

List of References.  
Equipment for Ultrasonic Examination of Plates, Strips and Ingots.  
Updated: 25.04.2018

No.	System	Type of System	Customer	Date of Contract	Parameters of the Customer's Line
1	SEVER-1M-2500	EMAT based In-line	JSC «Severstal» LPC-1 Cherepovets, Russia	1997	Width: 2500 mm Thickness: 6 - 50 mm Length: 4 - 18 m Test speed: 0 - 2 m/s Surface: after hot rolling Temperature: -30°C - +100°C Testing area: Body + edges
2	SEVER-2M-2300	EMAT based In-line	JSC «Severstal» LPC-2 Cherepovets, Russia	1998	Width: 1000 - 1900 mm Thickness: 5 - 30 mm Length: coil Testing area: Body + edges
3	SEVER-5-32M-1800	EMAT based In-line	JSC «Volzhsky Pipe Plant» Volzhsky, Russia	1998	Width: 1000 - 1800 mm Thickness: 6 - 14 mm Length: coil Test speed: 1 - 2 m/s Surface: after hot rolling Temperature: -20°C - +150°C Testing area: Body + edges
4	SEVER-5-32M-1800	EMAT based In-line	JSC «Volzhsky Pipe Plant» Volzhsky, Russia	1998	Width: 1000 - 1800 mm Thickness: 6 - 14 mm Length: coil Test speed: 1 - 2 m/min Surface: after hot rolling Temperature: -20°C - +150°C Testing area: Body + edges
5	SEVER-5-32M-1800	EMAT based In-line	JSC «Volzhsky Pipe Plant» Volzhsky, Russia	1998	Width: 1000 - 1800 mm Thickness: 6 - 14 mm Length: coil Test speed: 1 - 2 m/s Surface: after hot rolling Temperature: -20°C - +150°C Testing area: Body + edges
6	SEVER-5-32M-1800	EMAT based In-line	JSC «Volzhsky Pipe Plant» Volzhsky, Russia	1998	Width: 1000 - 1800 mm Thickness: 6 - 14 mm Length: coil

List of References.  
Equipment for Ultrasonic Examination of Plates, Strips and Ingots.  
Updated: 25.04.2018

					Test speed: 1 - 2 m/min Surface: after hot rolling Temperature: -20°C - +150°C Testing area: Body + edges
7	SEVER-6-08-2500	EMAT based In-line	JSC «Magnitogorsk Iron and Steel Works» (OAO «MMK») Magnitogorsk, Russia	1999	Width: 1000 - 2350 mm Thickness: 5 - 60 mm Length: coil Test speed: 1 - 2 m/s Surface: after hot rolling Temperature: -20°C - +300°C Testing area: Body + edges
8	SEVER-6-08-2300	EMAT based In-line	JSC «Volzhsky Pipe Plant» Volzhsky, Russia	2001	Width: 1000 - 2300 mm Thickness: 5 - 30 mm Length: coil Test speed: 0 - 2 m/s Surface: after hot rolling Temperature: -30°C - +300°C Testing area: Body + edges
9	SEVER-6-08-2800	EMAT based In-line	JSC «Magnitogorsk Iron and Steel Works» (OAO «MMK») Magnitogorsk, Russia	2001	Width: 1000 - 2750 mm Thickness: 5 - 60 mm Length: 4 - 12 m
10	SEVER-6-08-5000	EMAT based In-line	JSC «Severstal» LPC-3 Kolpino, Russia	2001 (2005- modernization)	Width: 1600 - 4800 mm Thickness: 10 - 50 mm Length: 8 - 30 m Test speed: 0,2 - 0,6 m/s Surface: after hot rolling and flattening Temperature: -30°C - +650°C Testing area: Body + edges
11	SEVER-10-5000	EMAT based Off-line	JSC «Severstal» LPC-3 Kolpino, Russia	2002	Width: 1600 - 4800 mm Thickness: 10 - 50 mm Length: 8 - 30 m
12	SEVER-6-08-2800	EMAT based In-line	JSC «Alchevskiy Iron and Steel Works» Alchevsk, Ukraine	2000	Width: 1500 - 2800 mm Thickness: 4 - 50 mm Length: min 2,5 m Test speed: 0,2 - 1 m/s Surface: after hot rolling Temperature: -20°C - +650°C

List of References.  
 Equipment for Ultrasonic Examination of Plates, Strips and Ingots.  
 Updated: 25.04.2018

					Testing area: Body + edges
13	SEVER-10-3000	EMAT based Off-line	JSC «Severstal» LPC-1 Cherepovets, Russia	2003	Width: 1500 - 2800 mm Thickness: 8 - 50 mm Length: up to 15 m Test speed per 1 cycle: for plates 2800x6000– 6-7 min Surface: after hot rolling and heat treatment Temperature: -30°C - +150°C Testing area: Body + edges
14	SEVER-6-08-2800	EMAT based In-line	JSC «Ural steel» (NOSTA) Novotroitsk, Russia	2004	Width: 1500 - 2750 mm Thickness: 7 - 50 mm Length: 4,5 - 30 m Test speed: 0 - 2 m/s Surface: after hot rolling Temperature: -20°C - +650°C Testing area: Body + edges
15	SEVER-6-08-2500	EMAT based In-line	JSC «Tokyo Steel» (via Institut Dr. Foerster GmbH&Co.KG) Kitakyushu, Japan	2005	Width: 1500 - 2500 mm Thickness: 6 - 65 mm Length: max 4 - 26 m Test speed: 1,5 m/s Surface: after hot rolling Temperature: max +650°C Testing area: Body + edges
16	SEVER-6-08-5000	EMAT based In-line	JSC «Amurmetal» Komsomolsk-na-Amure, Russia	2006	Width: up to 5000 mm Thickness: up to 100 mm Length: min 5 m Test speed: up to 2 m/s Surface: after hot rolling Temperature: max +650°C Testing area: Body + edges
17	SEVER-6-08-2500	EMAT based In-line	JSC «Magnitogorsk Iron and Steel Works» (OAO «MMK») LPC-4 Magnitogorsk, Russia	2006	Width: 1000 - 2350 mm Thickness: 5 - 20 mm Length: coil Test speed: 0,1 - 2 m/s Surface: after hot rolling Temperature: -40°C - +300°C Testing area: Body + edges

List of References.  
Equipment for Ultrasonic Examination of Plates, Strips and Ingots.  
Updated: 25.04.2018

18	SEVER-6-08-500	EMAT based In-line	JSC «Magnitogorsk Iron and Steel Works» (OAO «MMK») LPC-8 Magnitogorsk, Russia	2007	Width: 250 - 490 mm Thickness: 2 - 4 mm Length: coil Test speed: up to 2m/s Surface: after hot rolling Temperature: 0°C - +50°C Testing area: Body + edges
19	SEVER-6-08-2100	EMAT based In-line	Mitsubishi Corporation for JSC «Uraltrubprom» Pervouralsk, Russia	2008	Width: 650 - 2100 mm Thickness: 3 - 22 mm Length: coil Test speed: 40 m/min Surface: after hot rolling Temperature: -25°C - +150°C Testing area: Body + edges
20	SEVER-6-08-2000	EMAT based In-line	JSC «Severstal» Cherepovets, Russia	2008	Width: 1000 - 1850 mm Thickness: 3 - 20 mm Length: 2 - 12 m Surface: after hot rolling Temperature: 0°C - +100°C Testing area: Body + edges
21	SEVER-6-08-4600	EMAT based In-line	JSC «Chelyabinsk Tube- Rolling Plant» Chelyabinsk, Russia	2008	Width: 1500 - 4600 mm Thickness: 6 - 50 mm Length: 10,7 - 18,3 m Speed: 60 m/min Surface: after hot rolling Temperature: -10°C - +30°C Testing area: Body + edges Surface defects
22	SEVER-6-08-2500	EMAT based In-line	ZAO «NKMZ» for OAO «MMK» Novokramatorsk, Russia	2008	Width: 1000 - 2350 mm Thickness: 5 - 25 mm Length: coil Speed: 60 m/min Surface: after hot rolling Temperature: -30°C - +100°C Testing area: Body + edges
23	EMATEST-PL-3800	EMAT based In-line	JSC «ERDEMIR», Turkey	2008	Width: 1000 - 3800 mm Thickness: 5 - 60 mm Length: 4,0 - 26,0 m

List of References.  
 Equipment for Ultrasonic Examination of Plates, Strips and Ingots.  
 Updated: 25.04.2018

					Speed: 1 m/s Surface: after hot rolling Temperature: max +250°C Testing area: Body + edges
24	EMATEST-PL-5000	EMAT based In-line	«Hunan Valin Xiangtan Iron & Steel Co., Ltd.» Xiangtan, China	2009	Width: 1300 - 5000 mm Thickness: 5 - 100 mm Length: 5,0 - 52,0 m Speed: 0 - 2,0 m/s Surface: after hot rolling Temperature: max +100°C Testing area: Body + edges
25	EMATEST-PL-5000	EMAT based In-line	JSC «Magnitogorsk Iron and Steel Works» (OAO «MMK») Magnitogorsk, Russia	2010	Width: 1000 - 5000 mm Thickness: 8 - 60 mm Length: 3,0 - 18,5 m Speed: 0,1- 2,0 m/s Surface: after hot rolling Temperature: max +300°C Testing area: Body + edges
26	EMATEST-PL-5500	EMAT based In-line	«Nippon Steel Corporation» Oita, Japan	2011	Width: 900 - 5500 mm Thickness: 6 - 60 mm Length: 10,0 - 64,0 m Speed: 0,2 - 2,0 m/s Surface: after hot rolling Temperature: max +400°C Testing area: Body + edges
27	EMATEST-PL-5000	EMAT based In-line	HAEUSLER AG for «Kuwait Pipe Industries and Oil Services Company (KPIOS)» Kuwait	2011	Width: 1300 - 4840 mm Thickness: 6 - 35 mm Length: 8,0 - 12,2 m Speed: 0,1 - 2,0 m/s Surface: after hot rolling Temperature: max +100°C Testing area: Body + edges Testing Criteria: acc. to API 5L including 44 <sup>th</sup> Edition
28	EMATEST-PL-3500	EMAT based In-line	«Nanjing Iron & Steel Co., Ltd.» Nanjing, China	2011	Width: 1600 - 3300 mm Thickness: 4 - 80 mm Length: 4,0 - 52,0 m Speed: 0,1 - 2,0 m/s

List of References.  
Equipment for Ultrasonic Examination of Plates, Strips and Ingots.  
Updated: 25.04.2018

					Surface: after hot rolling Temperature: max +350°C Body + edges Testing Criteria: acc. to API 5L including 44 <sup>th</sup> Edition etc.
29	EMATEST-PL-2800	EMAT based In-line	PAO «AMK» Alchevsk, Ukraine	2012	Width: 1600 - 2800 mm Thickness: 6 - 60 mm Length: 6,0 - endless Speed: up to 2,0 m/s Surface: after hot rolling Temperature: max +500°C Testing area: Body + edges  Testing Criteria: acc. to API Spec 5L, GB/T 2970, JB 4730, ASTM A 435, ASTM A 578, ASME SA 435, ASME SA 578, ISO 12094 JIS G0801 JIS G0901, SEL 072 NF A04-305, BS 5996, EURONORM 160GOST 22 727
30	EMATEST-PL-2800	EMAT based In-line	PAO «NKMZ» for OAO «AMET» Asha, Russia	2013	Width: 1600 - 2800 mm Thickness: 6 - 60 mm Length: 6,0 - endless Speed: up to 2,0 m/s Surface: after hot rolling Temperature: max +500°C Testing area: Body + edges  Testing Criteria: acc. to API Spec 5L, GB/T 2970, JB 4730, ASTM A 435, ASTM A 578, ASME SA 435, ASME SA 578, ISO 12094 JIS G0801 JIS G0901, SEL 072 NF A04-305, BS 5996, EURONORM 160GOST 22 727
31	SEVER-6-08-2800	EMAT based In-line	JSC «Ural steel» (NOSTA) Novotroitsk, Russia	2013	Width: 1500 - 2800 mm Thickness: 7 - 50 mm Length: 4,5 - 36 m Test speed: 1 m/s Surface: after hot rolling

List of References.  
Equipment for Ultrasonic Examination of Plates, Strips and Ingots.  
Updated: 25.04.2018

					<p>Temperature: -30 - +650°C Testing area: Body + edges</p> <p>Testing Criteria: acc. to GOST 22727, EN 10160, ISO 12094, ASTM, API 5L, JIS G0901, JIS G0801</p>
32	EMATEST-PL-3700	EMAT based In-line	SMS Siemag AG for «EPSSN», Venezuela	2014	<p>Width: 1500 - 3700 mm Thickness: 8 - 50 mm Length: up to 38 m Test speed: 1 m/s Surface: after hot rolling Temperature: up to +100°C Testing area: Body + edges</p> <p>Testing Criteria: acc. to EN 10160, SEL-072/1977, EURONORM EU-160/1984, BS5996 /1993, JIS G0801, JIS G0901, ASTM A 578 Level I, II, III, ASME SA 578 Level I, II, III, ASTM A 435, ASME SA 435, NF A04-305, GB/T2970-2004, JB4730-2005, ISO 12094</p>
33	RIDER	Mechanized Off-line carriage-based scanner	«POSCO» Pohang, Korea	2014	<p>Width: from 400 mm Thickness: from 5 mm Length: unlimited Surface: after hot and cold rolling, edges – rolled or sheared Temperature: from -20°C - +150°C Testing area: Body + edges</p> <p>Defects to be detected:</p> <ul style="list-style-type: none"> <li>▪ Surface and subsurface defects.</li> </ul> <p>Sensitivity:</p> <ul style="list-style-type: none"> <li>▪ For surface: rectangular notch 1 mm in depth and 5 mm in length;</li> <li>▪ For sub-surface: rectangular notch made from the other side of the reference plate (H mm thick) to the depth of H - 3 mm, not less than 5 mm long</li> </ul>

List of References.  
Equipment for Ultrasonic Examination of Plates, Strips and Ingots.  
Updated: 25.04.2018

34	RIDER	Mechanized Off-line carriage-based scanner	«POSCO» Gwangyang, Korea	2014	<p>Width: from 400 mm Thickness: from 5 mm Length: unlimited Surface: after hot and cold rolling, edges – rolled or sheared Temperature: from -20°C - +150°C Testing area: Body + edges Defects to be detected:</p> <ul style="list-style-type: none"> <li>▪ Surface and subsurface defects;</li> </ul> <p>Sensitivity:</p> <ul style="list-style-type: none"> <li>▪ For surface: rectangular notch 1 mm in depth and 5 mm in length;</li> <li>▪ For sub-surface: rectangular notch made from the other side of the reference plate (H mm thick) to the depth of H - 3 mm, not less than 5 mm long</li> </ul>
35	ALUTEST-PL-2700	Off-line robot-based scanner	«Tianjin Zhongwang Aluminium Co., Ltd.» Tianjin, China	2015	<p>Material: aluminium ingots Thickness: 390 - 810 mm Width: 1200 - 2700 mm Length: 2200 - 8000 mm Surface: after milling process for both sites Temperature: up to +40°C Testing area: Body + edges Defects to be detected:</p> <ul style="list-style-type: none"> <li>▪ Internal, surface and sub-surface defects</li> </ul> <p>Sensitivity:</p> <ul style="list-style-type: none"> <li>▪ For Internal defects: FBH <math>\Phi</math> 0.8 mm, Drilling (cylindrical) 0.6 mm in diameter, 25 mm long along the plate's main axis, located between 0 -10mm under the surface.</li> <li>▪ For surface/subsurface cracks: Longitudinal notch 0.2(D)x25(L) mm</li> </ul>



List of References.  
Equipment for Ultrasonic Examination of Plates, Strips and Ingots.  
Updated: 25.04.2018

36	<p>Modernization of Ultrasonic testing system produced by NDT Systems&amp;Services AG (type HP-B2/L2-TR3,). Scope of modernization: Test electronics + UT software + Test process control system software</p>	PEP based On-line	AO «MMK», Magnitogorsk, Russia		<p>Width 1400-3500 mm Thickness 7- 60 mm Length 4500-12500 mm Test speed: 0,5 m/s Surface: after hot rolling Plate temperature 0...+100 °C Testing area: Body + edges</p> <p>Testing Criteria: acc. to GOST 22727, EN 10160, ISO 10893, JIS G0901, JIS G0801, ASTM, API 5L + Customer's specifications</p>
37	EMATEST-PL-3500	EMAT based In-line	«Zhangjiagang Shajing Heavy Plates Co., Ltd.» Zhangjiagang, China	2015	<p>Width: 1500 - 3500 mm Thickness: 6 - 100 mm Length: up to 33 m Test speed: up to 2 m/s Surface: after hot rolling Temperature: up to +300°C Testing area: Body + edges</p> <p>Testing Criteria: acc. to API5L, ASTM A578/A578M, BS 5996, DNV-OS-F101 (2007), EN 10160, EN 10246-15, ISO 12094, GB/T 2970, JIS G0801, JIS G0901, GOST 22727, SEL 072, SCHELL, JB/T 47013, GB/T 9711, GB/T 3091, SY/T 5768, GB/T 21835, JIS G3444, ASTMA53, ASTMA</p>
38	NORDISCAN-PL-4200	PEP based Off-line	«NLMK Dansteel A/S» Frederikswaerk, Denmark	2016	<p>Width: 1000 - 4200 mm Thickness: 6 - 250 mm Length: up to 50 m Test speed: 0,5 m/s Surface: after hot rolling Temperature: 0°C - +80°C Testing area: Body + edges</p> <p>Testing Criteria: acc. to API5L, GB/T 2970, ASTM A578/A578M, JIS G0801, GB/t3091, BS</p>

List of References.  
Equipment for Ultrasonic Examination of Plates, Strips and Ingots.  
Updated: 25.04.2018

					5996, JIS G0901, SY/T5768, DNV-OS-F101 (2007), GOST 22727, GB/T21835, EN 10160, SEL 072, JIS G3444, EN 10246-15, ASTM, A453, ISO 12094, JB 4730
39	Modernization of Ultrasonic testing system produced by NUKEM	Phased Array On-line	AO «Ural Steel», Novotroitsk, RUSSIA	2017	<p>Width 1400-2680 mm Thickness 7- 60 mm Length 4500-12500 mm Test speed: 0,5 m/s Surface: after hot rolling Plate temperature 0...+100 °C Testing area: Body + edges</p> <p>Testing Criteria: acc. to GOST 22727, EN 10160, ISO 10893, JIS G0901, JIS G0801, ASTM, API 5L + Customer's specifications</p>
40	NORDISCAN-PL-3600	Phased Arrays Off-line	EVRAZ NA, Portland, Oregon, North America	2018	<p>Width: 1000 - 3600 mm Thickness: 6 - 150 mm Length: up to 40 m Test speed: 0,6 m/s Surface: after hot rolling Temperature: 0°C - +80°C Testing area: Body + edges</p> <p>Testing Criteria: acc. to API5L, GB/T 2970, ASTM A578/A578M, JIS G0801, GB/t3091, BS 5996, JIS G0901, SY/T5768, DNV-OS-F101 (2007), GOST 22727, GB/T21835, EN 10160, SEL 072, JIS G3444, EN 10246-15, ASTM, A453, ISO 12094, JB 4730</p>