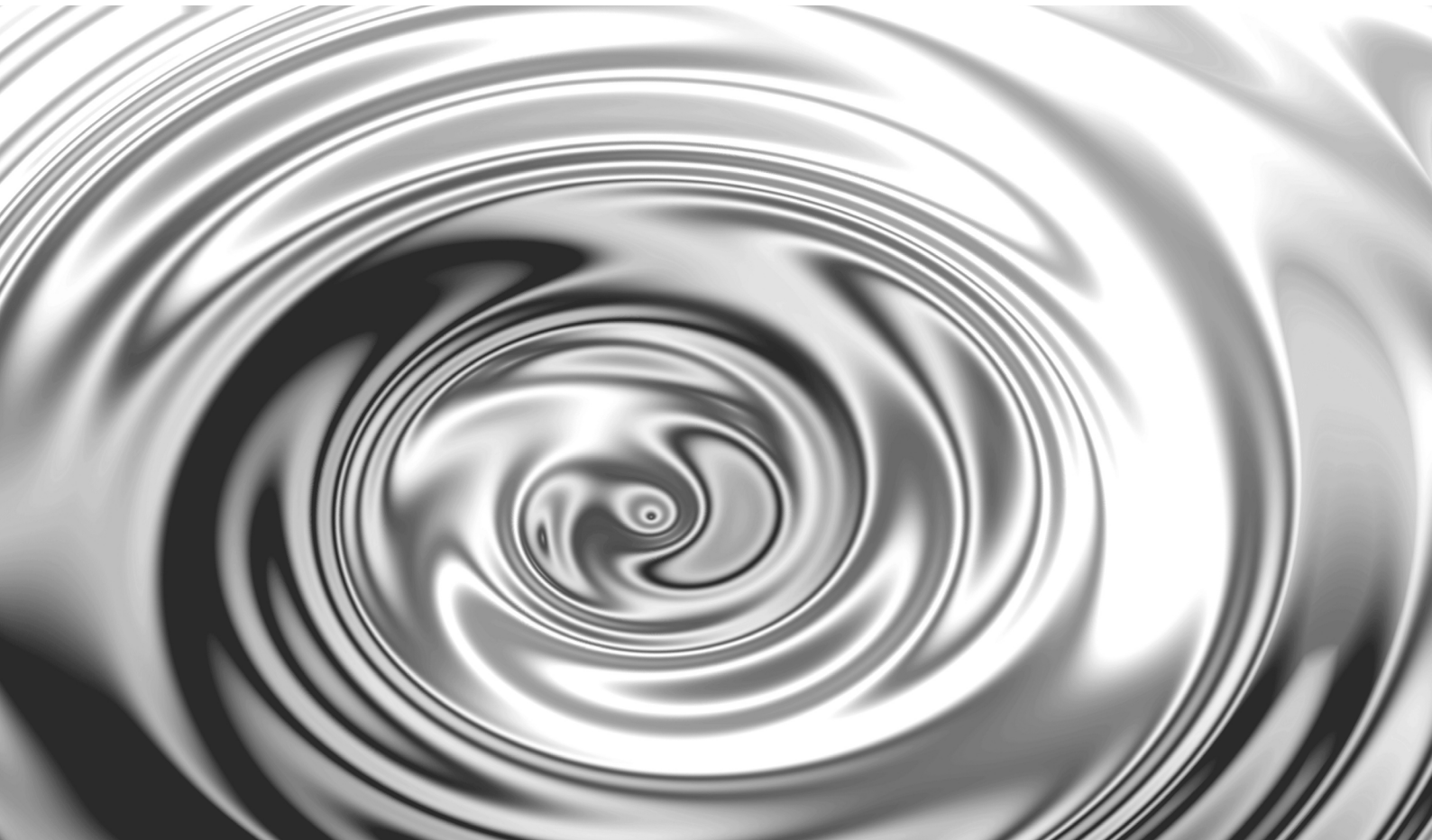


# How to boost foundry sustainability

4 areas to consider when melting and dosing aluminium



## What does sustainability mean to you?

Around the world, aluminium die casting foundries approach sustainability differently. For some it is interchangeable with “green” and reducing environmental impact. For others it’s about long-term business viability - minimizing costs, optimizing resources and creating a safe, efficient working environment that promotes long-term staff retention. **For most, it’s a mix of both. Being sustainable is being greener and leaner.** Whatever sustainability means to you, choosing the right melting and dosing furnace solutions – and using them right way – will help you achieve your sustainability goals. **With this in mind, here are 4 areas we think you should focus on.**

# 1 Make the most of your aluminium

Aluminium is virtually 100% recyclable. In fact, estimates suggest that nearly 75% of the aluminium ever produced is still in circulation today. From a sustainability perspective, this is a distinct advantage and a key reason demand for aluminium cast parts has soared. To make the most of aluminium's impressive credentials:

## i. Leverage in-house recycling

In-house recycling offers several important benefits. Utilizing chips and returns already generated, for instance as a byproduct of finishing and reworking castings, avoids the need to purchase fresh ingot material/ingot stacks and instead makes better use of a valuable existing resource. As well as the positive environmental implications of 're-using' existing metal, this approach also has clear cost saving benefits, particularly where special (and therefore more expensive) alloys are used.

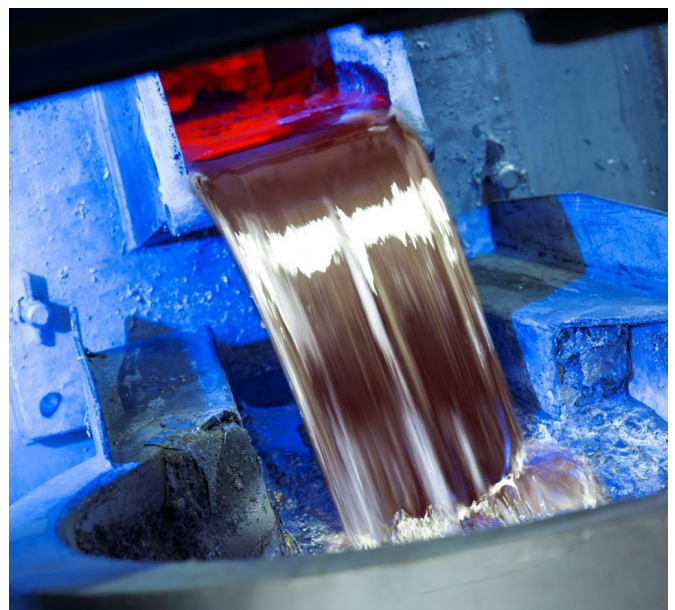
There is also an opportunity to eliminate certain processes. For instance, the interim storage of chip material becomes unnecessary (or can at least be minimised). Selling of the chips similarly becomes unnecessary. Once production based on chip recycling has been adopted, and becomes routine, there is even the possibility to source inexpensive recycled material from external suppliers.

However, in-house recycling does require the correct equipment. Combination chip melters are an ideal solution. Specifically designed to melt aluminium ingots, chips or in-house returns like runners, gates, biscuits etc. – or any combination - these shaft melting furnaces offer a high level of flexibility and are also extremely energy efficient. The special shaft design combines preheating, heating and liquefaction in one unit, using waste gas heat from the furnace chamber to preheat the feedstock in the shaft. Even when used for 'combined melting' in conjunction with the chip pocket, this ensures energy consumption is minimized.

It is also possible to produce the entire alloy required in a relatively confined space using one melting unit. The furnace's optimised holding chamber dimensions ensures the melting of the ingot, return and chip material, on the one hand, and the required pouring temperature on the other.

## Solution spotlight:

**StrikoWestofen's CombiMelter** furnaces employ a pump and 'vortex' generating system which draws chip material straight under the metal bath surface, where it melts under exclusion of air (preventing oxidation and metal loss), comparable to immersion melting. Here the circulation of metal using a specially designed pump, leads to a thermal, as well as chemical, homogenization of the metal bath. The continuous movement is coupled with an even heat distribution – optimizing quality conditions and minimizing energy consumption. By varying the metal delivery rate, it is possible to adjust the system to the chip quality and required melting rate, further supporting sustainable, efficient and cost-effective production.



## ii. Minimize oxidation and metal loss

While aluminium is highly recyclable, it's still susceptible to oxidation. In fact, aluminium and aluminium alloys oxidize relatively quickly compared with other metals in both solid and molten states. Oxidation rate also significantly increases with temperature, meaning molten aluminium is particularly prone to this problem.

The dross caused by oxidized aluminium is a challenge for foundries seeking to improve their sustainability. Research suggests that around 3 million tonnes of dross is generated annually. Just over half goes directly to landfill. The remainder is recycled. But even recycling dross has its issues. Hot dross loses approximately 1% of the metallic aluminium it contains every minute – a real problem in terms of usable metal recoverability, particularly if transporting off site for treatment. Processing of dross to extract usable metal is also energy intensive.

As well as wasting raw material, failure to prevent excessive oxidation and/or oxides mixing into the melt can also mean:

- **Increased cleaning and maintenance requirements**
- **Premature equipment damage**
- **Defects in cast parts/increased scrap rates**

All these scenarios have negative cost implications, create an unnecessary drain on resources, generate waste and/or will see energy consumption increase – in the case of increased scrap rates for instance, the energy required to cast more parts (in place of defective castings) may be substantial.

Solutions designed to minimize oxidation and dross formation at every stage of the melting and dosing process are therefore advantageous to improving sustainability. Our dedicated guide on minimizing metal loss due to oxidation can be found here - [www.strikowestofen.com/metal-yield](http://www.strikowestofen.com/metal-yield)

### Quick fact:

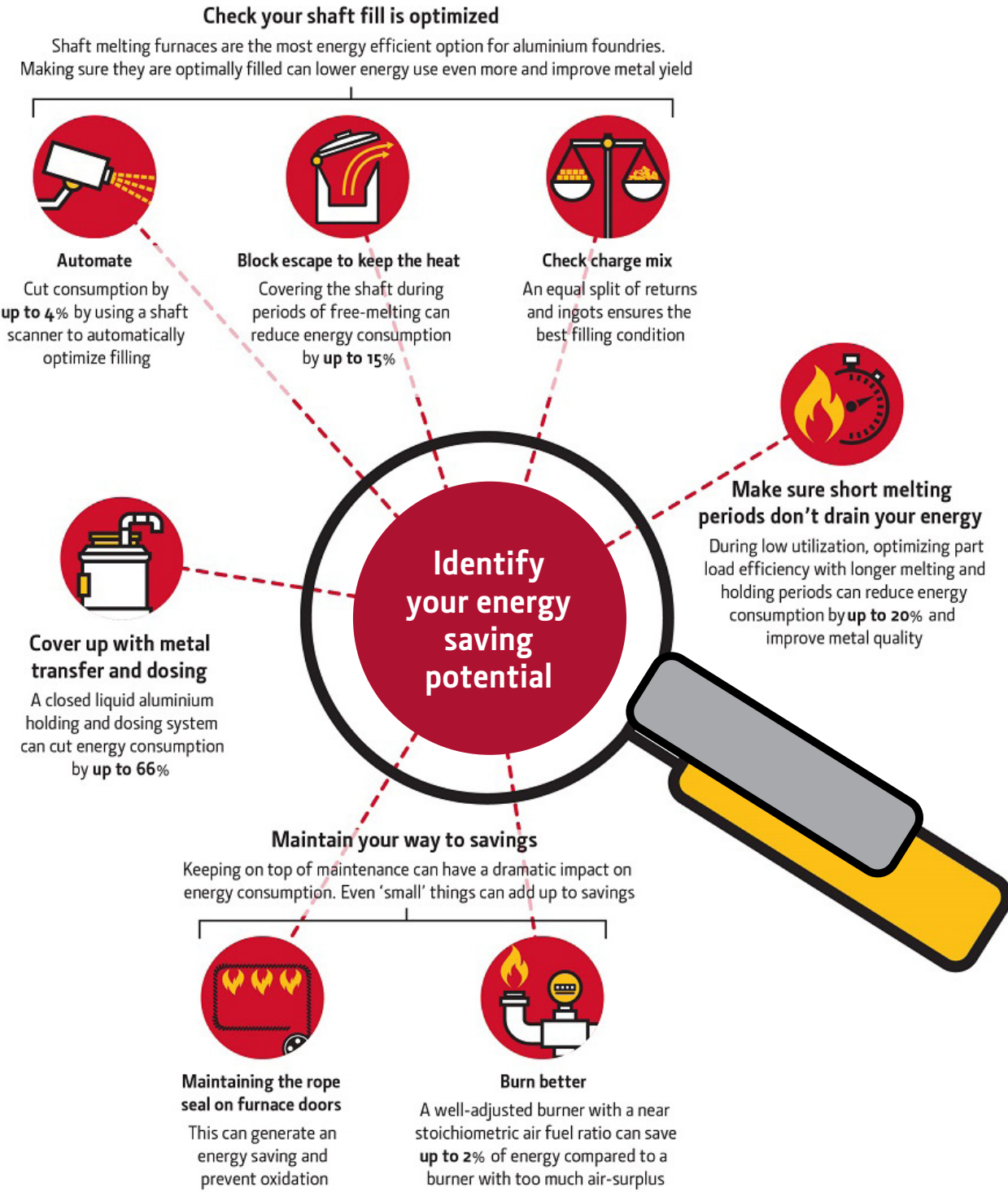
With an energy consumption level of just 489 kWh/t – **StrikoMelter PUREFFICIENCY**<sup>o</sup> is one of the most energy efficient aluminium melting furnaces on the market.





## 2 Address your energy hotspots

Using less energy is a fundamental element of any sustainability plan. With evidence suggesting the melt-shop alone can account for up to 77% of all energy consumed a die casting foundry, looking for efficiencies here makes sense. Here are 5 ways in which you can cut the energy consumption and carbon emissions in your aluminium foundry.



## 3 Optimize furnace lifespan



The more often equipment needs replacing, the less sustainable it is. Choosing foundry equipment constructed using high-grade materials, and only replacing wear parts with OEM spares in order to maintain performance, is essential in terms of prolonging service life.

### Furnace linings

In addition to being continuously exposed to extreme temperatures, repeated exposure to dross can result in penetrating damage to refractory linings. The linings of shaft melting furnaces also have to withstand potential impact damage from charge material. Choosing linings constructed using the highest grade materials and latest techniques will therefore always deliver a better return on investment.

The typical lifespan of a lining will depend on specific foundry conditions and usage but, for example, a dosing furnace lining constructed from high grade materials, resistant to mechanical

abrasion and insulated using the latest asbestos and ceramic fibre-free insulation techniques should – with the correct cleaning and maintenance – last as long as the furnace itself.

While linings from suppliers may seem very similar, unique design characteristics can mean replacement with non-OEM linings may result in a poor fit which in turn will impact performance. Especially in terms of sustainability and energy efficiency. A poorly repaired/fitted lining may increase total energy consumption by as much as 30%.

### Solution spotlight:

**StrikoWestofen** offers a comprehensive relining service for melting and dosing furnaces, which includes performance validation on completion. To find out more, visit [www.strikowestofen.com/furnace-refractory-lining-services](http://www.strikowestofen.com/furnace-refractory-lining-services)



### Old machines, new capabilities

With the correct care and operating conditions, a quality melting or dosing furnace can last more than 20 years. Which is great in terms of sustainability. But in many cases, furnaces get swapped out before this point. This is due to the misconception that in order to achieve optimum performance (energy consumption, metal yield etc.), new furnaces are always necessary.

Software upgrades and the ability to retrofit many new solutions specifically designed to improve performance, mean that legacy machines can be modernized to perform 'as good as new', if not better. Look out for sensor-driven monitoring, scanning and automation solutions designed to optimize key processes (see section 4 of this guide for more on automation), and parts designed to reduce maintenance requirements or mechanical wear.

“The precise filling of the shaft achieved with the help of the integrated laser scanner improved the heat recovery of the **ETAMAX<sup>®</sup>** system in the **StrikoMelter** to such an extent that we were able to reduce our gas consumption by about ten percent.”

– Production Manager, Czech OEM Customer



To explore each of these areas in more detail, download our free energy efficiency guide which can be found by visiting [www.strikowestofen.com/foundry-efficiency/cut-furnace-costs](http://www.strikowestofen.com/foundry-efficiency/cut-furnace-costs)



## 4 Promote process efficiency

A sustainable foundry is also process efficient. Keeping key processes - from standard equipment operations and status monitoring to maintenance and troubleshooting - as lean as possible utilizes less time, energy and human resource. Here are 2 processes to focus on.

### 1. Easy does it

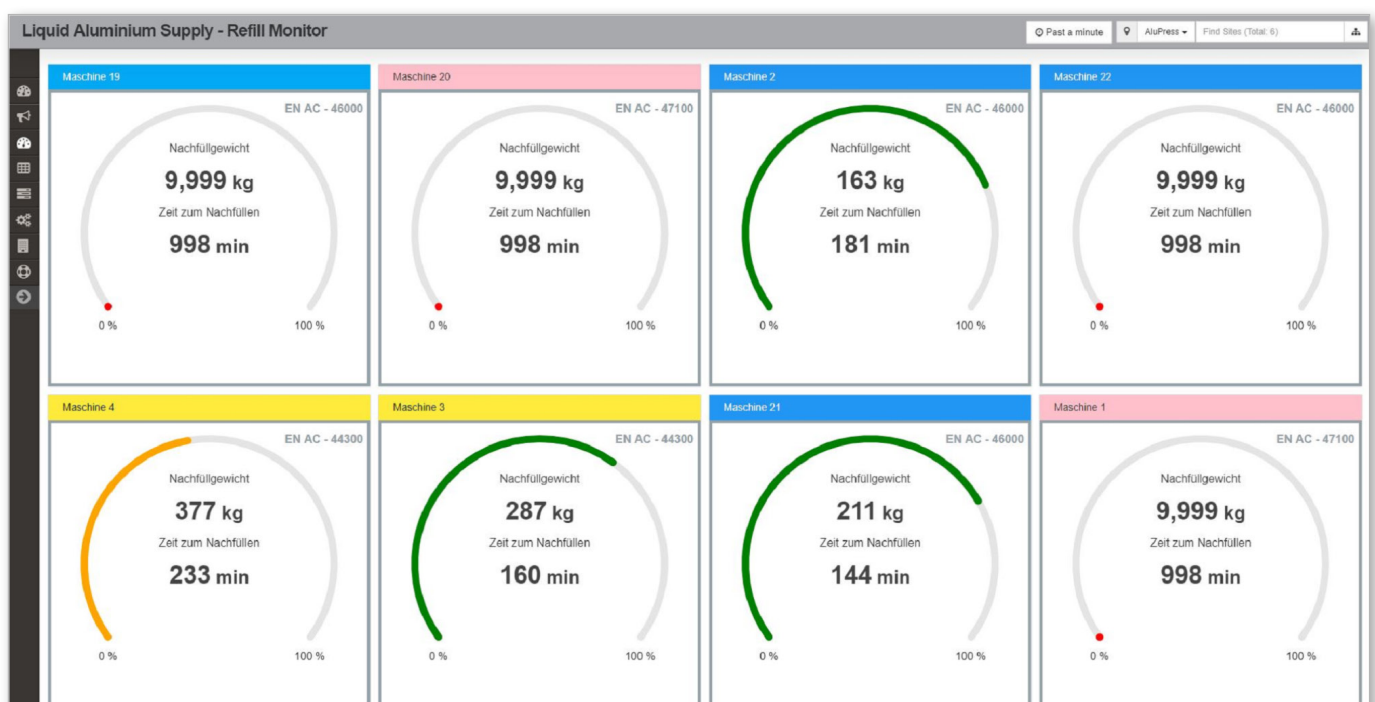
Don't underestimate the value of 'easy'. Equipment that makes life easier for operators frees up more of their time for improved productivity – an essential part of the sustainability mix. Choose melting and dosing furnaces designed to 'self-monitor', alerting and instructing operators quickly to any aspects that need adjusting. Also select furnaces that minimize cleaning and maintenance requirements, and which make parts that do require regular cleaning or changing more accessible. As well as saving your team time this will also reduce equipment downtime.

Of course, no furnace can eliminate the need for cleaning and maintenance entirely, so having a good understanding of processes that will help optimize equipment performance – especially in terms of energy efficiency – is essential. For a more

detailed look at this important area, read our dedicated guide which can be found by visiting

[www.strikowestofen.com/maintenance-guide](http://www.strikowestofen.com/maintenance-guide)

It's also worth exploring digital solutions designed to make monitoring and managing key processes easier for your foundry team. For example, by making it simple for operators to access, interpret and act on vital real-time filling data, **StrikoWestofen's Monitizer | Refill Monitor** ensures dosing and bale-out equipment is never low on molten metal and always working at full capacity. As well as optimizing energy consumption, minimizing downtime and preventing possible metal wastage, this also avoids unnecessary filling trips.





## 2. Amazing automation

Adopting automation in the right way can have a dramatic impact on process efficiency. This doesn't have to be complex. Even small solutions – often features built-in to furnace control systems - can make a big difference.

Automated biscuit correction in dosing furnaces is a good example. This feature improves dosing accuracy and reduces the out-of-tolerance rate by constantly monitoring the die casting process to ensure the dosing weight is automatically optimized to the cycle. The improvement to dosing accuracy this supports helps reduce scrap rates and therefore unnecessary waste.

A natural area to focus on from a sustainability standpoint is also automation that optimizes energy consumption. For instance, by using a shaft filling laser it is possible to automate charging cycles to ensure the melting furnace shaft is optimally filled at all times for optimum heat recovery. This can improve melting efficiency and reduce gas consumption by as much as 10%.

### Solution spotlight:

When melting, a drawback of part load operation can be a rise in energy consumption due to short, stop/start melting periods. Our **Part Load Efficiency Control** combats this by automatically adapting the melting process to the specific furnace load, switching between “melting” and “holding” in the most energy efficient way. This can reduce energy consumption by as much as 20% during periods of low utilization.

## Find out more

As this guide shows, sustainability is about far more than ‘being green’. It’s about looking at foundry processes and identifying ways to improve efficiencies, optimize resources and reduce costly (for business and the environment) waste. For more hints, tips and ideas on all of these topics, visit:

[www.strikowestofen.com/foundry-efficiency](http://www.strikowestofen.com/foundry-efficiency)