

**Abstract:**

More than 10 years have now passed since the JFE Group was created accompanying the merger of Kawasaki Steel Corporation and NKK Corporation. During that period, both steel products and manufacturing processes have become even more advanced. Chemical analysis techniques responding to that progress have supported development in a number of areas, including the development of products and manufacturing processes, stable operation at the manufacturing site and quality control and assurance. Recently, development of chemical analysis techniques has been carried out to address the issue of global environmental conservation surrounding the steel industry. This paper reviews the history of chemical analysis techniques at JFE Steel Corporation to date, and presents an outline of recent trends in techniques in the four areas of trace analysis, precipitates and inclusions analysis, online/on-site analysis and organic/environmental/slag analysis.

In addition, JFE Techno-Research Corporation (JFE-TEC) provides advanced analytical services in which the

analytical techniques cultivated in analysis of iron and steel are strengthened in directions aligned with the needs of the world. Therefore, the analytical techniques of JFE-TEC are also introduced.

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In the period since modern steel manufacturing began, chemical analysis techniques have supported the both manufacturing site and research and development in the steel industry as indispensable basic technologies. At JFE Steel, development of techniques for chemical analysis began around 1960. At that time, when productivity increased dramatically as a result of the introduction of converter steelmaking, the analytical methods that would become main to the steel works also changed greatly, from the wet analysis methods used until then to rapid instrumental analysis methods. Occasioned by this change, the development of rapid analytical techniques became an important challenge for research and development, and even today, steel manufacturers are continuing to promote the development of rapid, highly accurate process analysis techniques. On the other hand, precipitates and inclusions analysis and ultra trace elemental analysis became main analytical techniques for research and development of (steel) product and (steel) manufacturing process. Precipitates and inclusions analysis began in the 1960s, and active research was carried out in tandem with the progress of refining technology from the 1970s through the 1980s. Although wet chemical analysis was the main stream at the beginning, research was also carried out by rapid dry chemical analysis methods from the 1990s. The latter began

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around 1980, and from the 1990s, remarkable progress was achieved thanks to the advent of advanced pretreatment techniques and extremely sensitive analytical instruments, as exemplified by the inductively coupled plasma mass spectrometer (ICP-MS). Tracing back through history, here we will take retrospective view of the chemical analysis techniques developed by JFE Steel, and will introduce those techniques that made important contributions to the development of JFE Steel, and in turn, the steel industry.

In the 1980s, JFE Steel began development of a technique for trace analysis of steel, and established an analytical technique that combined unique analytical operations performed from analysis to measurement of iron and steel specimens at the test tube scale, and matrix separation methods utilizing solvent extraction and chromatography







manufacturing process, are used as basic materials for social infrastructure in the forms of cement and concrete aggregate, roadbed materials, etc. based on appropriate



