there are challenges with this method:

- Safety hazards due to wheel breakage and silica dust
- Inconsistent material removal, leading to quality issues
- Environmental pressure to reduce airborne pollutants
- Downtime and labor costs from frequent wheel changes and operator fatigue

These problems call for a more robust, efficient and sustainable grinding solution. Replacing traditional resin-bonded wheels with ATS stand grinders equipped with Engis® diamond wheels offers performance and long-term benefits for operations managers, process engineers and other decision-makers in the foundry industry who are responsible for improving productivity, ensuring workplace safety, meeting environmental standards and managing grinding and finishing operations.

Transforming Metal Removal Processes

Grinding operations in foundries face persistent challenges, including health and safety risks, environmental concerns, inconsistent part quality and lost productivity due to downtime, wheel maintenance and frequent replacements. Resin-bonded wheels, the traditional tool of choice, often exacerbate these issues due to their limited durability and performance variability.

Diamond-plated wheel stand grinders — particularly when paired with ATS automation — offer a high-performance alternative. Compared to conventional resin-bonded wheels, Engis diamond wheels provide superior lifespan, higher material removal rates, better surface finishes, improved operator safety and a significantly reduced environmental footprint. This article explores how diamond wheels, in combination with ATS stand grinders, are transforming metal removal processes in foundries, offering measurable improvements in efficiency, quality and cost-effectiveness.

The Limitations of Resin-Bonded Wheels

Resin-bonded wheels have been the industry standard for decades. While suitable for basic applications, they come with significant limitations that hinder modern foundry operations.

Key Limitations:

- Shorter Lifespan: Resin wheels degrade quickly under the stress of high-volume grinding.
- Inconsistent Performance: Frequent recalibration and dressing are required to maintain cutting efficiency.
- High Breakage Risk: Under intense pressure or prolonged use, resin wheels are prone to shattering, posing serious safety threats.
- Frequent Replacement: The need for regular dressing and replacement causes unnecessary downtime.
- Productivity Bottlenecks: Slower material removal rates increase the burden on downstream processes.
- Health and Safety Concerns: High levels of silica dust and vibration pose long-term risks to operator health.

These drawbacks lead to higher operational costs, lower product quality and growing concerns about workplace safety and compliance.

The Diamond Wheel Advantage

Industrial diamond tools became commercially viable in the U.S. market around 2003. Engis was one of the earliest companies to enter this space. Despite their clear advantages, adoption of diamond tools has been limited by the lack of compatible equipment, especially for automatic grinding in iron foundries. ATS, with its automated stand grinder solutions, bridges this gap.

Unmatched Durability & Composition

Diamond has a Knoop hardness rating of 7,000 and far exceeds traditional abrasives like silicon carbide and aluminum oxide. This extreme hardness allows for longer-lasting tools that retain sharpness and consistency throughout their use.

Key Benefits of Diamond Wheels

LONGER TOOL LIFE

Diamond wheels offer significantly longer tool life, lasting 25 to 30 times longer than traditional resin-bonded wheels [Waupaca]. Their durability reduces the need for frequent dressing, allowing them to maintain consistent performance over time. As a result, fewer wheel changes are needed, which minimizes downtime and boosts overall operational uptime. While per-wheel costs are more expensive in many cases, the improved longevity provides lower overall wheel costs over time [Modern Casting].

HIGHER MATERIAL REMOVAL RATES

Diamond wheels deliver higher material removal rates, operating up to 40–45% more efficiently when paired with ATS stand grinders. Diamond wheel stand grinders achieve optimal performance at around 20,000 surface feet per minute (SFM) and maintain a consistent removal rate without the need for recalibration [Engis]. This efficiency accelerates production and helps maximize wheel life, even under continuous, high-demand usage.

REDUCED RECALIBRATION EFFORTS

In automated robotic grinding applications, wheel selection has a direct impact on system stability and maintenance requirements. While resin bonded wheels can be used in automation, they require frequent calibration checks because wheel wear and positional changes cause the robot to regularly reverify its setup. In contrast, diamond wheels offer a clear advantage: their superior wear resistance and dimensional stability allow the grinding position to remain consistent over time. As a result, once calibrated, diamond wheels eliminate the need for repeated rechecks, making them the preferred choice for reliable, efficient and low-maintenance robotic grinding operations.

IMPROVED SAFETY

Diamond wheels significantly enhance workplace safety in grinding operations. Their solid steel core eliminates the risk of catastrophic wheel breakage — a major hazard associated with traditional vitrified or resin-bonded wheels [Waupaca]. Diamond wheels also generate substantially less silica dust during grinding, helping facilities meet and exceed OSHA and other international safety standards related to airborne particulate exposure [Engis].

In foundries that implement diamond wheels into their manual grinding operations, the diamond wheel requires less grinding pressure and effort from operators, easing any resulting shoulder and elbow strain significantly [Modern Casting]. This combination of structural integrity, ergonomic benefits and dust reduction makes diamond wheels a safer and more responsible choice for modern foundry and machining environments.

ENVIRONMENTAL IMPACT

Diamond wheels support a cleaner, more sustainable grinding process. Their efficient cutting action generates far less dust and airborne pollutants, directly reducing emissions in compliance with environmental regulations [Waupaca]. Because diamond wheels last longer, they require fewer replacements, which minimizes solid waste from wheel disposal [Engis]. Engis further enhances this sustainability profile by offering wheel recycling options, helping customers close the loop on resource use. Reduced wheel-generated dust may also lower the burden on plant clean-air initiatives; Modern Casting reported that one foundry customer saved more than $200,000 in clean-air initiatives during the first year after switching to diamond cutting wheels. Overall, the extended life cycle, reduced waste and lower particulate generation of diamond wheels align with both corporate sustainability goals and evolving environmental standards [AFS].

ECONOMIC IMPACT

The economic advantages of diamond wheels are both immediate and long-term. In addition to the increased throughput from improved material removal rates, diamond wheels produce cleaner, more precise grinds and virtually eliminate the occurrence of damaged or over-ground castings, cutting scrappage rates from typical levels of 10-15% down to near zero. Their exceptional wear resistance also translates into dramatically lower consumable costs — often up to 65% less than conventional abrasive wheels [Engis]. Smoother operation and reduced vibration lessen operator fatigue, enabling more consistent performance across shifts [Waupaca]. These factors collectively improve productivity, extend equipment life and deliver a measurable return on investment for manufacturers.

LONG-TERM EFFICIENCY

Although the initial investment in diamond wheels is higher than conventional abrasive wheels, durability and performance advantages of diamond deliver substantial long-term savings. The extended service life dramatically reduces the frequency of wheel changes, minimizing downtime and maintenance labor. Because diamond wheels maintain their cutting profile longer, they also ensure consistent part quality and reduce the need for rework or secondary finishing operations. These operational efficiencies translate directly into lower total cost of ownership (TCO), particularly in high-volume or continuous-duty applications. Over the course of months or years, the cumulative savings in labor, consumables, and production consistency more than offset the upfront expense — making diamond wheels a strategically sound investment for any facility focused on cost control and process reliability.

ATS Automation – The Stand Grinder Solution

Integrating diamond wheel technology with ATS Automation Solutions delivers a powerful synergy of precision, productivity and process control. Traditional grinding operations often face a gradual decline in efficiency as wheels wear down, losing diameter and speed over time. This degradation forces operators to apply more pressure to complete each cut, generating excess heat that not only shortens tool life but also risks damaging the casting itself. In one documented OSHA incident (ID 157493), the failure of a manual wheel-grinding process led to the death of an employee when a hand grinder's wheel fragmented under stress, underscoring how tool degradation and high operator force contribute to risk.

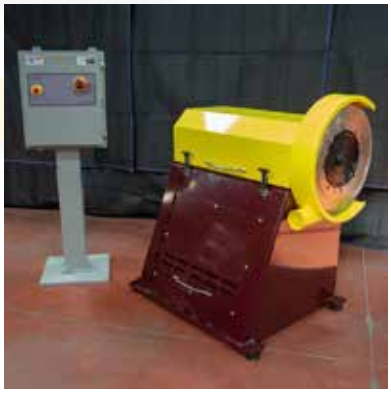
ATS automated systems avoid these issues and maintain consistent grinding parameters by utilizing diamond wheels that retain their diameter and cutting speed throughout their usable life. The result is a measurable improvement in throughput — up to 15% more tonnage per man-hour — achieved without increasing operator workload. Because the diamond wheel maintains optimal performance, the automated system can operate at a steady pace, ensuring uniform material removal and consistent part quality. OSHA records (such as ID 118465) highlight how manual grinding operations are vulnerable to wheel shattering or misalignment when operators must compensate for tool wear, increasing exposure to flying fragments and serious injury.

Moreover, automation addresses one of the key variables in manual grinding: human fatigue and inconsistency. Operators using ATS systems can oversee and direct the robotic process while the robot performs the grinding with precision and repeatability. This standardizes output while enhancing safety by reducing direct operator exposure to heat, vibration and airborne particles. In another OSHA case (ID 103511), an employee suffered injuries working with a manually-fed grinding machine where inconsistent feed pressure and wheel wear contributed to exposure to silica dust and vibration-related hazards. By shifting to an automated stand-grinder equipped with diamond wheels, these exposure risks are significantly reduced — the operator is further from the cut zone, the wheel holds its specification longer (reducing dust and vibration), and the control system ensures safe, repeatable operation.

By combining the endurance of diamond wheels with the precision of ATS automation, manufacturers can achieve a sustainable increase in productivity, part quality and worker safety — all while lowering the total cost per part produced. The OSHA case histories make it clear: the hazards inherent in manual grinding, associated with wheel wear, fragment risks, operator fatigue and variability, can be greatly mitigated with diamond wheels, ATS high speed stand grinders and automation. Automation is not just productivity-enhancing but provides meaningful safety upgrade for foundry grinding operations.

Considerations for Implementation

Diamond wheel stand grinders represent a significant technological advancement in industrial grinding, offering a comprehensive solution for foundries focused on maximizing efficiency, safety, quality and sustainability. Transitioning to this technology requires an understanding of the return on investment: while the initial investment may be higher than traditional resin-bonded grinding systems, the long-term benefits far outweigh the upfront cost. The superior durability and consistency of diamond wheels dramatically reduce consumable expenses, downtime and rework, while improving throughput and part quality.



Moreover, these systems align closely with modern manufacturing priorities, enhancing workplace safety through reduced dust, vibration and noise, and supporting compliance with increasingly stringent environmental regulations. Their extended lifespan and recyclability contribute to waste reduction and overall process sustainability. For foundries committed to continuous improvement and operational excellence, implementing diamond wheel stand grinders is not merely an equipment upgrade — it is a strategic move toward future-ready manufacturing. By adopting this technology, organizations position themselves to achieve lasting gains in productivity, cost efficiency and environmental stewardship.

A Transformative Step Forward for Foundry Operations

The transition from conventional resin-bonded grinding wheels to ATS stand grinders equipped with Engis diamond wheels represents a transformative step forward for foundry operations. This technology addresses the persistent pain points that have long challenged the industry — frequent wheel failures, inconsistent performance, safety hazards and escalating maintenance costs — by delivering a solution that is stronger, cleaner and more consistent. Through their unmatched hardness, stability and longevity, diamond wheels maintain cutting precision and efficiency far beyond the limits of traditional abrasives, while ATS automation ensures repeatable, high-quality results with minimal operator intervention.

The data and case evidence presented in this paper demonstrate clear, measurable advantages: up to 15% higher throughput per man-hour, reductions in consumable costs of up to 65%, near-zero scrap rates and dramatic improvements in workplace safety and environmental compliance. Together, these gains translate into lower total cost of ownership, higher part quality and a safer, more sustainable production environment.

For operations managers, process engineers and purchasing decision-makers, the adoption of diamond-plated wheel stand grinders is more than a technical upgrade — it is a strategic investment in the long-term competitiveness of the foundry. By embracing the combination of Engis diamond technology and ATS automation, foundries can modernize their grinding processes, strengthen their operational resilience and position themselves as leaders in safety, efficiency and sustainability within the evolving landscape of industrial manufacturing.

REFERENCES

AFS. *American Foundry Society.*
Industry Resources.
https://www.afsinc.org/

Engis Corporation. *World Leader in Superabrasive Finishing Systems.*
Foundry Products Overview.
https://www.engis.com/foundry-products

Modern Casting Magazine.
https://www.qgdigitalpublishing.com/publication/?i=862997&p=18&view=issueViewer

OSHA. *Occupational Safety and Health Administration.*
Foundry Accident Report Database. 2023. Case ID 157493.015.
https://www.osha.gov/ords/imis/accidentsearch.accident_detail?id=157493.015

OSHA. *Occupational Safety and Health Administration.*
Foundry Accident Report Database. 2019. Case ID 118465.015
https://www.osha.gov/ords/imis/accidentsearch.accident_detail?id=118465.015

OSHA. *Occupational Safety and Health Administration.*
Foundry Accident Report Database. 2018. Case ID 103511.015.
https://www.osha.gov/ords/imis/accidentsearch.accident_detail?id=103511.015

Waupaca Foundry.
2021. Improving Workers Safety in the Mill Room. June 1, 2021.
https://waupacafoundry.com/blog/improving-worker-safety-in-the-mill-room