

# PMI-MASTER Smart



## OBJECTIVES

- | Compliance with ASME Section IX
- | Decrease plant downtime
- | Secure a portable instrument without a radiation source

## RESULTS

- | Quick determination of component weldability
- | Cost savings
- | Quick repairs with reduced downtime
- | Validated compliance reporting

## Major U.S. electric utility streamlines processes with Hitachi's portable OES

The **PMI-MASTER** Smart Optical Emissions Spectrometer (OES) was this utility provider's instrument of choice for their weld tech support team because of its portability, advanced capability to perform lab analysis out in the field, and absence of a radiation source.

Their welding team is responsible for the modification, repair and maintenance to systems throughout the plant which need to be compliant with ASME Section IX B&PV code. The ASME B&PV code indicates an acceptable weldability of steels, and stainless steels, for pre-heat, post-heat and interpass temperature.

The P-number referenced in the ASME B&V code is determined by knowing the carbon equivalent of a component. Without the ability to determine metal composition in-situ, the welding team would have to take shavings from the pipe to be sent to the lab for elemental composition. The results could take days and cause a delay in the repair process which could be costly, especially during forced or planned outages.

Improving on speed and accuracy for metals analysis was identified as a key objective for the purchase of a new analyzer. To identify the best instrument to meet their needs they consulted with the utility's metallurgy group. After review of a portable alloy analyzers currently available on the market, the **PMI-MASTER** Smart was determined to be the best choice.

OES was chosen because it can measure light elements plus it does not contain a radiation source. The **PMI-MASTER** Smart was selected as the front-runner based on its portability and light element accuracy. Their principal engineer commented,

“ Sometimes large components come into the lab and having a portable instrument allows us to bring the analyzer to the component. The **PMI-MASTER** Smart was much lighter in comparison to other portable OES analyzers. ”

## OTHER TECHNOLOGIES CONSIDERED

The plant's radiation team advised against an instrument containing a radiation source; therefore, eliminating handheld X-ray Fluorescence (XRF) as a suitable choice, plus XRF has limitations when it comes to measuring very light elements. A handheld Laser-Induced Breakdown Spectroscopy (LIBS) instrument was purchased at one of their sister plants, but it was determined that LIBS was not a suitable technology to ensure 100% compliance with ASME B&PV code because of limitations in the detection and accuracy of light elements such as carbon, phosphorous, sulfur, nitrogen, and boron.

## WHY PORTABLE OES?

ASME Section B&PV code focuses on failure analysis. Failure analysis supporting power generation can occur in various metals found throughout a power plant, specifically in piping, welds, turbine parts, pump parts, and valves. The ability to identify carbon in steels is by far the most important element for a welding team to measure, in order to determine the proper course for weldability when making repairs. OES is a longstanding, field-proven technology for accurate and repeatable measurement of light elements and it is an accepted method to ensure compliance with ASME B&PV code. Without question OES is the best method to provide analysis of light elements without compromise and OES can produce certified reporting of compliance for ASME B&PV.



## CONCLUSION

### PMI-MASTER SMART IS A HIGHLY-PORTABLE AND ACCURATE LABORATORY INSTRUMENT FOR THE VERIFICATION OF CHEMICAL COMPOSITION

They chose the **PMI-MASTER** Smart with a UV Touch Probe and a cart for easy transportation throughout the facility. To reach high areas they purchased an 8 meter cord for the probe. They have also found that they can easily rig the instrument on a crane or scaffolding. From a plant-safety aspect they only had to obtain approval for the use of argon. Their process is much simpler now; just measure and begin to repair. It is safer for the maintenance technicians because filed shavings can cause painful splinters and shavings taken in an area of radiation can become contaminated. Measurements can be taken in a matter of minutes eliminating increased exposure of personnel to radiation. All of Hitachi's OES systems come with a pre-set library containing the most extensive grade library available worldwide. However, the **PMI-MASTER** Smart was configured specifically to meet the welding team's needs by one of Hitachi's

technicians to automatically provide the P-number with the carbon equivalency for every measurement. They also have the ability to print reports to verify ASME compliance right from the instrument.

They were so pleased with the performance of the **PMI-MASTER** Smart that one was purchased for their Metals Lab too, plus there are plans to incorporate the **PMI-MASTER** Smart into other plants in the near future. The **PMI-MASTER** Smart comes with an extensive grade database of over 10,000 alloys, found globally, which is useful for any metals laboratory. Their principal engineer stated,

“ We had a situation awhile back where we were given an odd-ball alloy making it nearly impossible to determine its composition. I could definitely see how the grade database could have been useful to help us to determine the composition of that alloy. ”

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