

SLAGMAN VSD

LADLE SLAG DETECTION SYSTEM

FROM



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➤ Introduction



For any continuous casting steelmaker, one of the most critical steps in ensuring maximum **profit**, top-notch **quality**, and **consistency** heat-to-heat and day-to-day is finding the perfect moment to end pouring a heat of steel. Too soon and precious yield is lost, too late and the tundish is filled with slag, shortening tundish life and potentially creating undesirable inclusions in the steel.

The **Slagman VSD by Metallurgical Sensors is the perfect solution**. You'll know precisely when to end a heat every time. More importantly, the Slagman VSD is built with **simplicity**, **up-time**, and operator **trust** first and foremost.

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➤ How It Works

The Slagman VSD utilizes a state-of-the-art, fully digital, **tri-axial accelerometer** attached to the ladle shroud manipulator arm.

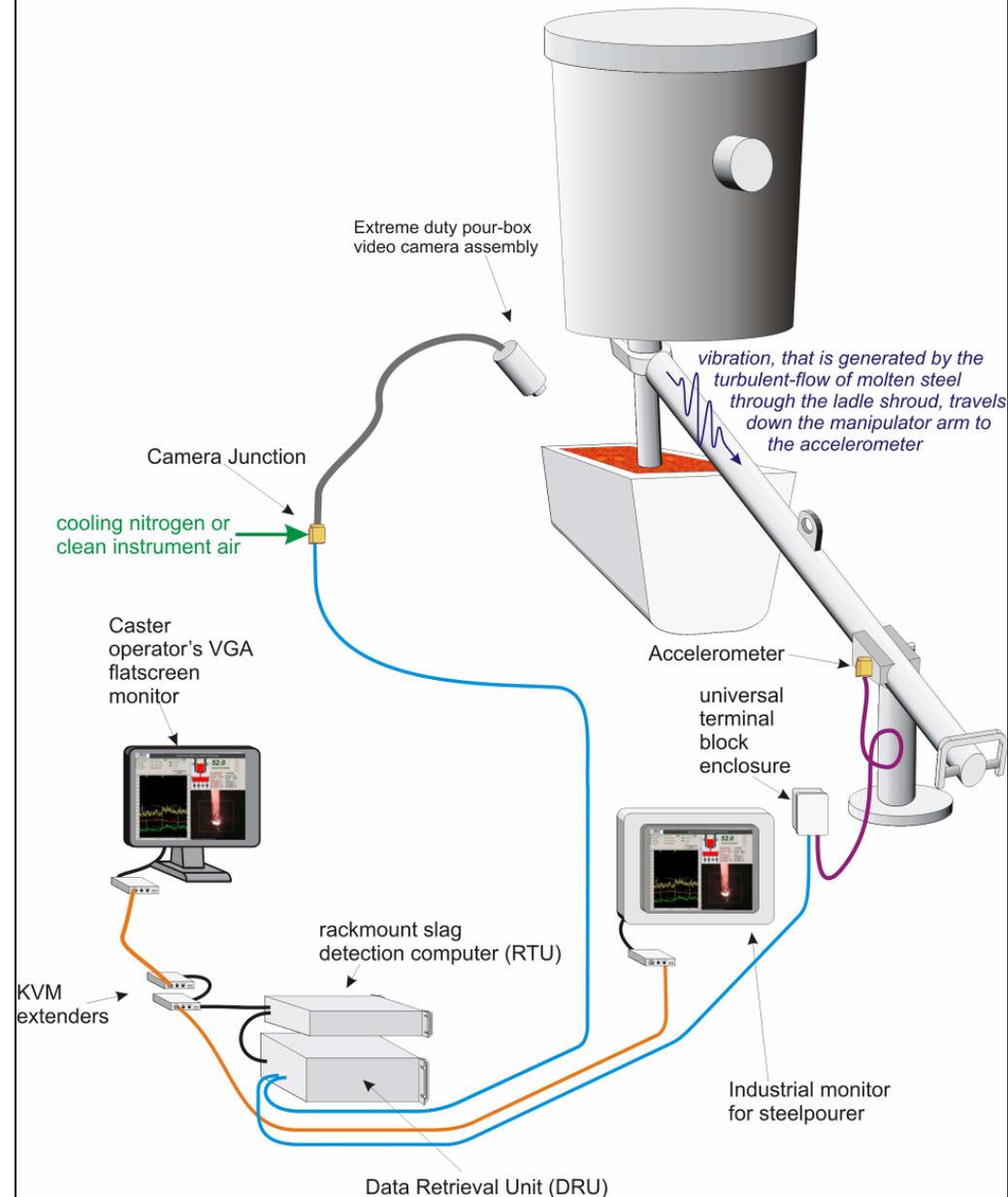
The flow of material through the shroud causes **vibrations** that are detected by the accelerometer and processed by the computer.

Slag, steel, and a mixture of both all have a specific vibration "pattern" that can be **detected**.

Additionally, a ruggedized camera feeds video of the shroud into advanced **image processing** software that can detect hot slag on the surface of the tundish.

When the time is right, the Slagman VSD presents the operator with a clear indication that "**Slag Out**" has occurred.

Layout of the Slag Detection System



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➤ Robust Hardware

The Slagman VSD has no moving parts, is fully self-contained, and only requires **one sensor** per continuous casting machine. (Nothing on the ladle!)

The system is totally passive and requires **no changes between heats.**

All components are designed for hot, dirty steel mill usage and to **last for years.**

The sensors include **self-diagnosis** tools, such as internal temperature, to warn if damaging conditions arise.

VSD systems are the best in the industry for up-time and require almost **no maintenance.**



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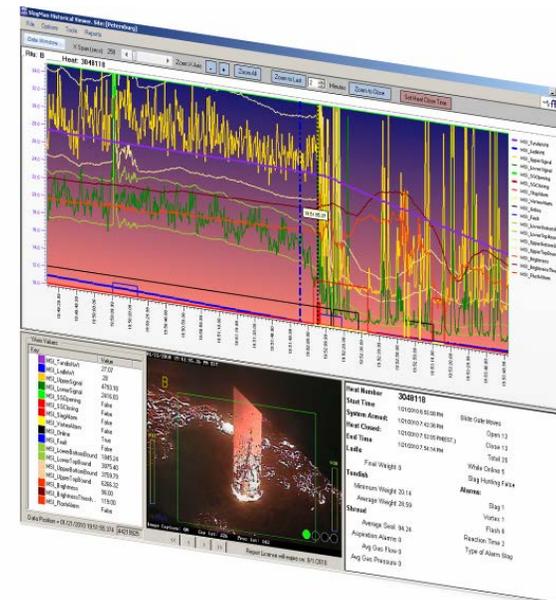
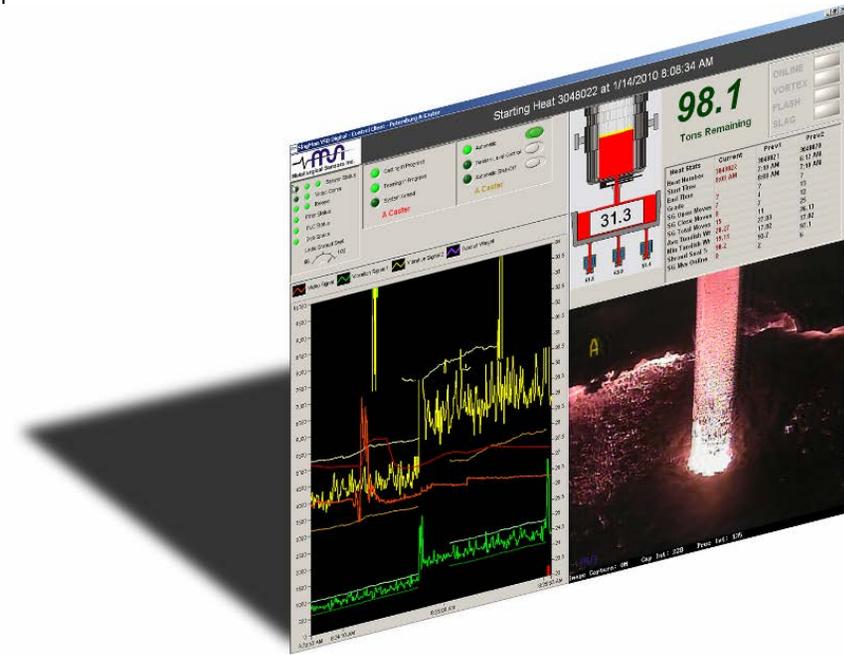
➤ Cutting Edge Software

The heart of the Slagman VSD is the Control Client. This powerful application utilizes the latest programming technologies in combining **signal processing**, **image analysis**, **operator display**, and **data archiving** into one streamlined interface.

The Control Client is fully integrated into the caster's automation system to provide maximum **dependability**, **accuracy** and historical analysis of your caster's **performance**.

The Control Client can even use the vibration signal to detect undesirable conditions such as a **exposed** or **leaking shroud**.

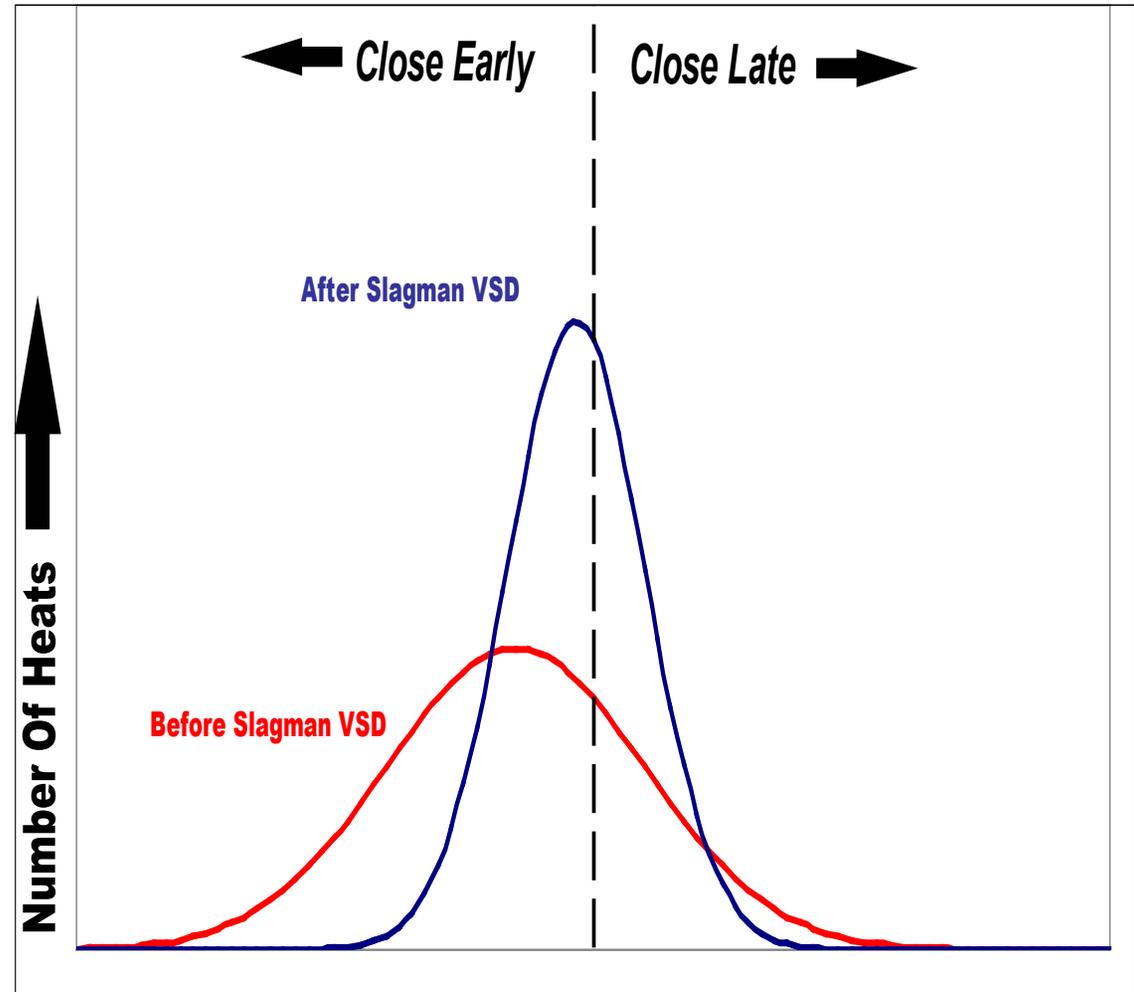
All data and video images generated by the Slagman VSD are archived for **historical analysis**. The Historical Viewer is a robust application designed to quickly and easily recall this data for review.



➤ Proven Success

Shown here is *real data* from one of our happy customers. Not only was there a **significant improvement** in repeatability of ladle shut-off, but yield loss (due to early shut-off), and slaggy tundishes (due to late shut-off) were both substantially reduced after the installation of a **Slagman VSD** system from Metallurgical Sensors, Inc.

Even better, many of our installations have been in continuous operation for **years** *with little to no maintenance*, and it works **every heat**.



➤ Exceptional Service

Why should you choose Metallurgical Sensors, Inc. as your partner in achieving the results you desire in your shop?

Because we are committed to helping you achieve those results any way we can.

Not only can all of our hardware and software be customized to suit any specific need, but we consider no job complete until all personnel- operating, engineering, and managerial- are *trained and familiar* with the system.

We perform a rigorous **production testing** phase to ensure that not only is our product providing the functionality you require, but that that functionality is providing the **results** you require.

Additionally, All VSD systems are built with **remote administration** in mind so if you have any problem, help is just a phone call away.

➤ Vibration or Electromagnetic?

Many of our customers have replaced aging electromagnetic “coil” systems with the Slagman VSD. Why switch to vibration technology? For these simple reasons:

Initial Cost

Simple hardware, one detector per caster. No need to install anything on your ladles.

Operating Cost

No installing or servicing coils. No hookups between heats.

Maintenance

Our systems have proven they can **run for years** with no maintenance. And, if needed, any part can be changed “on-line”.

Sensitivity

In head-to-head plant trials, the Slagman VSD has out-performed electromagnetic systems in several key areas. Full slag flow is detected **equally well** by either system, however the unique nature of vibration technology allows multiple “ranges” of vibration frequencies to be monitored, resulting in **vortexing alarms** and **fewer false alarms**. The VSD can even detect a leaky ladle shroud!

Reliability

Easily the most important factor, VSD systems are designed to work all the time. No “surprise” bad coils, melted cables, or noisy signals. Our systems typically experience over 99.99% uptime, and along with it, increased operator **trust** and **conformance**.

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➤ For More Information

If you would like to discuss how the **Slagman VSD** from Metallurgical Sensors can benefit your shop, or have any other inquiries, please don't hesitate to contact us. References available.



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