

sij

Electrical steels
SIWATT





SIJ is a vertically integrated holding company, the leading steel manufacturer in Slovenia, and one of the largest stainless and special steel manufacturers in Europe. SIJ Group consists of the two largest steel companies in Slovenia (SIJ Acroni and SIJ Metal Ravne), other manufacturing and processing companies (SIJ Ravne Systems, SIJ Elektrode, SIJ SUZ), specialized service and sales centers across Europe and the USA, and companies for scrap steel collection and sales.

www.sij.si



INCREASE YOUR PRODUCT'S LIFE SPAN

The highest steel quality, based on world class production equipment and more than 400 years of experience in steel making



DECREASE MACHINING COSTS

Narrow dimensional tolerances, exceeding international standards



OPTIMIZE YOUR MANUFACTURING PROCESSES

Extensive range of mechanical treatment possibilities to find the best fit for your production process



EXCEED YOUR CUSTOMERS' EXPECTATIONS

Strong in-house R&D Department and broad applied knowledge helps you get the best solutions for your customers' needs

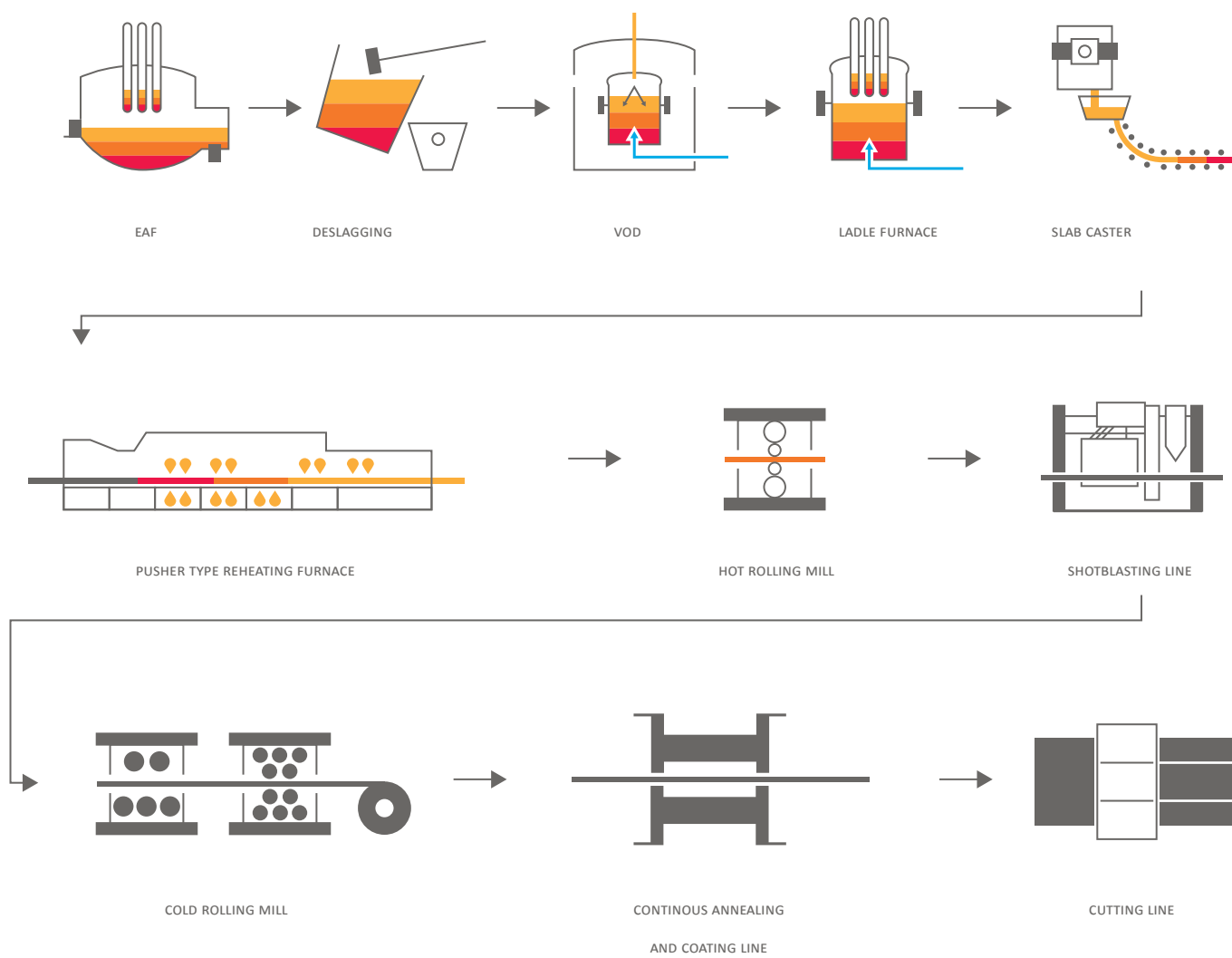
Acroni is the largest slovenian steel manufacturer, which in order to produce steel recycles scrap in an electric arc furnace, casts it on continuous caster and rolls it into quality flat rolled steel products.

The company is specialised for the production of flat steel products and belongs among most important european suppliers of electrical steel. Besides non – oriented electrical steel, Acroni produces also stainless and carbon steel.

Constant development, improvement of processes and materials along with the introduction of a quality assurance system in accordance with ISO 9001, environmental management systems in accordance with ISO 14001 and occupational health and safety management systems in accordance with OHSAS 18001, are our guarantee for a constant quality level.

Our experts are always prepared to offer customers their assistance so that the excellent properties of our steels may be exploited to their full advantage and the satisfaction of the customer.

PRODUCTION PROCESS SILICON STEEL



The SIWATT logo is displayed in white text on a green square background. The word "SIWATT" is in a bold, sans-serif font, followed by three small white dots.The SIWATT logo is displayed in large, bold, sans-serif font. The word "SIWATT" is in green, and the three dots are in black.

SIWATT – NON ORIENTED FULLY PROCESSED ELECTRICAL STEELS

Electrical steels have special physical properties which make them suitable for application in the manufacture of electric equipments and appliances with rotating magnetic fields. The utilisation of fully processed steels is also widespread for construction of electrical static devices. Without electrical steels the production, transformation and utilisation of electrical energy would not be practical and would prove uneconomic.

WE PRODUCE TWO MAIN TYPES OF ELECTRICAL STEELS:

- cold rolled-fully processed electrical steels
- cold rolled-semi processed electrical steels



TRUSTED BY THE BEST



R. Bourgeois

»Acroni is a historical partner in the silicon steel industry like the R.BOURGEOIS group ... and naturally we have been cooperating together for many years, especially for the demanding requirements of our industry, where we can find a common understanding with the mill and its teams.”



Domel

»Acroni is a reliable business partner, that enables with its adaptability and responsiveness adequate fulfillment of Domel requirements.”



ROTATING MACHINES

- Large rotating machines (2 and 4 poles)
- Large rotating machines (many poles)
- Small generators
- Medium rotating machines
- Hermetic motors
- General duties A.C. electric motors, domestic appliance motors
- Small D.C. intermittent motors, compressor motors

STATIC MACHINES

- Audio transformers
- Saturable reactors and magnetic amplifiers
- Voltage regulator transformers, distribution transformers
- Power transformers
- Current transformers
- Welding transformers
- Fluorescent lamp ballasts
- Magnetic switches
- Pole pieces and relay cores

COLD ROLLED FULLY-PROCESSED ELECTRICAL STEELS

Cold rolled fully-processed electrical steels may be delivered without insulation or insulated on both sides with insulation in order to achieve desired properties for various fields of application (higher surface insulation resistance, improvement of punchability and corrosion resistance, annealing).

FULLY-PROCESSED ELECTRICAL STEELS – DINAMO
(GUARANTEED VALUES)

	Grade	Nominal	Specific total loss 1), 4)		Magnetic polarisation (min.)			Stacking	Density
SIJ grade	EN 10106	thickness	(max.)		for field strength 2),4 (A/m)			factor	(assumed)
		(mm)						(min.)	(kg/dm3)
			at 1.5T	at 1.0T3)	2500 (T)	5000 (T)	10000 (T)		
			(W/kg)	(W/kg)					
SIWATT M270-35A	M270-35A	0,35	2,7	1,10	1,49	1,60	1,70	0,95	7,65
SIWATT M300-35A	M300-35A		3,0	1,20	1,49	1,60	1,70		7,65
SIWATT M330-35A	M330-35A		3,3	1,30	1,49	1,60	1,70		7,65
SIWATT M310-50A	M310-50A	0,50	3,1	1,25	1,49	1,60	1,70	0,97	7,65
SIWATT M330-50A	M330-50A		3,3	1,35	1,49	1,60	1,70		7,65
SIWATT M350-50A	M350-50A		3,5	1,50	1,50	1,60	1,70		7,65
SIWATT M400-50A	M400-50A		4,0	1,70	1,53	1,63	1,73		7,70
SIWATT M470-50A	M470-50A		4,7	2,00	1,54	1,64	1,74		7,70
SIWATT M530-50A	M530-50A		5,3	2,30	1,56	1,65	1,75		7,70
SIWATT M600-50A	M600-50A		6,0	2,60	1,57	1,66	1,76		7,75
SIWATT M700-50A	M700-50A	0,65	7,0	3,00	1,60	1,69	1,77	0,97	7,80
SIWATT M800-50A	M800-50A		8,0	3,60	1,60	1,70	1,78		7,80
SIWATT M350-65A	M350-65A		3,5	1,50	1,49	1,60	1,70		7,60
SIWATT M400-65A	M400-65A		4,0	1,70	1,52	1,62	1,72		7,65
SIWATT M470-65A	M470-65A		4,7	2,00	1,53	1,63	1,73		7,65
SIWATT M530-65A	M530-65A		5,3	2,30	1,54	1,64	1,74		7,70
SIWATT M600-65A	M600-65A		6,0	2,60	1,56	1,66	1,76		7,75
SIWATT M700-65A	M700-65A	0,97	7,0	3,00	1,57	1,67	1,76	0,97	7,75
SIWATT M800-65A	M800-65A		8,0	3,60	1,60	1,70	1,78		7,80

1) In accordance with IEC 60404-8-4 and EN 10106, the values are specified and guaranteed for magnetic polarisation at 1.5 T unless otherwise agreed

2) In accordance with IEC 60404-8-4 and EN 10106, the values are specified and guaranteed for field strength at 2500 A/m, 5000 A/m and 10000 A/m unless otherwise agreed

3) These are only informative values

4) Valid for testing in A. C. field in the 25 cm Epstein frame according to IEC 60404-2

FULLY-PROCESSED HIGH PERMEABILITY ELECTRICAL STEELS
(GUARANTEED VALUES)

SIJ grade	Grade	Nominal thickness (mm)	Specific total loss 1) (max.)	Magnetic polarisation (min.) for field strength 2) (A/m)			
			at 1.5T (W/kg)	at 1.0T1) (W/kg)	2500 (T)	5000 (T)	10000 (T)
SIWATT M330-35A-HP	M330-35A-HP	0,35	3,30	1,30	1,55	1,64	1,76
SIWATT M400-50A-HP	M400-50A-HP		4,00	1,70	1,61	1,70	1,70
SIWATT M530-50A-HP	M530-50A-HP		5,30	2,30	1,63	1,72	1,70
SIWATT M600-50A-HP	M600-50A-HP	0,65	6,00	2,60	1,64	1,73	
SIWATT M700-50A-HP	M700-50A-HP		7,00	3,00	1,67	1,76	1,70
SIWATT M470-65A-HP	M470-65A-HP		4,70	2,00	1,58	1,67	1,79
SIWATT M600-65A-HP	M600-65A-HP		6,00	2,60	1,62	1,71	1,82
SIWATT M700-65A-HP	M700-65A-HP		7,00	3,00	1,65	1,73	1,84
SIWATT M800-65A-HP	M800-65A-HP		8,00	3,60	1,67	1,76	1,87

1) These are only informative values

2) Valid for testing in A. C. field in the 25 cm Epstein frame according to IEC 60404-2

ELECTRICAL STEEL FOR MEDIUM AND HIGHER FREQUENCY STRIP

SIJ grade	Grade	Nominal thickness (mm)	Specific total loss 1) (max.)	Magnetic polarisation at 50 Hz (A/m)			
			at 1.0T (W/kg)	Frequency (Hz)	2500 (T)	5000 (T)	10000 (T)
SIWATT NO 20	NO 20	0,20	15	400	1,48	1,59	1,69

INSULATION COATINGS ON FULLY PROCESSED ELECTRICAL STEELS

AISI Designation ASTM A976	C – 6	C – 3	C-5
THERMAL CLASS (IEC 60085)	H	H	H
THICKNESS OF LAYER ON EACH SIDE (µm) (ISO 2178)	1 to 6	0,5 to 3	1,5 to 3
COMPOSITION	ORGANIC WITH FILLERS	ORGANIC WITHOUT FILLERS	ORGANIC/INORGANIC WITH FILLERS
SURFACE INSULATION RESISTANCE 1) (Ohm cm2) (ASTM A717)	40 to 500	up to 15	1 to 70
HEAT RESISTANCE	180°C 2)	180°C 2)	180°C 2) / 850°C 3)
INFLUENCE ON PUNCHABILITY	FAVOURABLE	VERY FAVOURABLE	VERY FAVOURABLE
INFLUENCE ON WELDABILITY	CONDITIONAL	CONDITIONAL	GOOD
RESISTANCE TO MEDIUM 4)	GOOD	GOOD	GOOD
COLOUR 5)	LIGHT GREY TO DARK GREY	YELLOW	LIGHT GREY TO GREEN

- 1) Surface insulation resistance depends on coating thickness
- 2) In air long time (testing for 20000 hours at a given temperature in accordance with IEC 60085)
- 3) In protective gas atmosphere (as stress-relief annealing)
- 4) It relates to the resistance to the most of lubricants, refrigerating mediums and oils. The varnish producer tests the resistance to the specific medium only after the customer’s requirement
- 5) Colour shades depend on the coating thickness and type of varnish applied

COMPARISON OF GRADE DESIGNATIONS

SIJ GRADE	EN 10106 (2007)	IEC 60404-8-4 (1998)	AISI*	JIS C 2552 (2000)	GOST* 21 427 0-75
SIWATT M270-35A	M270-35A	M270-35A 5	M 19	35A270	2412
SIWATT M300-35A	M300-35A	M300-35A 5	M 22	35A300	2411
SIWATT M330-35A	M330-35A	M330-35A 5	M 36	--	--
SIWATT M330-50A	M330-50A	M330-50A 5	M 27	--	--
SIWATT M350-50A	M350-50A	M350-50A 5	M 36	50A350	2411
SIWATT M400-50A	M400-50A	M400-50A 5	M 43	50A400	2312
SIWATT M470-50A	M470-50A	M470-50A 5	--	50A470	2311
SIWATT M530-50A	M530-50A	M530-50A 5	M 45	--	2212
SIWATT M600-50A	M600-50A	M600-50A 5	--	50A600	2112
SIWATT M700-50A	M700-50A	M700-50A 5	M 47	50A700	--
SIWATT M800-50A	M800-50A	M800-50A 5	--	50A800	2111
SIWATT M400-65A	M400-65A	M400-65A 5	M 27	--	--
SIWATT M470-65A	M470-65A	M470-65A 5	M 43	--	--
SIWATT M530-65A	M530-65A	M530-65A 5	--	--	2312
SIWATT M600-65A	M600-65A	M600-65A 5	M 45	--	2212
SIWATT M700-65A	M700-65A	M700-65A 5	--	--	2211
SIWATT M800-65A	M800-65A	M800-65A 5	--	65A800	2112

*approximate comparable

GENERAL INFORMATION

STRIPS

Width of coil	30 to 100 mm
Inside nominal diameter	508mm (20’')
Outside nominal diameter	1300 mm(max)

DIMENSIONS AND WEIGHTS

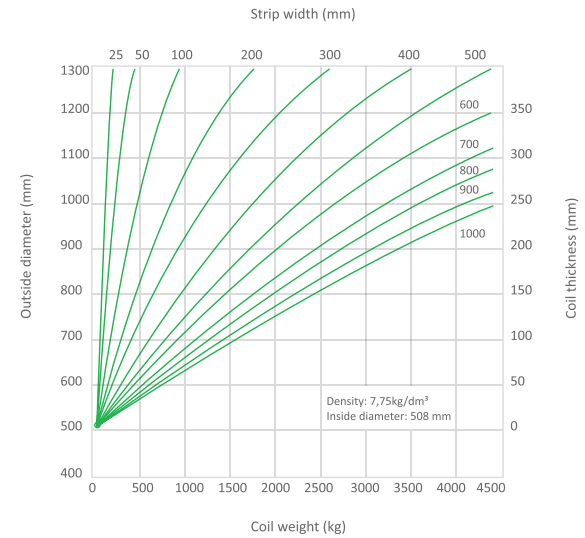
Coil weight (kg/mm of width)		Outside diameter (mm)
Entire coil	6 to 8,6	1100 to 1300
1/2 coil	3 to 4,5	870 to 1000
1/3 coil	2 to 2,9	770 to 850

DIMENSIONS AND WEIGHTS

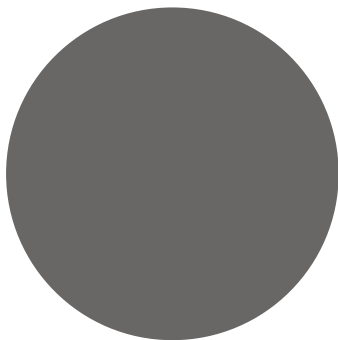
TOLERANCES ON NOMINAL WIDTH		TOLERANCES ON NOMINAL THICKNESS	
Nominal width “w” (mm)	Tolerance (mm)	Nominal thickness (mm)	Tolerance (mm)
w ≤ 150	0 to +0,2	0,35	±0,03 ±8
150 < w ≤ 300	0 to +0,3	0,50	±0,04 ±8
300 < w ≤ 600	0 to +0,5	0,65	±0,04 ±6
600 < w ≤ 1000	0 to +1,0	1,00	±0,06 ±6

SHEETS

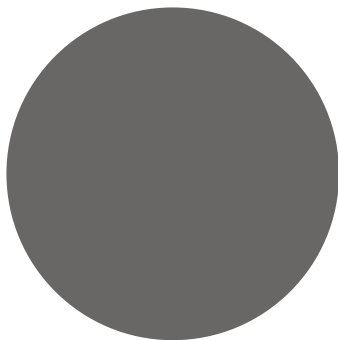
Cut lengths	600 to 6000 mm
Cut length tolerances	0 to + 0,5%
Widths of sheets	420 to 1000 mm
Package weights	1000 to 2500 kg
Dimensional and geometrical tolerances are in accordance with standards	EN 10106, EN 10341



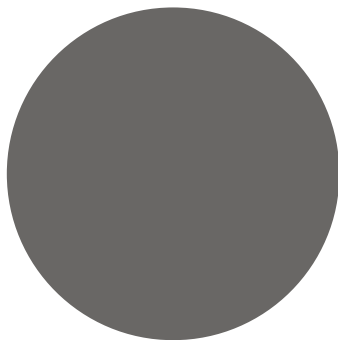
Our work is never truly done; we are a part of an endless process. This is symbolised by the three dots in our corporate logo, and the logos of each SIJ Group product and service brand. Three dots equals three values. Each one stands firmly on its own, and they all stand together, forever. As a sign of trust and quality, they symbolise our three main values, which define who and what we are.



CUSTOMISATION.



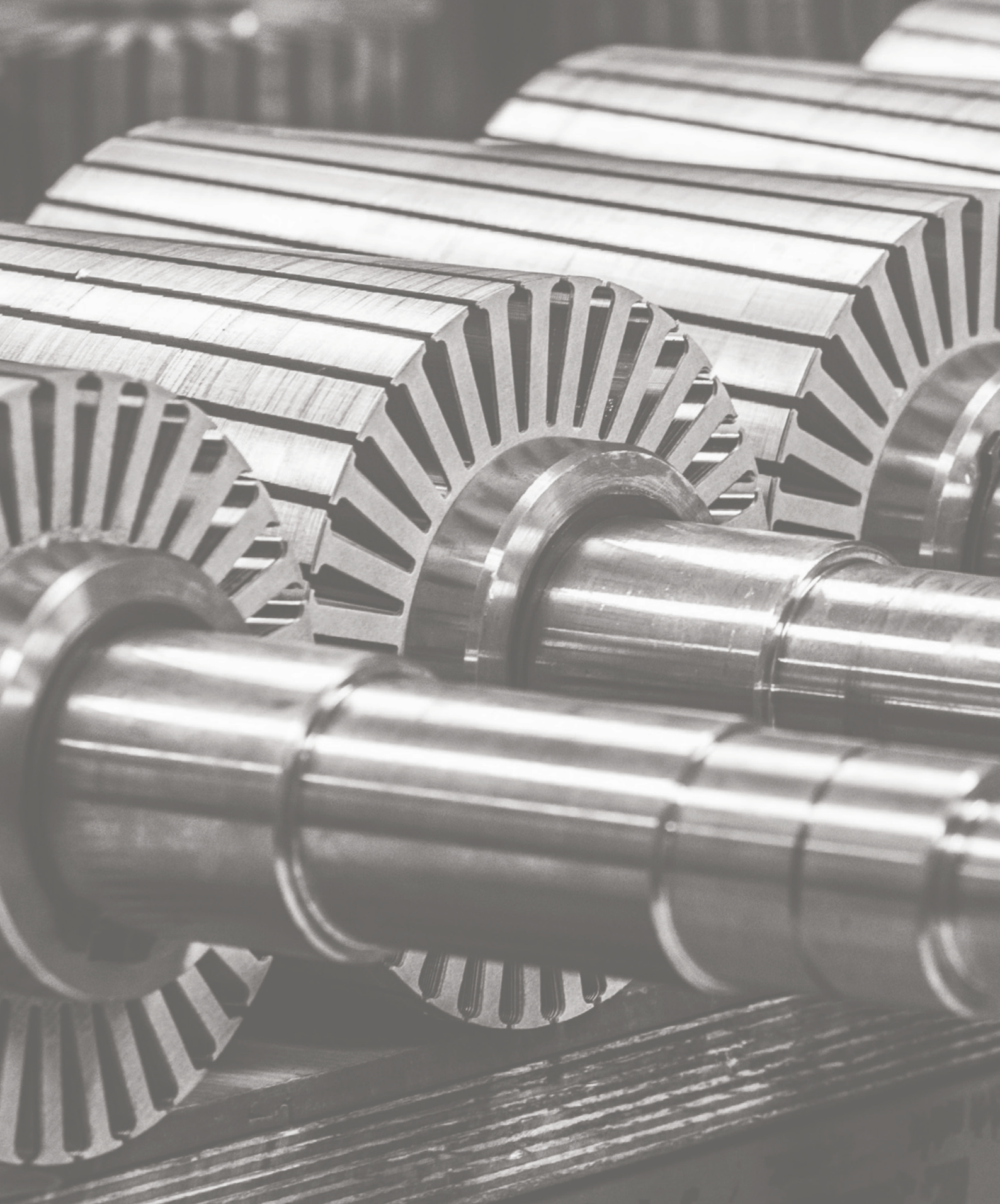
STRIVING.



PROVEN.



**BEST THINGS IN THE WORLD
CONTAIN SLOVENIAN STEEL**



SIJ Group

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