Automated Alloy Sorting

Stainless Steel & Specialty Alloys

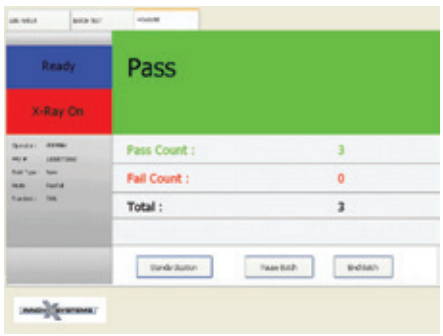
Focus

Tubes/Rods/Pipes
High Volume QC
Pass/Fail Mode
Analytical Mode

FOX-IQ
Automated, On-line XRF

Tube and pipe manufactures use many different metals and alloys in their production lines. To avoid material mix-ups and to meet their customers' requirements, they must compare their product against acceptable alloy specifications. Particularly in the aerospace, petroleum and nuclear industries, the consequences of processing or fabricating with the wrong alloy material can be serious, resulting in product failure and eventual loss of business. High volume manufacturers need a fast, non-destructive method that offers 100% PMI (Positive Material Identification).

Innov-X Systems has designed the FOX-IQ Factory Online XRF system to perform automated on-line analysis for 100% high-volume process control. X-ray Fluorescence (XRF) is a proven analytical technique commonly used to quickly and non-destructively verify alloy grade and chemistry. Each FOX-IQ delivers fast, accurate grade ID, pass/fail tests and chemistry with automated links to the QC/QA reporting system. The system is set up for simple integration with existing or new PLC-controlled processes, or flexible enough to work with complicated user-designed programs.



The FOX-IQ is controlled by an industry-hardened PC for start/stop, data acquisition, decision making and communication to external devices. FOX-IQ's powerful, yet user friendly software is customized for the tube/pipe industry and features automated retesting, multi-level access and an intuitive touchscreen interface. This CE certified system is engineered for 24/7operation in industrial environments; its compact design will fit in virtually all existing operations.

FOX-IQ Modes of Operation

Pass/Fail mode is designed for high-throughput alloy sorting and quality control. All sorting is done by comparing your sample to an operator-selected reference fingerprint. It will provide a PASS or FAIL result in 2-3 seconds.

The system comes with a standard reference library of common alloy fingerprints, though adding your own (up to 300 more) is a simple one minute procedure. Furthermore, once the unit has been taught a fingerprint, it will not need periodic recalibration.

Analytical mode utilizes a Fundamental Parameters (FP) algorithm to determine elemental chemistry. The FP method utilized in Analytical mode is ideal for applications that require analysis of proprietary or uncommon alloys, for monitoring chemistry of tramp elements, or for monitoring chemistry during processing. The Analytical mode can identify an unknown material in approximately 5 seconds, with increased precision for longer test times.

APPLICATION BRIEF

FOX-IQ Performance

Experimental Application Results - 316/316Ti Processing Line

APPLICATION BRIEF

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Identification

	Selected Material	Analyzed Material	Result
1380	316Ti	316L	FAIL
1381	316Ti	316L	FAIL
1382	316Ti	316L	FAIL
1383	316Ti	316L	FAIL
1384	316Ti	316L	FAIL
1385	316Ti	316L	FAIL
1386	316Ti	316L	FAIL
1387	316Ti	316L	FAIL
1388	316Ti	316L	FAIL
1389	316Ti	316L	FAIL
1390	316Ti	316Ti	PASS
1391	316Ti	316Ti	PASS
1392	316Ti	316Ti	PASS
1393	316Ti	316Ti	PASS
1394	316Ti	316Ti	PASS
1395	316Ti	316Ti	PASS
1396	316Ti	316Ti	PASS
1397	316Ti	316Ti	PASS
1398	316Ti	316Ti	PASS
1399	316Ti	316Ti	PASS

3 second tests.
10/10 - Passing Ti
0/10 - Passing w/o Ti

	Selected Material	Analyzed Material	Result
1340	316L	316L	PASS
1341	316L	316L	PASS
1342	316L	316L	PASS
1343	316L	316L	PASS
1344	316L	316L	PASS
1345	316L	316L	PASS
1346	316L	316L	PASS
1347	316L	316L	PASS
1348	316L	316L	PASS
1349	316L	316L	PASS
1350	316L	316Ti	FAIL
1351	316L	316Ti	FAIL
1352	316L	316Ti	FAIL
1353	316L	316Ti	FAIL
1354	316L	316Ti	FAIL
1355	316L	316Ti	FAIL
1356	316L	316Ti	FAIL
1357	316L	316Ti	FAIL
1358	316L	316Ti	FAIL
1359	316L	316Ti	FAIL

3 second tests.
10/10 - Passing Ti
0/10 - Passing w/o Ti

Chemistry

	Sample	Ti	Cr	Mn	Ni	Cu	Mo
	316 Ti a	0.37	17.15	1.39	13.00	0.31	1.91
	316 Ti a	0.32	17.12	1.32	12.71	0.44	2.03
	316 Ti a	0.32	17.33	1.23	12.89	0.42	1.93
	316 Ti a	0.46	17.21	1.29	12.52	0.37	2.04
	316 Ti a	0.31	17.22	1.08	12.75	0.52	1.96
AVE	316 Ti a	0.36	17.21	1.26	12.77	0.41	1.97
STD		0.06	0.08	0.12	0.18	0.08	0.06

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STD		0.06	0.08	0.12	0.18	0.08	0.06

Takeaway - able to repeatably and reliably detect 0.35% Ti in only 4 seconds
Very quick, repeatable chemistry in 4 seconds of testing time

Distance

Distance mm	Ti	Cr	Mn	Ni	Cu	Mo
0	0.32	17.26	1.19	12.98	0.37	1.95
2.5	0.32	17.09	1.27	12.95	0.36	1.99
4	0.32	17.04	1.36	13.11	0.40	2.00

Average of 10-3 second tests at different distances.
Concentration in %.
The analyzer uses a normalization process that makes it much less sensitive to small changes to difference.
(~1-2 cm)
This will save you the headache of building complicated and expesnive moving mount tables.

Conclusion

The FOX-IQ Tube and Rod On-line Process Analyzer proved very capable of accurately analyzing samples in Pass/Fail and Analytical Modes. With accurate results within 5 seconds or less, the FOX-IQ will make a significant impact on tube and pipe manufacture in a high volume production line by providing quick, reliable, non-destructive alloy analysis.

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