



NF Wire Forum



Sustainability in mechanical engineering and energy-efficient machines for the wire and cable industry

Stephan Gorgels

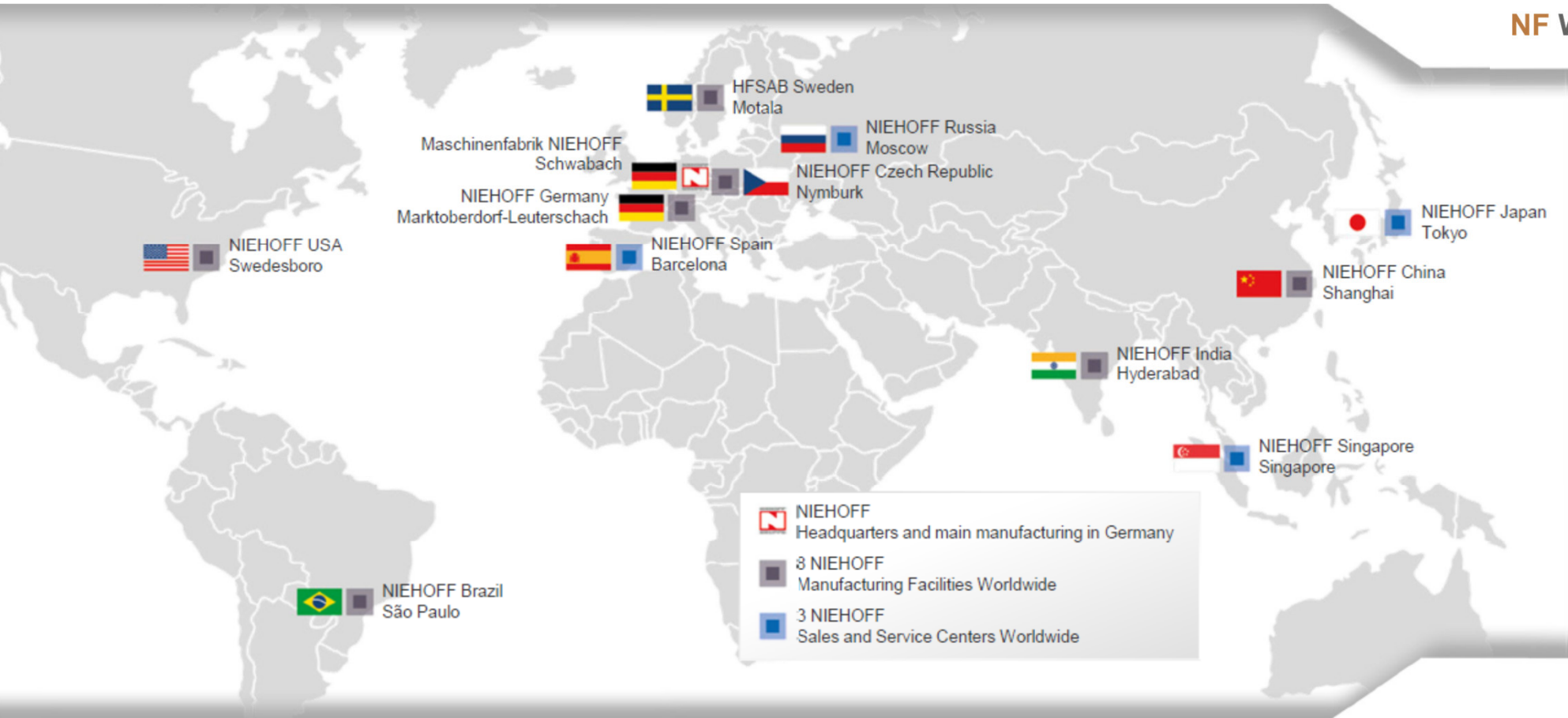
Maschinenfabrik NIEHOFF GmbH & Co. KG, Germany



Locations Worldwide



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Core Products



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1,394

Rod Breakdown Lines



2,498

Multiwire Drawing Lines



7,482

Bunchers



2,750

Braiders



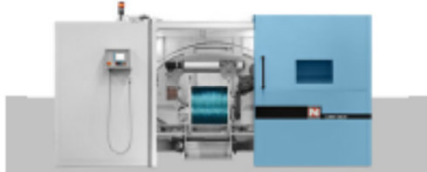
853

NPS Cable Spoolers



268

Stranding Lines



173

Galvanic Plating Lines



174

Inductive Annealers



Sustainable Manufacturing of NIEHOFF Machinery



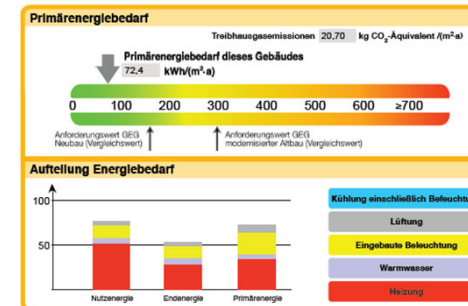
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- **Geothermal cooling and heating system:** 162 earth probes in a depth of 85 m combined with heat pumps.
- Niehoff energy requirements are covered from **renewable sources** by 100%.
- 60 – 70 % of the heat energy required in the Niehoff paint shop is saved by **recovering heat from exhaust air**.
- With 190 kWh/m²a, the **primary energy requirement** undercuts the standard value (347 kWh/m²a set by the German Energy Saving Ordinance EnEV 2009) significantly by 45%.

ENERGIEAUSWEIS für Nichtwohngebäude

gemäß den §§ 79 ff. Gebäudeenergiegesetz (GEG) vom 1.08.2020

Gültig bis:	08.12.2032	Registrierungsnummer:	BY-2022-004340402	Ausgang
Gebäude				
Bestimmung / Gebäudekategorie	40-Gewerbliche und industrielle Gebäude (allgemein)			
Adresse	Walter-Niehoff-Straße 2(BA 1+2), 91126 Schwabach			
Gebäudeart	Teil des Nichtwohngebäudes			
Baujahr Gebäude	2009-2012			
Nutzungsfläche	25342			
Wesentliche Energieträger für Heizung	Strom-Mix, Erdgas, Nah-/Fernwärme HW erneuerbar			
Wesentliche Energieträger für Warmwasser	Strom-Mix, Nah-/Fernwärme HW erneuerbar			
Art der Lüftung	<input checked="" type="checkbox"/> Fensterlüftung <input type="checkbox"/> Schiebelüftung <input type="checkbox"/> Lüftungseinheit mit Wärmerückgewinnung <input type="checkbox"/> Lüftungseinheit ohne Wärmerückgewinnung			
Art der Kühlung	<input type="checkbox"/> Passive Kühlung <input type="checkbox"/> Kühlung aus Strom <input type="checkbox"/> Kälte aus Wärme			
Erneuerbare Energien	<input checked="" type="checkbox"/> Umwandlung <input type="checkbox"/> Umwandlung (Sole/Wasser WP) Heizung			



Bescheinigung über die Stromlieferung aus Wasserkraft

Hiermit bestätigen wir, dass das Unternehmen



Maschinenfabrik Niehoff GmbH & Co. KG
Walter-Niehoff-Str. 2
91126 Schwabach

im Rahmen des Stromlieferungsvertrags LEW Business Natur vom 01.01.2021 bis zum 31.12.2021 mit 100% Ökostrom aus regionalen Wasserkraftwerken beliefert wird.

Die Jahresliefermenge beträgt ca. 3'412'398 kWh.

Die Stromlieferung erfolgt durch die Lechwerke AG - Schaezlerstraße 3 - 86150 Augsburg

Sustainable Manufacturing of NIEHOFF Machinery



Certificates and Awards

- Certified according to ISO 14001



- ECOVADIS award



- BLUE COMPETENCE



- LUFTHANSA Emission Mitigation Certificate



- Environmental award by the State of Bavaria for **close-to-nature building design** and **high biodiversity**



- Certified by the German Environmental Auditors Board **EMAS**

- **Blossom Pact Award Bavaria**



- Certified by the Federal Ministry for Economic Affairs and Climate Action „**Initiative Energy Efficiency and Environmental Protection Network**“



Sustainability in mechanical engineering and energy-efficient machines for the wire and cable industry



Sources for this presentation:

NIEHOFF: Operating instructions and internal documentation

Sustainability in mechanical engineering and energy-efficient machines for the wire and cable industry

Why buy new machines...

...when existing machines are economically depreciated but are still running technically flawlessly?

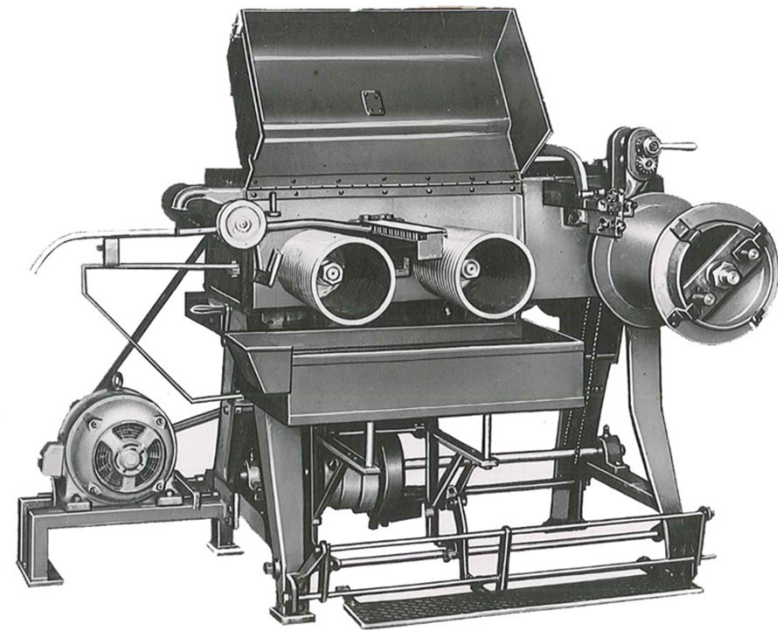


Does technical progress in the wire and cable industry really justify investment in new systems?

Milestones in the development of non-ferrous wire production over the last 60 years

- 1960s – Tandem drawing machines replace cone machines
- 1970s – Invention of inline annealing for non-ferrous wires
- Double spoolers and reels for continuous operation
- Electronic drive technology and control systems
- Process and machine condition monitoring

Has development slowed down or has it even stopped?

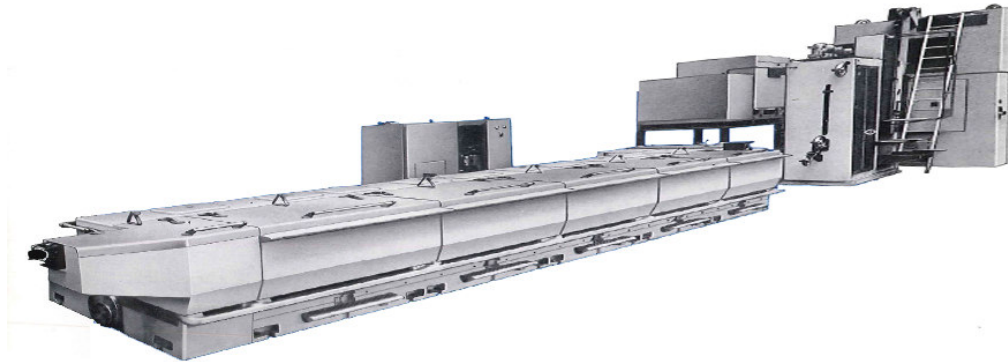


Evolution of RBD machines

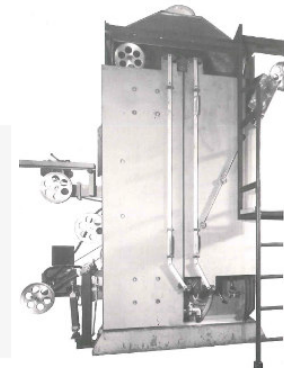
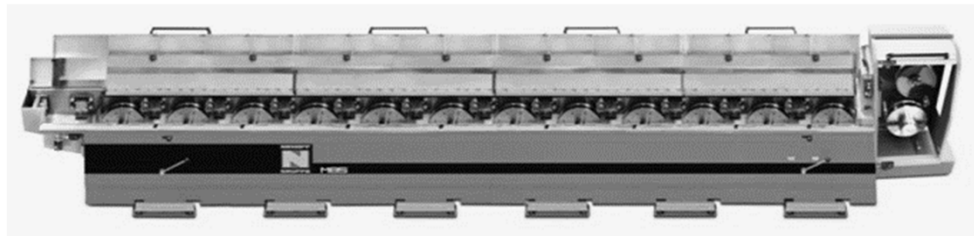


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- **1962:** M85 + VG 85



- **1986:** MM85 + R500



Evolution of RBD machines

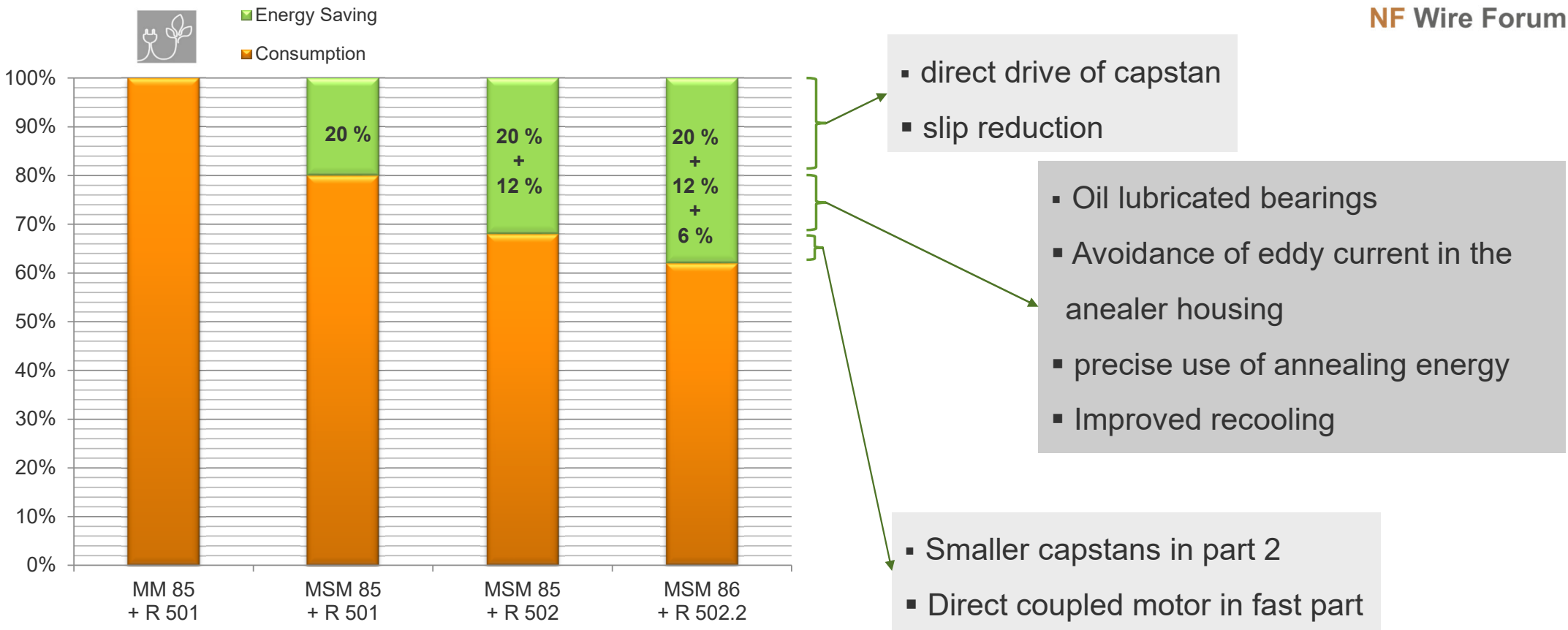
- 1998: MSM85 + R501



- 2018: MSM86 + R502.2



Energy savings with state-of-the-art machinery



Why buy new machines...

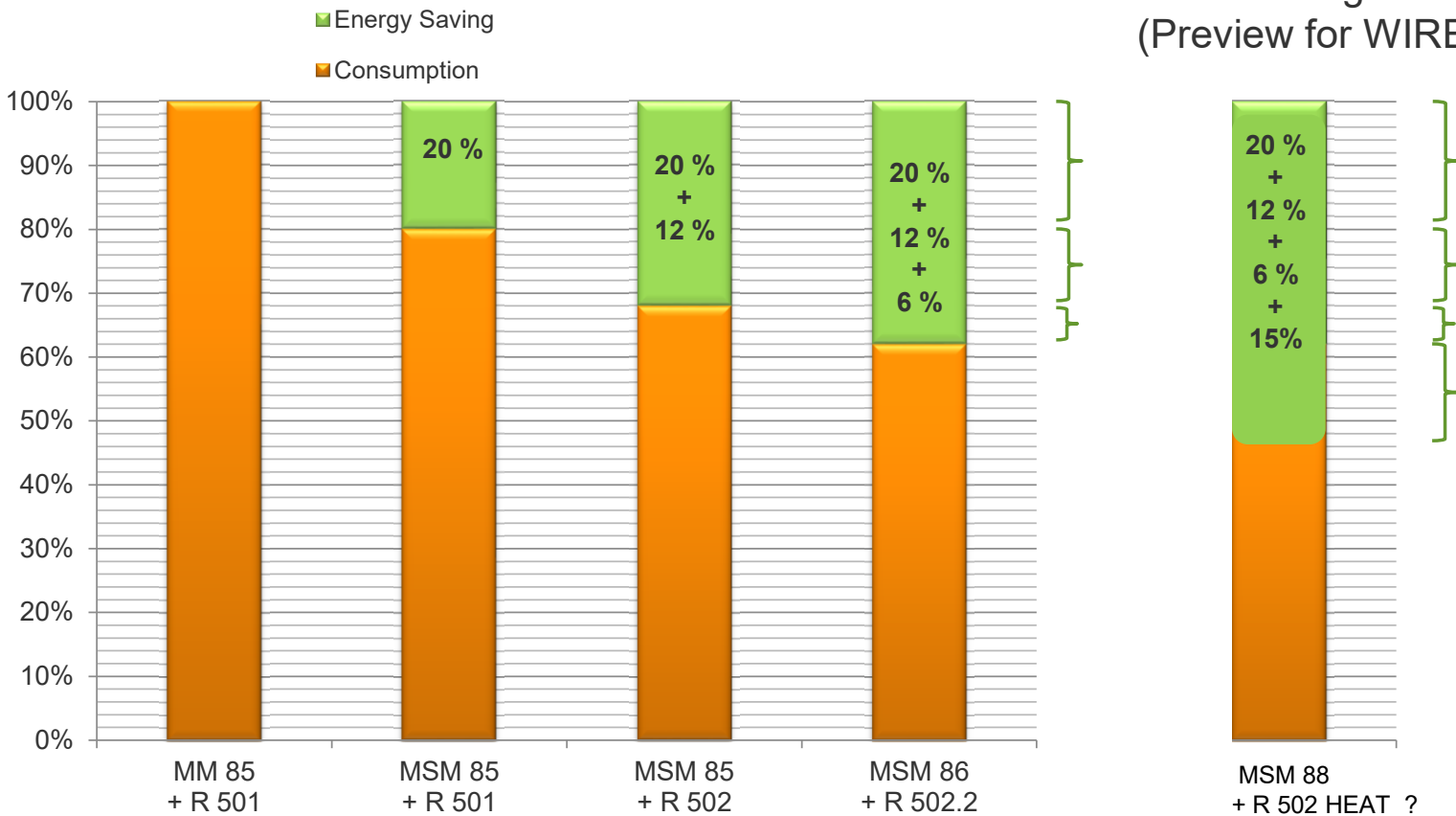
Was that all?



what happens next?

Energy savings with state-of-the-art machinery

Comming soon
(Preview for WIRE 2024)



- Torque Motors
- Annealer in HEAT technology

Sustainability in mechanical engineering and energy-efficient machines for the wire and cable industry



New Generation of RBD Lines – MSM 84 / 88 + R402 / R502

MSM 84 / 88 + R402 / R502 - Drivers for the New Development

- Sustainability: "Green" machine
- Energy savings
- Higher output
- Enhanced reliability / process stability

New Generation of RBD Lines – MSM 84 / 88 + R402 / R502

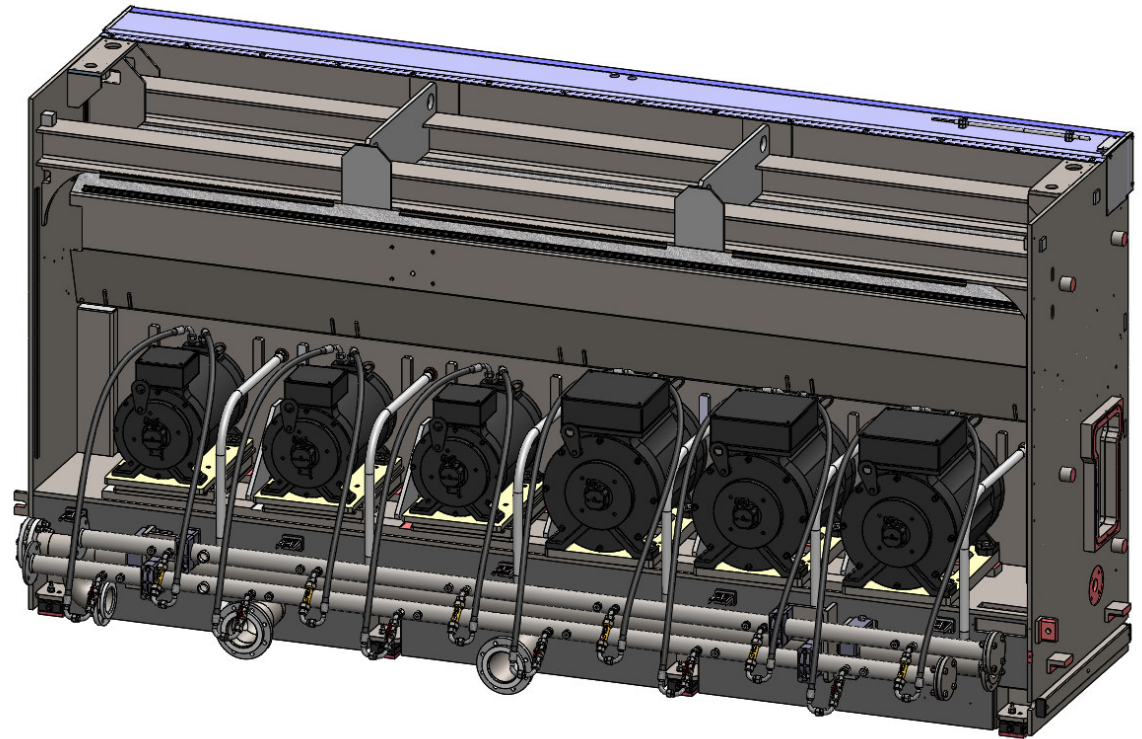


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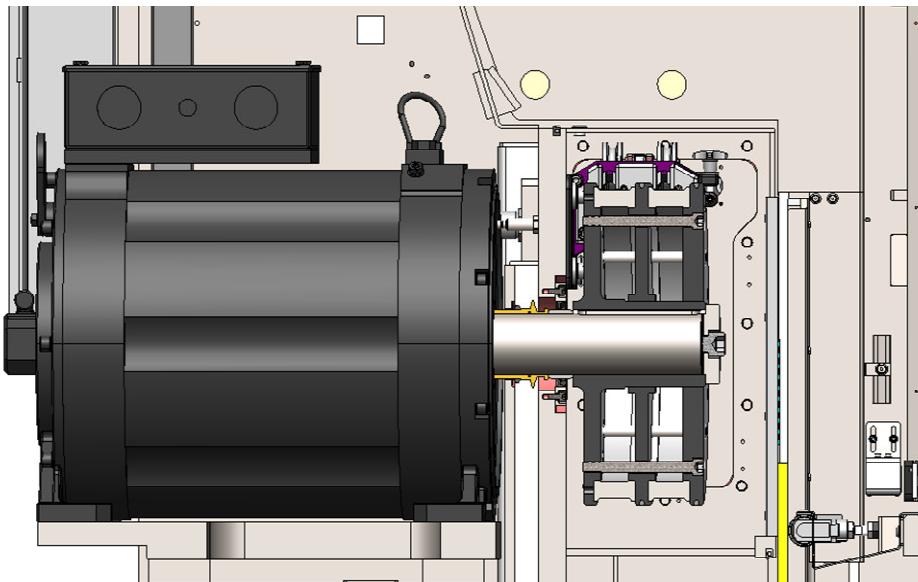
Torque Motors



Torque Motors



Torque Motors



Minimum maintenance costs



Excellent energy savings

- Directly coupled torque motor



Conventional Energy Efficiency

Material			Wire diameter Inlet	Wire diameter Outlet	v [m/s] drawing line	Density		Power Wire drawing	Splashing power drawing machine	Pump power drawing machine
Number of wires			d _{in}	d _{out}	v			P _{Draht}	P _{Planach}	P _{Pump}
			[mm]	[mm]	[m/s]			[kW]	[kW]	[kW]
Row 1	Cu-ETP	2	8,000	1,400	40,0	8,960	3975	335	19,4	8,0
Row 2	Cu-ETP	2	8,000	1,600	40,0	8,960	5188	398	19,4	8,0
Row 3	Cu-ETP	2	8,000	1,800	40,0	8,960	6567	458	19,4	8,0
Row 4	Cu-ETP	2	8,000	2,050	37,5	8,960	7985	519	18,2	8,0
Row 5	Cu-ETP	2	8,000	2,300	30,0	8,960	8041	470	14,4	8,0
Row 6	Cu-ETP	2	8,000	2,600	23,5	8,960	8049	416	11,4	8,0
Row 7	Cu-ETP	2	8,000	3,000	14,5	8,960	6612	292	7,0	8,0
Row 8	Cu-ETP	2	8,000	3,500	7,5	8,960	4655	169	3,6	8,0
Row 9	-	-	-	-	-	-	-	-	-	-
Row 10	-	-	-	-	-	-	-	-	-	-
Row 11	Cu-ETP	2	8,000	1,500	40,0	8,960	4560	371	19,4	8,0
Row 12	Cu-ETP	2	8,000	1,600	40,0	8,960	5188	409	19,4	8,0
Row 13	Cu-ETP	2	8,000	1,800	40,0	8,960	6567	473	19,4	8,0
Row 14	Cu-ETP	2	8,000	2,050	38,0	8,960	8091	525	18,5	8,0
Row 15	Cu-ETP	2	8,000	2,300	31,0	8,960	8309	484	15,1	8,0
Row 16	Cu-ETP	2	8,000	2,600	24,0	8,960	8220	424	11,7	8,0
Row 17	Cu-ETP	2	8,000	3,000	14,5	8,960	6612	291	7,0	8,0
Row 18	Cu-ETP	2	8,000	3,500	7,5	8,960	4655	169	3,6	8,0
Row 19	-	-	-	-	-	-	-	-	-	-
Row 20	Cu-ETP	1	8,000	1,600	40,0	8,960	2594	198	19,4	8,0

52 kWh/t



Energy Efficiency MSM 88 with Torque Motors

Material			Wire diameter Inlet			Density		Power		
Number of wires			Wire diameter Outlet			Mass capacity		Wire drawing		
			v [m/s]					Splashing power drawing machine		
			v					P _{Pump}		
			[mm]			[kg/dm³]		[kW]		
Row 1	Cu-ETP	2	8,000	1,400	40,0	8,960	3975	327	19,4	8,0
Row 2	Cu-ETP	2	8,000	1,600	40,0	8,960	5188	388	19,4	8,0
Row 3	Cu-ETP	2	8,000	1,800	40,0	8,960	6567	446	19,4	8,0
Row 4	Cu-ETP	2	8,000	2,050	37,5	8,960	7985	504	18,2	8,0
Row 5	Cu-ETP	2	8,000	2,300	30,0	8,960	8041	455	14,6	8,0
Row 6	Cu-ETP	2	8,000	2,600	23,5	8,960	8049	401	11,4	8,0
Row 7	Cu-ETP	2	8,000	3,000	14,5	8,960	6612	281	7,0	8,0
Row 8	Cu-ETP	2	8,000	3,500	7,5	8,960	4655	162	3,6	8,0
Row 9	-	-	-	-	-	-	-	-	-	-
Row 10	-	-	-	-	-	-	-	-	-	-
Row 11	Cu-ETP	2	8,000	1,500	40,0	8,960	4560	362	19,4	8,0
Row 12	Cu-ETP	2	8,000	1,600	40,0	8,960	5188	400	19,4	8,0
Row 13	Cu-ETP	2	8,000	1,800	40,0	8,960	6567	461	19,4	8,0
Row 14	Cu-ETP	2	8,000	2,050	38,0	8,960	8091	510	18,5	8,0
Row 15	Cu-ETP	2	8,000	2,300	31,0	8,960	8309	469	15,1	8,0
Row 16	Cu-ETP	2	8,000	2,600	24,0	8,960	8220	409	11,7	8,0
Row 17	Cu-ETP	2	8,000	3,000	14,5	8,960	6612	280	7,0	8,0
Row 18	Cu-ETP	2	8,000	3,500	7,5	8,960	4655	162	3,6	8,0
Row 19	-	-	-	-	-	-	-	-	-	-
Row 20	Cu-ETP	1	8,000	1,600	40,0	8,960	2594	194	19,4	8,0

50 kWh/t

High Efficiency Annealing Technology – HEAT – R502.H



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HEAT

High Efficiency Annealing Technology

There is still a lot of potential in the Annealer!



High Efficiency Annealing Technology – HEAT – R502.H

HEAT



More information will be given at the “WIRE 2024” in Düsseldorf



Customer Benefits – MSM88 + R502.H + 2 Spoolers

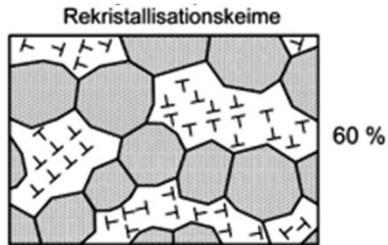
Production Example: 2 x AWG10 with 4,724 ft/min

- 102 kWh/t instead of 119 kWh/t $\Rightarrow \Delta = 17 \text{ kWh/t}$
 - Capacity: 8 to/h
 - Production time 6,500 h/a, OEE 85% \rightarrow 44,000 t/a
 - Energy costs 0.20 €/kWh
- 150,000 € less energy costs / year or
- **748,000 kWh savings / year equal to 300 t of CO₂ savings / year**



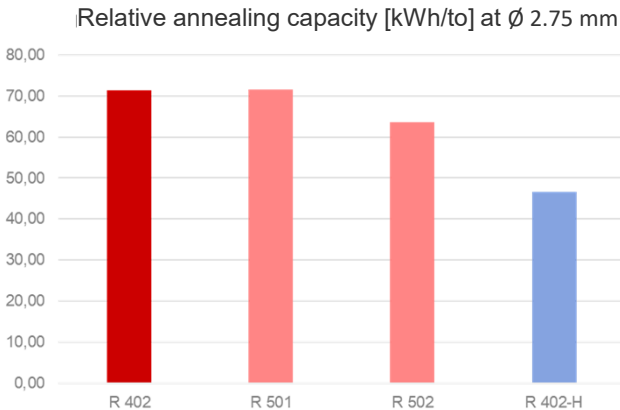
Annealing – USP / R502.H

Improved Recrystallization



+ 33%
(max)

Better energy efficiency



Higher output

2,500	2,500	Diameter (mm)
26,5	35,3	v max (m/s)
530	530	P (kW)
7400	7356	I (A)
41,2	41,6	U (V)
8347,5	11130,0	Production output [kg/h]
R502	R502.H	

New Generation of RBD Lines – MSM 84 / 88 + R402 / R502

Enhanced Reliability / Process Stability

Results

- Less wire breaks in the annealer
- More stable process
- Less downtime
- Higher OEE

New Generation of RBD Lines – MSM 84 / 88 + R402 / R502



Thank you for your attention!

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