Abstract:

To respond to customers' needs for higher grade and higher quality linepipe in recent years, in 2003, JFE Steel's Chita Works carried out a revamp of its 26" medium-diameter ERW pipe mill, in which the maximum wall thickness of API 5LX56 grade (API: American Petroleum Institute) was increased from the former 20.6 mm to 25.4 mm. At the same time, Chita also improved its measurement technology and developed an original

particularly in environments where large-diameter pipe, as represented by UOE pipe, is applied[1)].

On the other hand, against a background in which priority is assigned to high productivity, there has been a continuing changeover from UOE and seamless steel pipe to electric resistance welded (ERW) pipe, supported by rapid progress in material and pipe manufacturing technologies for ERW pipe for linepipe.

The 26" medium-diameter ERW pipe mill at JFE Steel's Chita Works is the only mill in the world which is capable of manufacturing ERW pipe with outer diameters up to 26". Therefore, taking advantage of this feature, Chita Works revamped its manufacturing equipment to expand the maximum wall thickness, and simultaneously improved its technology and established a quality assurance system for enhanced welded seam quality with the aim of entering the market for UOE pipe. These equipment improvements and new technologies developed for ERW pipe for linepipe are described in this report.

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In April 2003, the 26" medium-diameter ERW pipe mill was revamped to expand the available wall thickness of API 5LX56 from 20.6 mm to 25.4 mm. The available size range is shown in **Cfd+ ..**

The design specif cation of this mill was outer diameter: OD12"–26" and wall thickness: WT16 mm with

* ERW 1" wall thickness pipe: Only JFE Steel's 26" ERW mill can manufacture.

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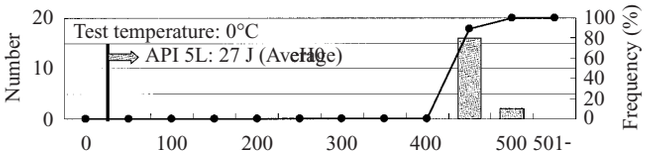
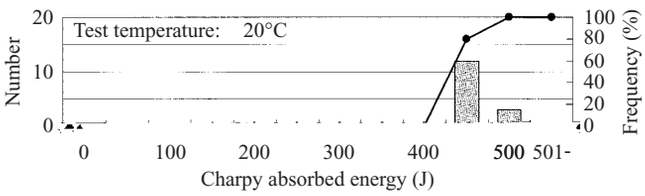
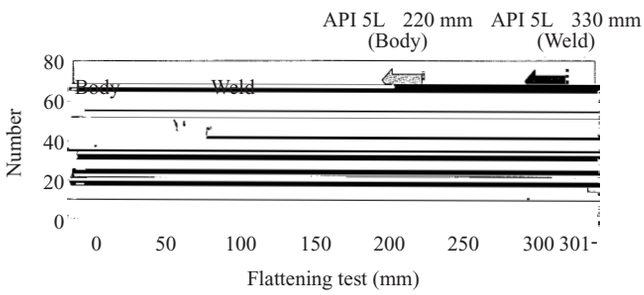




(b) X56(PSL2)OD24” WT25.4 mm Weld



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of standard production, and product quality is extremely stable.

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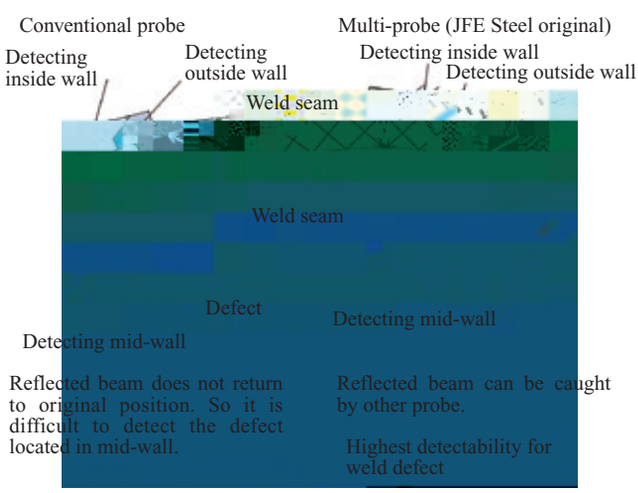
Heavy wall linepipes, represented by UOE pipes, are mainly used in sea bottom linepipes, and service conditions are extremely severe. Therefore, reliable detection of faws trapped in the material is necessary, not only in the body but also in the welds. In particular, in recent years, there have been strong movements, beginning with the major oil companies, to establish specifcations which attach importance to the weld seam faw detection capability in heavy wall products.

Anticipating this trend, JFE Steel developed and introduced a multiprobe ultrasonic inspection device for the weld seam[2]. As shown in **Cfd+.0**, with the conventional one-side, 3-channel, 45° faw detection angle probe arrangement, it is not possible to cover the full wall thickness in inspections of heavy wall pipes. Furthermore, the detection accuracy of refected echoes from faws trapped in the mid-wall area is low. For these reasons, operability was inevitably sacrifced in actual operation, for example, by using probes with different detection angles corresponding to the wall thickness and raising sensitivity to an extreme level in order to secure the necessary detection capability.

With JFE Steel’s newly-developed multiprobe UT inspection device, faw detection is performed using a one-side, 8-channel continuous arrangement of probes with a 45° detection angle in the pipe circumferential direction. Therefore, as distinctive features, this system enables coverage of 100% of the wall thickness, even with heavy wall products, and can also detect all refected signals. As a result, as shown in **Cfd+.1**, even faws in the mid-wall area can be detected without increasing detection sensitivity. The fact that this system shows an extremely stable detection capability with respect to deviations in the weld line during inspections has also been confrmed[2].

This is an original technology which was developed by JFE Steel and was introduced by the company before other companies. It has received a very favorable evaluation from the customers, and is making an important contribution to improving the reliability of ERW linepipe.



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