

A CASE STUDY FROM
SPECTRO ANALYTICAL INSTRUMENTS

SPECTROPORT: Caltrans Takes Reliable Metals Analysis on the Road

SPECTROPORT Advantages for Caltrans

- ▶ High-end mobile arc/spark OES analyzer for nondestructive elemental analysis of primary & secondary metals
- ▶ Ensured portability & ease of use with on-the-spot results within 10 seconds maximum for positive material identification (PMI) or sorting
- ▶ Ultra-low detection limits on wide range of elements — including carbon (C), phosphorus (P), sulfur (S), boron (B), beryllium (Be), calcium (Ca), silicon (Si), magnesium (Mg), aluminum (Al), & more
- ▶ iCAL 2.0 — usually single-sample, 5-minute standardization & highest stability versus most temperature/pressure shifts



It's estimated that 37% of all road bridges in the U.S. need major repairs — or outright replacement. The state of California alone has more than 25,000 bridges.

So Jason Gramlick should remain a busy man for the foreseeable future. He works for the California Department of Transportation (Caltrans) in San Francisco's Bay Area. His title: Associate Steel Inspector for Vallejo Quality Assurance & Source Inspection, Materials Engineering and Testing Services.

The Challenge

One critical part of his job is positive material identification (PMI) — as vital for transportation infrastructure as for petrochemical, power, and chemical plants worldwide.

The elemental composition of steel defines its grade, which codifies multiple other characteristics. In maintaining Caltrans' vast infrastructure for safe and efficient use, workers must check myriad in-service structures — some 100 years old — for factors including rust, cracks, hardness, and tensile strength; establish steel grades; then decide on repair or retrofit. Often they must determine whether old parts may be effectively welded to modern standards. And new construction must be inspected for conformance with specifications.

Caltrans maintains an advanced laboratory benchtop spectrometer, a SPECTROMAXx stationary metal analyzer, for use by the department's metallurgist in Sacramento. However, sometimes it's impractical to take the time and trouble involved in cutting a metal sample out of a bridge, transporting it to the state lab, and waiting for results — while public frustration mounts with every lane or bridge closure.



Managers decided to buy the Vallejo team its own portable analyzer. They needed an easy-to-use yet highly accurate instrument that could reliably deliver nondestructive elemental analysis on the road. “Our main consideration,” says Gramlick, “was the need to determine carbon equivalency values for the weldability of unknown base metals. And secondary to that CE value would be lower detection values. We looked at some handheld XRF units — but they can’t do carbon.”

In all, he helped evaluate five different mobile spectrometers before the team’s final choice: SPECTROPORT.

The Solution

The SPECTROPORT portable metal analyzer offers advanced arc/spark optical emission spectroscopy (OES) technology in a mobile point-and-shoot unit. Unlike handhelds, SPECTROPORT delivers reliable, accurate performance and low levels of detection for challenging elements including carbon (C), sulfur (S), phosphorus (P), and boron (B). It achieves consistent results via iCAL 2.0 one-sample standardization, combined with a self-adjusting optical system — so it’s resilient to many ambient temperature changes, and needs fewer recalibrations.

Users report SPECTROPORT is ideal for retrospective PMI of structural metals on the jobsite, as well as for checking incoming materials to verify batches and prevent counterfeiting.

The Results

Jason Gramlick gives SPECTROPORT a thumbs-up. “It works right and gives us the results we need. Everybody so far has been really happy with it.”

The unit’s 5-minute, single-sample standardization; relatively infrequent need for recalibration; and rapid readiness all suit his fast pace of work. “From showing up at the job site, pulling our equipment out of the vehicles, slapping it together, plugging it in, starting it, letting it warm up and doing the argon purge — from start to finish, we’re hitting at about 30 minutes.”

Once set up, operation is equally speedy — and simple. “We clear a small space, on let’s say a bridge girder, with a grinder, prep that area. Then it only takes 10 seconds per burn, and we average 5 burns per location on each test spot . . . Afterwards I export results to my thumb drive as PDFs, print them off, and document everything for the official record.” Finally, Jason Gramlick relies on SPECTRO for dependable support — and the right results. “If we have a problem on a job site, we’ve got the ability to reach out and get ahold of someone quickly. I’m not sure other suppliers can say the same. Service like that is invaluable. “We believe we have the best design and construction engineering department in the world for this type of work. We provide our engineering teams with the best, most accurate information available. Simply put, SPECTROPORT works for us.”

About Caltrans

The California Department of Transportation (Caltrans) manages more than 50,000 miles of highway and freeway lanes in the U.S.’s most populated state, as well as providing inter-city rail services plus public-use airports and special-use hospital heliports. Mission: to furnish a safe and reliable transportation network that serves all people and respects the environment.

About SPECTRO

SPECTRO is one of the world’s leading suppliers of analytical instruments. Its advanced analyzers use optical emission spectrometry (ICP-OES, arc/spark OES), and X-ray fluorescence spectrometry (XRF) technologies in the elemental analysis of materials for industry, research, and academia.



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