

Semi-Quantitative Analysis of Steel

1. Overview

Rare metals such as Ni, Cr, Mo, and Co, essential in industry today, are collected and reused due to their scarcity. However, these metals are generally found in alloy form. What and how much is in the alloy must be determined to reuse such metals.

Up until now, visual inspection, magnets, spark, and chemicals have been used as methods of analysis; however, these techniques require special training and are not something anybody could learn. Furthermore, qualitative identification is also required.

With the SEA2001, anybody can determine quickly and accurately a variety of alloy steels. Because the component density of each metal is detected by weight percent the amount of rare metal within the alloy can be rapidly and accurately determined.

An example of non-standard analysis is given below.

2. Analysis Conditions

Analysis conditions are listed in Table 1.

Table 1

Item	Settings
Collimator	3 mm
Tube Voltage	50 kV
Target	Rh
Atmosphere	Air
Measurement Time	300 seconds
Pre-treatment	none

3. Analysis Sample

BNRM'S (Brammer Non-destructive Reference Materials)
Metals Analysis Corporation

4. Quantitative Method

Fundamental Parameters Method (Theoretical Calculation Method)

5. Analysis Results

Table 1 Example of Base Alloy Analysis

(Units: %)

Element	Analysis Method	SUS304	SUS316	SUS430	INC600	INC718	HST G3	HST X
Fe	Chemical Analysis SEA	69.6	67.9	82.0	7.84	19.25	19.8	18.35
		71.08	68.77	83.04	7.95	19.46	19.83	18.20
Cr	Chemical Analysis SEA	18.35	16.5	16.55	15.54	18.18	22.7	21.9
		17.99	16.17	15.94	15.10	18.09	22.51	21.32
Ni	Chemical Analysis SEA	8.67	10.45	0.18	75.2	52.2	44.3	47.5
		8.46	10.41	0.17	75.12	52.03	44.31	47.86
MB	Jb Chem. Analysis SEA	1.53	1.70	0.42	0.27	0.07	0.82	0.63
		1.71	1.85	0.56	0.35	0.10	0.85	0.73
Mo	Chemical Analysis SEA	0.41	2.15	0.04	0.075	3.04	6.65	8.6
		0.45	2.39	0.04	0.071	3.33	7.26	9.46
Cu	Chemical Analysis SEA	0.316	0.27	0.06	0.15	0.05	1.97	0.12
		0.174	0.10	0.06	0.10	0.03	1.73	0.03
W	Chemical Analysis SEA	0.08	--	0.01	--	--	0.63	0.46
		0.00	0.10	0.03	0.79	0.00	0.98	0.63
Co	Chemical Analysis SEA	0.099	0.16	0.02	0.03	0.31	1.92	1.53
		0.00	0.00	0.00	0.20	0.37	2.02	1.58
V	Chemical Analysis SEA	0.10	0.18	0.09	--	--	0.05	0.08
		0.09	0.17	0.15	0.004	0.00	0.20	0.04
Nb	Chemical Analysis SEA	0.052	0.01	--	--	5.19	0.44	0.10
		0.039	0.01	0.00	0.03	5.70	0.49	0.14
Ti	Chemical Analysis SEA	--	--	--	0.27	1.00	0.015	0.011
		0.00	0.00	0.01	0.27	0.90	0.000	0.000
Sn	Chemical Analysis SEA	0.007	0.011	0.004	--	--	--	--
		0.006	0.015	0.000	--	--	--	--

Note: SEA measures without standard samples.

Measurement time is 300 seconds per measurement.

6. Summary

Any sample can be measured at a precision of within $\pm 1\%$. The SEA2001 is able to accurately grasp component differences of steel that has subtle differences such as SUS304 and SUS316 or HastG3 and HastX, and is extremely useful in determining steel alloys