

# SMR BALS

# ROLLING STOCK

# SUBASSEMBLIES

# 01. INTRODUCTION



SC SMR SA Bals was designed and built between years 1965 - 1970 and was known world-wide until 1990 as Enterprise of Axles and Bogies ( IOB ), and after that date it is registered at the Chamber of Commerce Olt under the number J28/31/1991 under the present name.

From design was provided with high technological complexity equipment, currently possessing the latest news in the industry of railway rolling stock manufacturers in the world. Opening Romania after 1989, to a market economy has made the plant profile to be more complex to assimilate new products, develop marketing activities and performance management.

The company is located at the entrance of Bals city, on the European E 574 road, at a distance of about 230 Km from the capital of Romania - Bucharest.

Since September 1999 the company was privatized and became 100 % Romanian private capital, the major shareholder being MR INDUSTRIAL INVESTMENT SA Bucharest. Business area reaches 50 hectares , of which about 60 % are production spaces and the rest is the internal network of railways, roads, deposits and annexes.

## The company performs the following activities:

- Production of rolling stock subassemblies : wheels, axles, wheelsets, running gears, bogies
- Development and casting steel ingots and steel parts
- Execution of castings, forgings and stampings
- Metal construction
- Cutting machining
- Heat treatment

## Company consists of the following production facilities:

- Electric steel mill
- Foundry
- Department of bogies workshops: forgings and stampings, machining by cutting, mounting bogies
- Forge axles and wheels

## Production capacity:

- monobloc wheels 50,000 pcs / year
- axles 18,000 pcs / year
- wheelset 18,000 pcs / year
- bogies 1,000 pcs / year



Through the products made and the technologies applied, based on long experience, SMR has gained over time a prominent place among manufacturers of material stock railway in the world.



Specialised in the production of railway rolling stock, SMR is equipped with modern equipment and high productivity that allow a manufacturing flow from raw material to finished product.

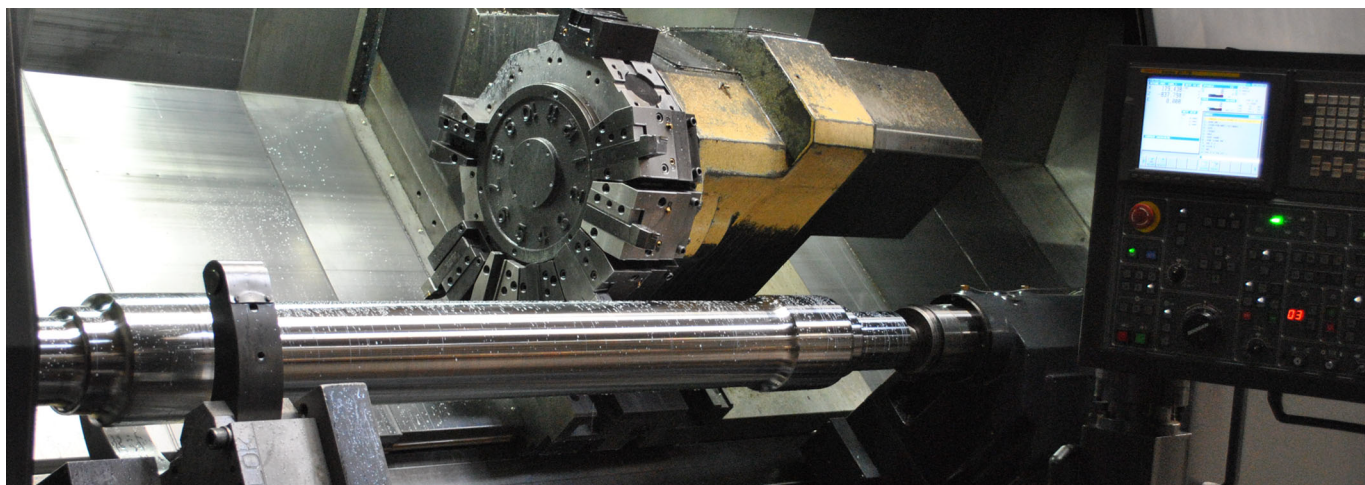
Steel is produced in a triplex of aggregates and metallurgical installations including a electric arc furnace melting 50 tons/batch, a metallurgical pot L.F. of 50to and a vacuum installation V.D. and then is casted into ingots. Throughout the technological process of steel elaboration occurs the monitoring of temperature, chemical composition and gas using the spectrometer and gas analyzer.

Part of the steel is routed to the parts foundry where it is stored into maintaining ovens, and the other side is poured into ingots required in manufacturing wheels and axles. The ingots are jagged into blocks and then get to the forge department where the monobloc wheels are forged on two production lines (Schlößemann-Germany). These production lines are composed of: heating furnaces blanks, 6300 tons hydraulic press, mill wheel, calibration hydraulic presses and punching of 3100 tons and 2000 tons.

The axles are forged of round or square semimanufactured on horizontal forging machine GFM. After forging, wheels and axles go to heat treatment and then to the mechanical processing department. Wheels processing is made on CNC lathes and axle processing is made on horizontal lathe machining by copying processing and machine tools with CNC (PUMA 600lm).

Wheelsets are obtained by pressing two monoblock wheels per axle, this process being performed on the hydraulic press. The running gears are obtained by mounting the bearings and grease boxes of the wheelsets. Components for bogies are manufactured by casting, forging, stamping, cutting and machining cutting. Bogie frames are obtained by assembling the component parts by welding (electric process with coated electrode and the protective gas process MAG) in special traversing.

In order to test the quality and for the control of the flows production, the company is equipped with laboratories, equipment and tools.



The company produces rolling stock subassemblies according with the most known standards: TSI, UIC, AAR, EN, ISO, BS, IRS, JIS, etc, or in accordance with the specific requirements of each client.



**The company owns certificates from national and international companies and organizations:**

- TUV Germany
  - The quality management system according to EN ISO 9001
  - The performance of welded structures according to EN 15085-2 for rolling stock, EN ISO 3834-2
- U.S. AAR (American Association of Railways Quality Assurance Program standard AAR M-1003)  
The Association of American Railroads M - 1003
- AFER - Romania (Romanian Railway Authority), in accordance with TSI Directive 2008/57/EC of 17.06.2008, 16.10.2009 Directives 2009/131/EC and 2011/18/EU of the 01.03.2011 for implementation of:
  - Axle type B drawing no. 1.888.1
  - Type BA 004 monoblock wheel drawing no. 1.888.2
  - Axle wheelsets type BA004 + B drawing no. 1.888.0 / M
- AFER - Romania for the design, manufacture and repair of subassemblies for rolling stock running gears, bogies, manufacture of castings and forgings)

## 02. WHEELS

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SMR SA BALS has over 40 years experience in manufacturing and designing monoblock wheels for customers in over 70 countries worldwide. Monoblock wheels are used to equip wheelsets supporting loads up to 25 t/axle running at a speed up to 160 km/h. The blocks are heated in rotary furnace at the required processing temperature (approx. 1260 ° C).

Turning blocks in semimanufactured of monoblock wheel is executed from a single warming of the material (block) and then processed on three machines arranged in the technological line, namely:

- 6,300 tf press - for discharge axial block to get a semi-manufactured disc form.
- Mill - which by its components acts on the membrane and wheel rim
- 2000 tf. (3150 ft) press to perfore and calibrate

Processing is executed on CNC lathes. Improving physical and mechanical characteristics of the materials in the tread portion is achieved by proper heat treatment. SMR Bals can provide customers products optimized for specific applications.



Our company has experience in manufacturing monoblock wheels in a varied range for beneficiaries from more than 70 countries worldwide.

### We offer:

- various range of wheels
- monoblock wheels
- raw forged wheels

The materials from which we make the wheels are in accordance with existing rules in force and accordance with the requirements of our customers.



No.	Standard Norma	Calitate Material		T.T	Proprietati fizico mecanice			Duritate HB
					Rm (N/mm²)	A(%) min.	KU (J) min	
1	UIC812 - 3/'84	R1	P	UN	600 - 720	12 18	15	-
		R2	P	UN	700 - 840	9 14	10	-
		R3	P	UN	800 - 940	0 10	10	-
		R6	P	TE	780 - 900 (740)*	15(16)*	15	-
		R7	P	TE	820 - 940 (760)'	14(16)*	15	-
		R8	P	TE	860 - 980 (820)*	13(16)*	15	-
		R9	P	TE	900 - 1050 (880)*	12(14)*	10	-
2	STAS 8824/1 1991	R1	P	N	600 - 720	18	15	-
		R2	P	N	700 - 840	14	10	-
		R7	P	T	820 - 940	14	15	-
3	BS 5892/1992	R1	1	UN	600 - 720	12 18	15	179 - 217
		R2	1	UN	700 - 840	9 14	10	207 - 248
		R3	1	UN	800 - 940	7 14	10	235 - 277
		R6	1	TE	770 - 890 (740)* 730 - 890	15(16)*15	15 J5J	229 - 262 217 - 262
		R7	1	TE	820 - 940(760)* 780 - 940	14(16)*14	15 15	241 - 227 229 - 277
		R8	1	TE	860 - 980(820)* 820 - 980	13(16)*13	15 15	255 - 285 241 - 285
		R9	1	TE	900 - 1050(880)* 860 - 1050	12(14)*12	10 10	262 - 311 255 - 311
4	TTS 094 /1993	R7T	P	T	820 - 940(760)*	14(16)*	15	260 - 290
5	HS 248/1996	R9T	1	T	900 - 1050(880)*	12(14)*	10	262 - 302
6	MR MI 07/1984	class L	1	T	-	-	-	197 - 277
		class A	1	T	-	-	-	255 - 321
		class B	1	T	-	-	-	277 - 341
		class C	1	T	-	-	-	321 - 363
7	IRS R34 - 1981		1	T	980	8	-	300 - 341
8	IRS RI 9 - 1967		P	N(T)	764 - 882	11;9	-	-
9	IRS RI 9 - 1993		1	R.O	820 - 940(760)*	14(16)*	15	241 - 277

03.

AXLES

The axles are designed forming wheelsets. The axles are made in shape, size and material features corresponding to the specifications of our customers. Production flow of the axles includes forging in two stages, namely, forging the ingots on press followed by forging on a radial forging machine (GFM).

Forged axles are subject to heat treatment to achieve physical and mechanical characteristics in furnace functioning continues. Heat treatment furnaces are equipped with automatic temperature adjustment zone automatic and chart recording the heat treating. Processing axles is executed in several stages on lathes with Hydraulic copier with templates, CNC lathes (Doosan), advanced finishing obtained by rectification on specialized machine tools (Giustina).

SMR executes a variety of axles according to our customers' requirements. The axles can be delivered in different states of mechanical processing - blanks, semi-manufactured, ready for assembly. Therefore, we work with our clients on a unification of different types of products for individual use and for providing the axles payload over 23.5 t.



No.	Standard Norma	Material Quality Werkstoffgüte		T.T	Physico - mechanical properties		Physikalisch mechanische Merkmale		
					A(%) min.	KU long.	KU trans.	Re (N/mm <sup>2</sup> ) min.	Re (N/mm <sup>2</sup> )
						(J) min.			
1	UIC811 - 1/87 For motor vehicles Fur Triebfahrzeuge	A1		N	550	22	25	10	320
				T	550 - 700	24	40	15	350
		A2	22MnCrV5i	N	510 -620	22	40	20	350
		A3	C45	N	600 - 750	17	20	10	360
				T	620 - 770	0 - CO	25	13	390
		A4	25CrMo4/ISO R 683 II 1 Tip 1	T	650 - 800		40	20	420
	A5	42CrMo4/ISO R 683 IV 1 Tip 3a	T	730 - 880	14	25	13	510	
	UIC811 - 1/87 For trailed vehicles Fur Eisenbahnwagen	Al	C 35 i	U	500 - 650	20 22	20	8	270
				N	550 - 650		25	10	320
				T	550 - 700	24	40	15	350
		A2	22MnCrV5 i	N	510 - 620	22	40	20	350
2	STAS 1947/90	OC 01 i	N	550 - 650	22	50	20	320	
			T	550 - 700	25	80	30	350	
3	ITS 093 /98	A1N i	N	520 - 650	22	25	10	320	
4	BS 5892/83 Part 1 Teil 1	Al i	U	500 - 650	20	20	-	280	
			N	620 - 650	22	25	-	300	
			T	550 - 700	24	40	-	350	
		A2 I	N	600 - 750	17	20	-	360	
			T	620 - 770	19	25	-	390	
		A3 i	T	650 - 800	19	40	-	420	
		A4 i	T	650 - 800	19	40	-	420	
5	AAR ML 01/90	Grade U • Grad U i		U	585 - 895	14	-	-	275
		Grade F • Grad F i		NN	558 - 606**	22 - 20**	-	-	317-344**
		Grade G • Grad G i		T	564 - 620**	20 - 19**	-	-	330-378**
		Grade H • Grad H i		N+T	689 - 792**	18 - 16**	-	-	413-516**
6	IRS RL 6/95			N	550 - 650	22	25	-	320
				T	550 - 700	24	40	-	350
7	IRS R43/92	Category A		NT	570 - 685	25 - 17	20 35	-	-
		Category B		T	650 - 800	18	40	-	-
8	GOST 4728/89			N	580 - 650	20 - 18	50-35*	-	-
9	IRS RL 6/65			N	54-66kgf/mm <sup>2</sup>	21 - 17	-	-	50% Rm

# 04. WHEELSETS

Wheelsets are designed to equip wagons with maximum axle load of 25 tons and a speed of circulation of up to 160 km/h.

The wheels are mounted on axles by cold pressing and during the process is recorded the pressing pressure on a diagram whose profile must be accepted according to album the charts. For this purpose, the company uses a specialized press. Corrosion protection is provided according to customers demands, on the line of protective coatings.

The product portfolio includes axle equipped with monoblock wheels for different applications. We produce motors and/or running wheelsets both for freight trains as well as for the passengers trains.

Wheelsets produced by us are characterized by safety, design and reduced environmental impact.





## 05. RUNNING GEARS

The running gears are manufactured starting from the wheelsets by equipping them with bearings and grease cans. Grease can be: type CU-1, CU-2 or cans for special applications.

Fastening and sealing of labyrinth rings and inner rings of the bearings are totally monitored (size, heating, temperature) and closing and securing the ends of the axle and of the cans according to standard procedures certified by the providers of bearings (SKF, KINEX, etc.)



## 06. BOGIES

Welded or casted bogies are manufactured starting from semifinished laminates and castings or forgings which are machined and assembled to form subassemblies components of the bogie (bogie frame, wheelhouses brake, suspension) which together with the running gears compose the complete bogie. During manufacture essential components are inspected and tested at various stages to certify functionality and reliability of the bogie.

The complete bogie is tested under load on the stand to verify its elasticity and functionality and in the case of express prescriptions testing is made rolling under load on the stand. SMR Bals produces welded bogies amongst the family Y 25 (Cs, Rs, Ls, LSD, Ls (s) d1, SLS (s) d1) and cast bogies type Ride Control or Diamond. The materials for the bogies are in compliance with UIC standards, STAS, GOST, AAR

### Ride Control

- 1000-1600 mm gauge;
- Wheel diameter 774-965 mm;
- Axle load 15-35.7 to

### Type Diamond

- 1000-1520 mm gauge;
- Wheel diameter 838-950 mm;
- Axle load  $\leq$  23 to



Gauge, mm

	1435
Wheelbase, mm	1800
Diameter on tread, mm	920
Diameter of axle journal, mm	120-130
Distance between journals centers, mm	2000
Height of center plate under car tare, mm	757-760
Distance between side bearers centers, mm	1700
Axle load, tons	20,0-22,5
Running speed, km/h	100-120
Brake amplifying ratio	4

Features

Designed for 4-axles high tonnage freight cars			
Built according to UIC standard			
Number of bogie-mounted axles	2	2	2
Gauge, mm	1435	1435	1435
Distance between axles, mm	1800	1800	1800
Running tread diameter, mm	920	920	920
Total length, mm	3250	3250	3250
Net weight, kg	4800	4860/4958	4700
Load axle, t	20 t	20.0/22.5 t	23.5 t
• Maximum speed, km/h	120	120	120

07.  
STEEL MAKING

SMR SA Bals develops steels of different brands, depending on the wishes of customers. Steel is developed in EAF, alkaline lined, modernized. Is treated in a first step, a facility LF (ladle furnace) - Fully automatic (including bubbling with Ar).

Performance level achieved:

- Sulfur content - <0.010% to over 90% of the batch
- Carbon content varies within ± 0.02% from the average, over 90% of the batch
- Mn content varies within ± 0.05% from the average, approx. 90% of the batch
- Si content varies within ± 0.05% from the average, over 95% of the batch

Average duration of treatment is 45 min. The second stage of treatment is carried out in vacuum systemtype VD (VTD - 65 tons), fully automated. To achieve the vacuum, dry mechanical pumps are used and thetime down to 0.5 mbar pressure it's about 8 minutes. The final hydrogen content is consistently achievedbelow 2 ppm. Liquid steel is poured through siphoned in round molds, with different sections, related to the final product to be obtained (molds Ø 390 mm, Ø 425 mm and Ø 520 mm).





As related activities within the department are running and cutting shoot the blocks used in further processing.

The main types of steel, developed in the factory, according to EN 10020-1993:

**Unalloyed steel**

- Steel for general use
- High quality steel
- Special steels

**Alloy steel**

- High quality steel
- Special alloy steel

**Stainless steel**

**Carbon steel castings**

The ingots are cast by weight up to 50 tons.

# 08. ENVIRONMENTAL MANAGEMENT SYSTEMS

SMR SA BALS has established the Environmental MANAGEMENT SYSTEM according to the reference standard SR EN ISO 14001:2005 considering the impact on water, air, soil and the production of waste.

In this sense through our work we consider:

- Maintain permanent compliance with the legal requirements and other environmental requirements and application of the principles of pollution prevention;
- Establishing and periodically reviewing the objectives of improving on-line environmental about improving waste management and preventing the occurrence of emergencies environmental impact.



09.

EXTERNAL REFERENCES

MECANOEXPORTIMPORT S.A. - Bucharest and SMR S.A.- Bals export of bogies, wheelsets, solid wheels and axles

No.	Country	Product	Quantity Delivered	Period of Delivery
1	Algeria	Wheelsets Ø 920 mm	1182	1978-1982
2	Angola	Wheelsets Ø 838 mm	248	1979-1980
3	Argentina	Wheelsets Ø 762 mm	1658	1986-1987
4	Argentina	Wheels Ø 765, Ø 864, Ø 914, Ø 915, Ø 954, Ø 1026 mm	2455	1995-2000
5	Argentina	Axles	114	1996-2000
6	Australia	Bogies Type Ride Control, Ø 965 mm, gauge 1435 mm, axle load 35,7 t	696	1988
7	Austria	Bogies Type Y25Ls, Ø 920 mm, gauge 1435 mm, axle load 22,5 t	636	1987-1989
8	Austria	Wheelsets Ø 920, Ø 1000 mm	482	1975-1987
9	Austria	Wheels Ø 920 mm	12	1993
10	Bangladesh	Wheelsets Ø 774 mm, gauge 1000 mm	40	1984
11	Bangladesh	Wheels Ø 768, Ø 845, Ø 920, Ø 1022, Ø 1080, Ø 1092 mm	4225	1996-2009
12	Bangladesh	Tyres Ø 730 mm	528	1997
13	Belgium	Bogies Type Y25Ls, Ø 920mm, gauge 1435 mm, axle load 22,5 t	460	1993-1994
14	Belgium	Wheels Ø 950 mm	20	2008
15	Belgium	Axles	10	2008
16	Belgium - Cameroons	Wheels Ø 660, Ø 710, Ø 750, Ø 760, Ø 800, Ø 850, Ø 880, Ø 950, Ø1016 mm	8713	2000-2009

No.	Country	Product	Quantity Delivered	Period of Delivery
17	Belgium-Gabon	Wheels Ø 840, Ø 890, Ø 920 mm	180	2000
18	Belgium-Ivory Coast	Wheels Ø 750, Ø 800, Ø 925, Ø 950 mm	436	2005-2008
19	Belgium-Madagascar	Wheels Ø 956 mm	48	2003-2006
20	Belgium-Morocco	Wheels Ø 1010 mm	50	2002
21	Belgium-Portugal	Wheels Ø 956 mm	8	2003
22	Belgium-Cameroons	Axles for coaches/wagons/locomotives	1238	2002-2009
23	Belgium-Ivory Coast	Axles	41	2007
24	Belgium-Morocco	Axles	5	2002
25	Belgium	Base plates for rails	3005	2002
26	Brazil	Bogies Type Ride Control, Ø 838 mm	4900	1976-1977
27	Brazil	Wheelsets Ø 743, Ø 838, Ø 914 mm	14606	1975-1989
28	Brazil	Wheels Ø 838 mm	200	1997
29	Bulgaria	Wheelsets Ø 650, Ø 920, Ø 1000 mm	43776	1972-2003
30	Bulgaria	Tyres Ø 730, Ø 860 mm	376	1997
31	Canada	Axles for locomotives	84	2002-2003
32	Chile	Wheels Ø 610 mm	60	1996
33	China	Bogies Type Ride Control, Ø 920 mm, gauge 1435 mm, axle load 20 t	2412	1974-1989
34	China	Wheelsets Ø 920, Ø 950 mm	9416	1972-1989
35	Cuba	Bogies Type Ride Control, Ø 838 mm, gauge 1435 mm, axle load 20 t	1108	1983-1990
36	Cuba	Wheelsets Ø 838 mm, gauge 1435 mm	476	1981-1986
37	Cuba	Wheels Ø 838 mm	915	1984
38	Cuba	Axles	3040	1981-1982
39	Czechoslovakia-Former	Bogies Type Y25Ls, Ø 920mm, gauge 1435 mm, axle load 22,5 t	4076	1977-1985
40	Czech Republic	Wheelsets Ø 920 mm, gauge 1435 mm, with axle boxes	200	2000-2001
41	France	Wheelsets Ø 380, Ø 450, Ø 750, Ø 760, Ø 800, Ø 850, Ø 950 mm	364	2000-2009
42	France	Wheels Ø 380, Ø 840, Ø 850, Ø 860, Ø 950 mm	1370	1999-2007
43	France - Senegal	Wheels Ø 800 mm	748	2004-2009
44	France	Axles for track cars	60	1999
45	France	Axles for locomotives	43	2001-2005



No.	Country	Product	Quantity Delivered	Period of Delivery
46	France-Senegal	Axles for wagons	383	2004-2009
47	France	Axle boxes	32	2004
48	Gabon	Axles	10	2000
49	Germany	Bogies Type DR3-3 axles, Type Y25Ls	10837	1976-2004
50	Germany	Wheelsets Ø 650, Ø 920, Ø 1000 mm	9100	1972-2007
51	Greece	Bogies Type Y25Ls, Ø 920mm, gauge 1435 mm, axle load 20/22,5 t	180	1984
52	Greece	Wheelsets Ø 920 mm, gauge 1435 mm	1087	1979-2003
53	Greece	Wheels Ø 840, Ø 850, Ø 858, Ø 860, Ø 920, Ø 928, Ø 960, Ø 1016, Ø 1100 mm	6256	1994-2009
54	Greece	Tyres Ø 845, Ø 865, Ø 921, Ø 925, Ø 1005 mm	1550	1997-2005
55	Holland	Bogies Type Y25Ls, Ø 920 mm, gauge 1435 mm, axle load 22,5 t	910	1982-1990
56	Hungary	Bogies Type Ride Control Ø 950 mm, Type Y25Ls Ø 920 mm	22674	1975-2006
57	Hungary	Frames for bogies Y25Ls	300	2003-2004
58	Hungary	Wheelsets Ø 1000 mm, gauge 1435 mm	406	1986
59	Hungary	Wheels Ø 360, Ø 850 mm	64	2001-2003
60	Hungary	Tyres Ø 845, Ø 1058 mm	64	2001-2003
61	Hungary	Upper King-Pin Bearing	250	2000-2001
62	India	Wheelsets Ø 724, Ø 780, Ø 800, Ø 840, Ø 851, Ø 915, Ø 920, Ø 1000, Ø 1090 mm	90439	1972-2008
63	India	Wheels Ø 705, Ø 838, Ø 854, Ø 915, Ø 920, Ø 970, Ø 1000, Ø 1092, Ø 1098, Ø 1100, Ø 1145 mm	110107	1972-2006
64	India	Wheel centres Ø 806 mm for coaches	14833	1994-1998
65	India	Axles for plain bearings	6883	1972-1984
66	Indonesia	Bogies Type Ride Control, Ø 774 mm, gauge 1067 mm, axle load 15 t	712	1984-1985
67	Indonesia	Wheelsets Ø 700, Ø 774 mm	6870	1983-2007
68	Indonesia	Wheelsets Ø 1092 mm, gauge 1676 mm	222	2006
69	Indonesia	Wheels Ø 780, Ø 857, Ø 866, Ø 910, Ø 920, Ø 1020 mm	17500	1997-2006
70	Indonesia	Tyres Ø 780, Ø 920, Ø 1020 mm	1360	1993-2001
71	Indonesia	Axles	470	2000-2006

No.	Country	Product	Quantity Delivered	Period of Delivery
72	Iran	Wheelsets Ø 920 mm, Ø 1000 MM, gauge 1435 mm	1357	2007-2009
73	Iran	Wheels Ø 840, Ø 920, Ø 1100 mm	3365	1988-2009
74	Iraq	Bogies Type DR3-3 axles, Ø 920mm, gauge 1435 mm	153	1981-1982
75	Iraq	Wheelsets Ø 920 mm, gauge 1435 mm	53	1980
76	Israel	Wheels Ø 920, Ø 960, Ø 1000, Ø 1016 mm	1700	1994-1998
77	Italy	Wheelsets Ø 920 mm, gauge 1435 mm	224	1979
78	Jordan	Wheels Ø 710, Ø 863, Ø 914 mm	7026	1994-2006
79	Jordan	Axles for locomotives	24	2004-2006
80	Kazakhstan	Wheelsets Ø 950 mm, gauge 1520 mm, with axle boxes	1000	1996
81	Macedonia	Bogies Type Y25Ls, Ø 920mm, gauge 1435 mm, axle load 22,5 t	10	1995
82	Macedonia	Wheels Ø 1050 mm for electrotrains	200	1995
83	Malaysia	Wheels Ø 724, Ø 850, Ø 851, Ø 965 mm	2328	2000-2003
84	Malaysia	Axles	310	1998-2003
85	Mozambique	Wheelsets Ø 838 mm, gauge 1067 mm	268	1979-1980
86	Norway	Bogies Type Y25Ls, Ø 920mm, gauge 1435 mm	30	1981
87	Pakistan	Wheels Ø 840, Ø 864, Ø 1016, Ø 1092 mm	12679	1996-2004
88	Peru	Wheelsets Ø 838, Ø 920 mm, gauge 1435 mm	364	1974-1982
89	Peru	Wheels Ø 851, Ø 914,4 mm	68	2006-2007
90	Peru	Axles for locomotives	6	2006
91	Poland	Bogies Type Y25Ls, Ø 920mm, gauge 1435 mm, axle load 20 t	9655	1975-1988
92	Poland	Wheelsets Ø 920, Ø1000 mm, gauge 1435 mm	22931	1973-1980
93	Poland	Wheels Ø 920 mm for bogies with variable gauge	20	1993
94	Portugal	Wheels Ø 850, Ø 920, Ø 1000, Ø 1016, Ø 1100 mm	5756	1982-1999
95	Portugal	Axles	15	1982
96	Russia	Frames for bogies Type Diamond	882	2001
97	Russia	Wheels Ø 957 mm	1724	2004-2005

No.	Country	Product	Quantity Delivered	Period of Delivery
98	Saudi Arabia	Wheels Ø 838, Ø 914, Ø 920, Ø 1016 mm	13360	1995-2009
99	Saudi Arabia	Axles	150	2001
100	Serbia	Wheelsets Ø 920 mm	122	2009
101	Serbia	Wheels Ø 920 mm	6	2009
102	Singapore	Wheels Ø 710, Ø 730, Ø 850 mm	88	1994
103	Slovakia	Wheelsets Ø 920 mm, gauge 1435 mm	400	2001
104	Slovakia	Wheels Ø 920 mm	50	2001
105	Slovakia - Cuba	Wheels Ø 1066,8 mm	592	2003-2008
106	South Africa	Axles	12	1995
107	South Korea	Wheelsets Ø 724, Ø 860 mm	164	2001-2004
108	South Korea	Axles	80	2000
109	Sry Lanka	Wheelsets Ø 920 mm, gauge 1000 mm	2088	1976-1981
110	Sry Lanka	Wheels Ø 914, Ø 1092 mm	262	1985-2001
111	Sudan	Tyres Ø 883 mm	4000	2002
112	Sudan	Axles	250	2005
113	Switzerland	Bogies Type Y25Ls, Ø 920mm, gauge 1435 mm, axle load 22,5 t	80	1993-1994
114	Syria	Bogies Type Y25Ls, Ø 920mm, gauge 1435 mm	160	1978
115	Syria	Wheelsets Ø 920 mm, gauge 1435 mm	508	1977-1989
116	Thailand	Axles	100	2000
117	Turkey	Bogies Type Y25Ls, Ø 920mm, gauge 1435 mm, axle load 22,5 t	316	2004-2007
118	Turkey	Wheelsets Ø 850, Ø 920, Ø 1000, Ø 1100 mm	70400	1982-2008
119	Turkey	Wheels Ø 352, Ø 406, Ø 680, Ø 710, Ø 750, Ø 850, Ø 920, Ø 1000, Ø 1016, Ø 1050, Ø 1100, Ø 1220 mm	77570	1993-2008
120	Ukraine	Wheels Ø 957 mm	13640	2004-2005
121	United Kingdom	Wheelsets Ø 920 mm, gauge 1435 mm	100	2004
122	United Kingdom	Wheels Ø 813, Ø 920 mm	830	2003-2005
123	United Kingdom	Axles	215	2001-2005
124	United Kingdom	Axle boxes	200	2004
125	USA	Wheelsets Ø 838 mm, gauge 1435 mm	24	1995
126	USA	Wheels Ø 1092 mm, for locomotives	145	2002

No.	Country	Product	Quantity Delivered	Period of Delivery
127	Iran	Bogies Type Diamond, Ø 950 mm, gauge 1520 mm, axle load 23 t	132000	1972-1991
128	USSR - Former	Wheelsets Ø 650 mm, gauge 1520 mm	402	1989
129	Vietnam	Bogies Type Diamond, Ø 838 mm	2154	1978-1980
130	Vietnam	Wheelsets Ø 838 mm, gauge 1000 mm	1345	1978-1980
131	Yugoslavia - Former	Wheelsets Ø 724 mm, gauge 1000 mm	2086	1997-1998
132	Yugoslavia - Former	Wheels Ø 920, Ø 923 mm	10029	1993-1996
133	Yugoslavia - Former	Tyres Ø 1005, Ø 1255 mm	1715	1994-1996
134	Yugoslavia - Former	Axles	80	1996
135	Zimbabwe	Axles	702	2000-2001



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