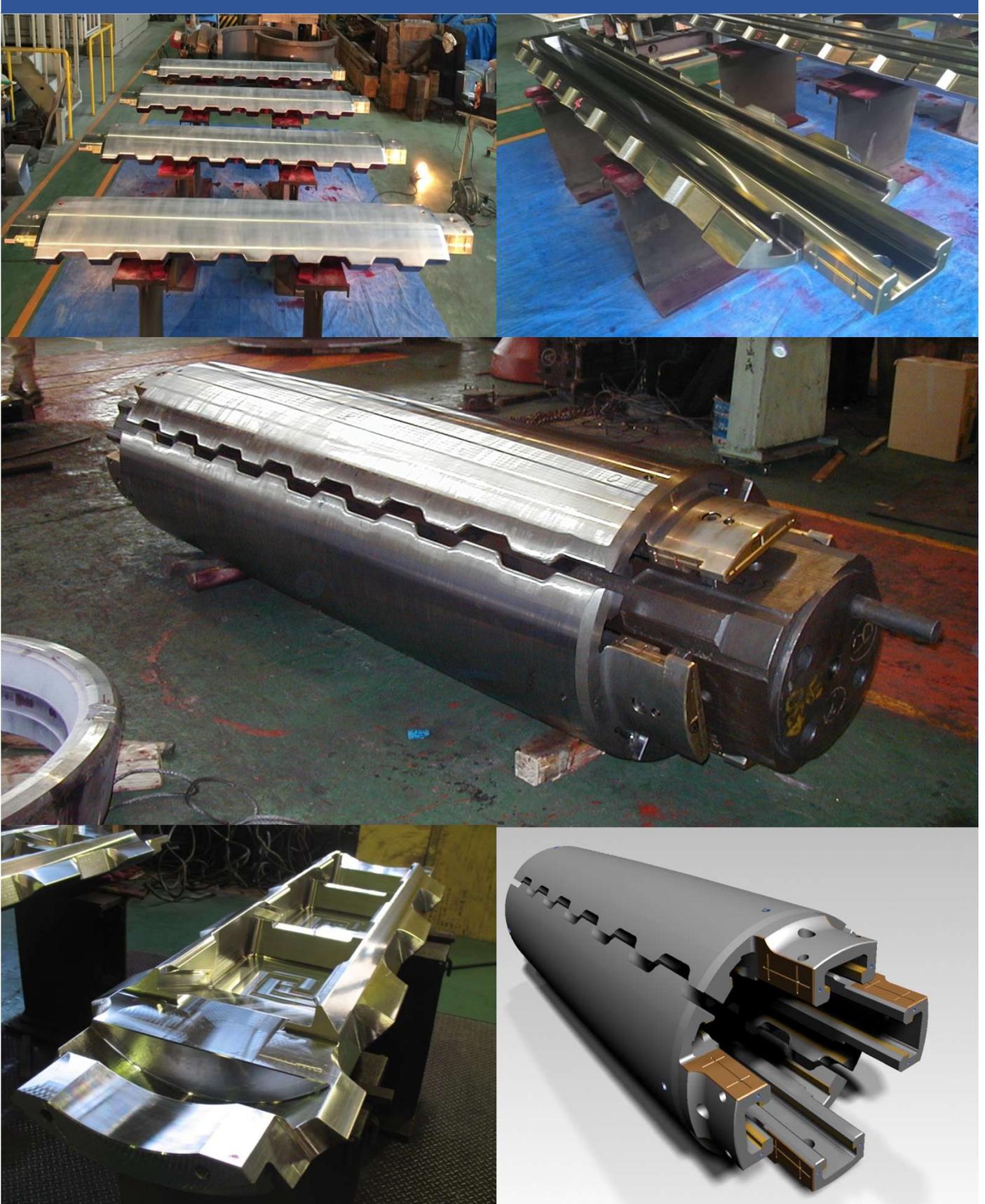


YST 5 for hot rolling winder

[Steel casting]



Special Material **YST 5**

★ Durability against high-temperature brittleness

If it could be used under winding condition of being heated bellow 750°C, the excellent toughness characteristics of YST5 will be kept. When it is exposed for a long time from the tempering temperature to 780°C(or more), toughness characteristics will be decreased, but because the surface crack growth is very slow, it does not cause sudden breakages of segments.

★ Durability against Low-temperature brittleness

Even if it is exposed to the embrittlement temperature range of 450 to 500°C for a long time, embrittlement as observed in high Cr steel does not occur in YST5.

★ Good abrasion resisting property

Even in the condition of high temperature, it has good abrasion resisting property.

★ Good machinability

Good machinability can be confirmed when machining the surface for reusing the segments.

★ High performance and Cost beneficial

Despite its high performance, YST5 has cost beneficial feature because alloy components is fewer than the 12Cr based material(ex.GX22CrMoV12-1).

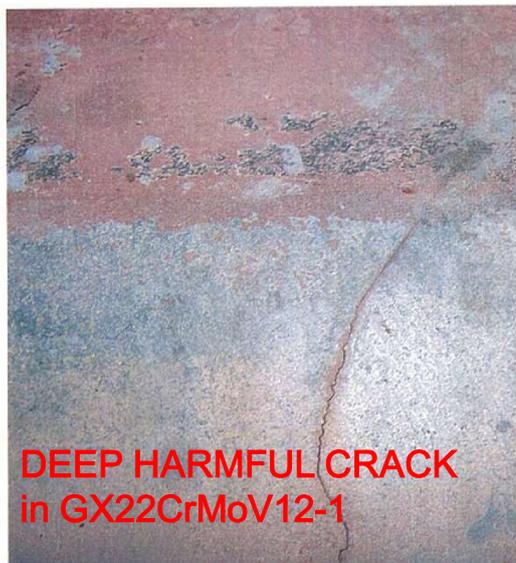
★ Comparison with GX22CrMoV12-1

Thanks to its excellent heat resistance, abrasion and corrosion resistance, GX22CrMoV12-1 is widely adopted in heavy industrial market such as turbine material of power generation field (Hydraulic, Gas & Steam turbine, etc) However, Hot-rolled mandrel equipment requires special materials that can be used under conditions of repetitive heating and cooling in many times. Under such harsh conditions for long time, many heat cracks will occur on the surface. Therefore, in order to avoid breakages and crack growth on the surface of segments, the material of the segment must be given top priority with sufficient fracture toughness properties which makes the occurrences and the progress of cracks delay. This point is the most important property to eliminate the sudden stop of facilities, and YST5 is the most suitable material.

The comparison of the mechanical properties and evaluation of **YST 5** and **GX22CrMoV12-1**

Material	Proof stress (N/mm2)	Tensile strength (N/mm2)	Elongation (%)	Reduction of area (%)	Hardness (HS)	Charpy absorbed energy(J) Temp.20°C
YST 5	560	710	22	70	33	115
	GOOD	GOOD	EXCELLENT	EXCELLENT	GOOD	EXCELLENT
GX22 CrMoV 12-1	600	785	18	48	40	25
	EXCELLENT	EXCELLENT	GOOD	GOOD	EXCELLENT	NO GOOD

【 Reference photography 】 Example of cracks in **GX22CrMoV12-1**



DEEP HARMFUL CRACK
in GX22CrMoV12-1



★ YST 5 Winding surface status after use



After winding 1,200,000 tons!!

(still usable/stock for emergency)

As a feature of YST 5,
although a **HONEYCOMB PATTERN** appears on the surface,
it is very shallow and **NEVER** progresses to **HARMFUL CRACKS**.

[Not Re-machined]



After winding
1,500,000 tons

In some mills, the same amount of coils are able to be wound further by Re-machining the surface after use.

《Steel casting》 Material Grade YST5 Segments for Hot Rolling Winder

Supply List (number of annual)

[Note] The number indicates the number of the sets consisting of four pieces.

Customer	Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2000~ Total	
Nippon Steel Corp.		6	3	2	15	15	6	8	6	16	8	10	9	10								114
Sumitomo Metal Industries		2	3		1	1	1	4	5	2	2	1	1	1								24
Nippon Steel & Sumitomo Metal Corp.															13	13	15	13	9	18		81
N.K.K.		4	4	6																		14
Kawasaki Steel Corp.		2	4	3																		9
JFE Steel Corp.					8	8	4	12	9	9	5	6	5	5	4	5	8	12	10	9		119
Kobe Steel			2		1	1		3	6	1	1		1		2	1	3	1	2	1		26
Nisshin Steel		6	5	3	1	1	1	5	5	3	4	1	3	4	2	2	2	3	3	3		57
Nippon Metal Industry					1	1			1													3
Tokyo Steel				2					2	2			1			1		1		3		12
Nakayama Steel							1												1			2
I.H.I. (export for Asia)			3	2																		5
Mull Group Inc. (for US)																1						1
Total		20	24	18	27	27	12	33	34	33	20	18	20	20	21	22	29	30	25	34		467



Since 1904, our group has been dedicating to offer customer's solutions many times. In steel and iron industry, we have approached improvement of our materials to be durable for sever conditions with considering cost. Through the business we have been earned great reputation in Japan. Now, based on the experiences in Japan, we are proud of expanding our business to the US market and really would like you to feel high-end quality. It must be the most extraordinary solutions for you.

- Capital: 432 Million JPY (3.9 Million USD)
- Sales: 29 Billion JPY (264 Million USD)
- Employees: 129
- Branches and offices: 13 offices in Japan and 3 overseas (Singapore, Shanghai, Taiwan)

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SEGMENTS

in IRON and STEEL industry



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