Overall integration for superior performance

The entire line delivers technically innovative solutions for your production tasks:

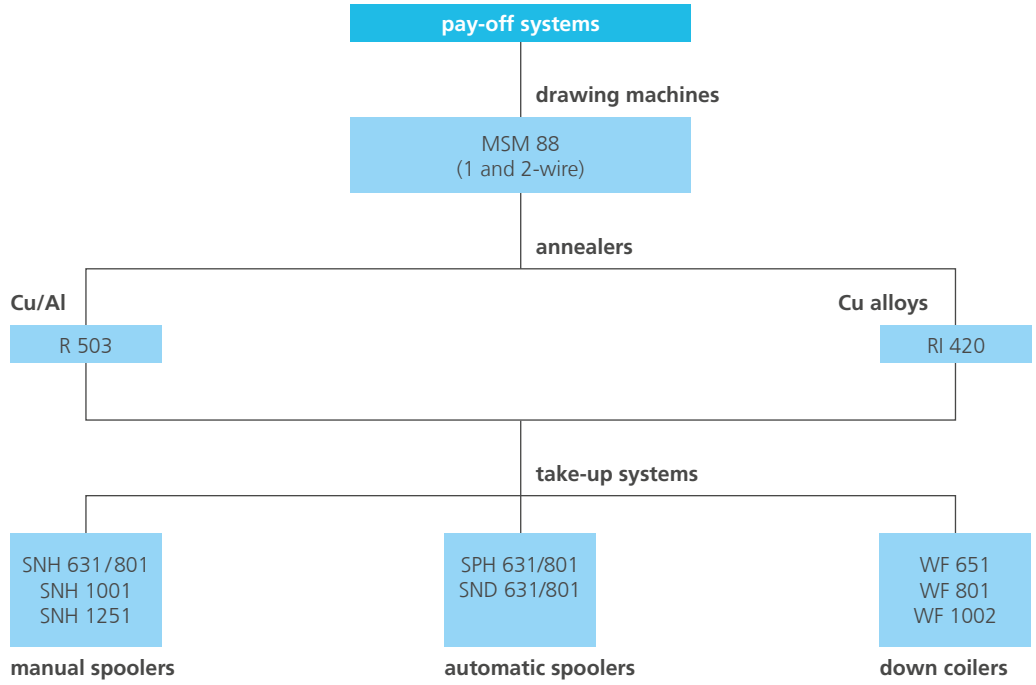
- convincing combinations of individual NIEHOFF components and the excellent quality standards guarantee superb line availability
- due to freely programmable control systems (PLCs) and standardized interfaces, the line can be combined very effectively with many spooling and coiling systems.

The MSM 88 line concept already incorporates the potential for future integration of NIEHOFF machine systems in overall production processes – i.e. the automation of different production areas, including:

- quality assurance
- operational data acquisition
- materials flow control

All possible combinations will deliver the ultimate in terms of quality and performance!

Suitable for combination and integration



(Further pay-off systems on request)

The modular NIEHOFF system

This drawing machine is designed for maximum flexibility – the modular system enables all variations required in our industry.

- system modules can be added horizontally in order to vary the number of drafts (5…15)
- extended variant diversity due to optional use of drawing capstan with 450 mm dia. or 560 mm dia. (3- or 4-draft-drawing-block and haul-off capstan module)
- optional dummy drafts possible, allowing 10, 12 or 14 drafts to be realized
- single and two-wire versions

Future-oriented machine construction technology for optimized system availability and reliability.

Module variants:

Module with drawing capstan dia. 560 mm


3-draft drawing block


4-draft drawing block

Module with drawing capstan dia. 450 mm


4-draft drawing block


6-draft drawing block


Haul-off capstan modul

Module with drawing capstan dia. 315 mm


4-draft drawing block


6-draft drawing block


8-draft drawing block

Examples: No. of drafts:


9


11


13


15

No. of drafts:


9

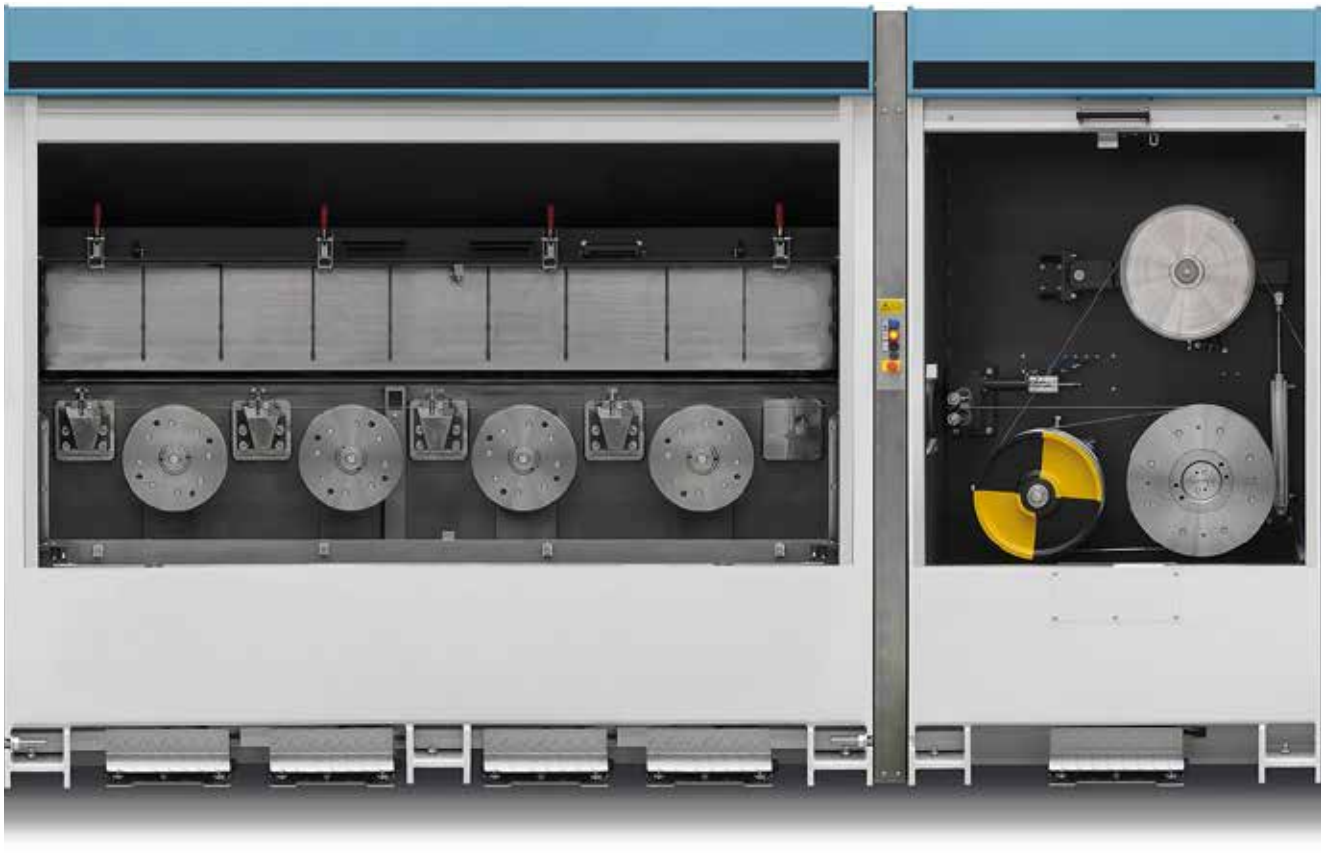

11


13


15

www.niehoff.de

Maschinenfabrik NIEHOFF GmbH & Co. KG
Walter-Niehoff-Strasse 2 · 91126 Schwabach, Germany · Phone +49 9122 977-0 · Fax +49 9122 977-155 · info@niehoff.de



MSM 88
Rod Breakdown Machine

Expertise, Customer Driven, Service – in Good Hands with NIEHOFF

NIEHOFF GRUPPE

MSM 88

Design:

- optimized wire cooling/lubrication (due to the fully submerged drawing basin)
- flexible machine drafting
- individually driven capstans in horizontal tandem layout
- synchronous torque motors or asynchronous three-phase AC drives, water-cooled and maintenance-free
- ergonomic and user-friendly machine design, with easy maintenance (large opening for changing complete drawing chains)
- no sound enclosure cabin required up to 85 dB (A)
- highly reliable separation of drawing emulsion and gear oil via mechanical sealing (long maintenance intervals)

Increase in quality:

- high surface quality of the wires due to the optimized wire path (inclination of the gearing/drawing capstans)
- innovative drawing die holders with high-pressure cooling of the drawing dies

Increase in productivity:

- reduced downtime when changing the machine setup for different dimensions via multi-motor drive technology (quick drawing die change system)
- NMI (NIEHOFF Machine Interface) color touchscreen for data entry, display of production parameters and maintenance instructions

Energy and cost efficiency:

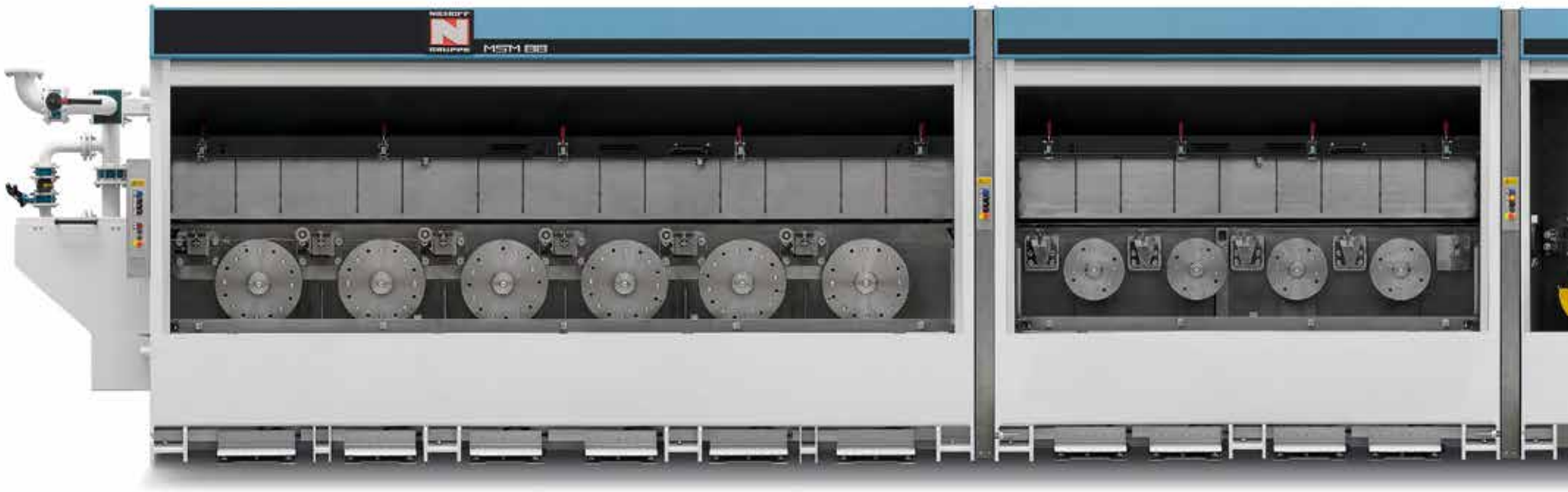
- long service life of drawing tools (drawing capstans, drawing dies) with minimized-slip operation
- energy savings of up to 20 % by multi-motor drive technology
- reduced consumption of oil and drawing lubricant
- additional energy savings by eliminating the gearbox - no gearbox losses, approx. 3-4% energy savings compared to MSM 86
- higher production output compared to MSM 86

Examples:
· 2 x 2.60 mm Cu 32.5 m/s instead of 24.0 m/s
· 2 x 3.00 mm Cu 24.4 m/s instead of 14.0 m/s
· 2 x 2.30 mm Cu 37.2 m/s instead of 30.5 m/s

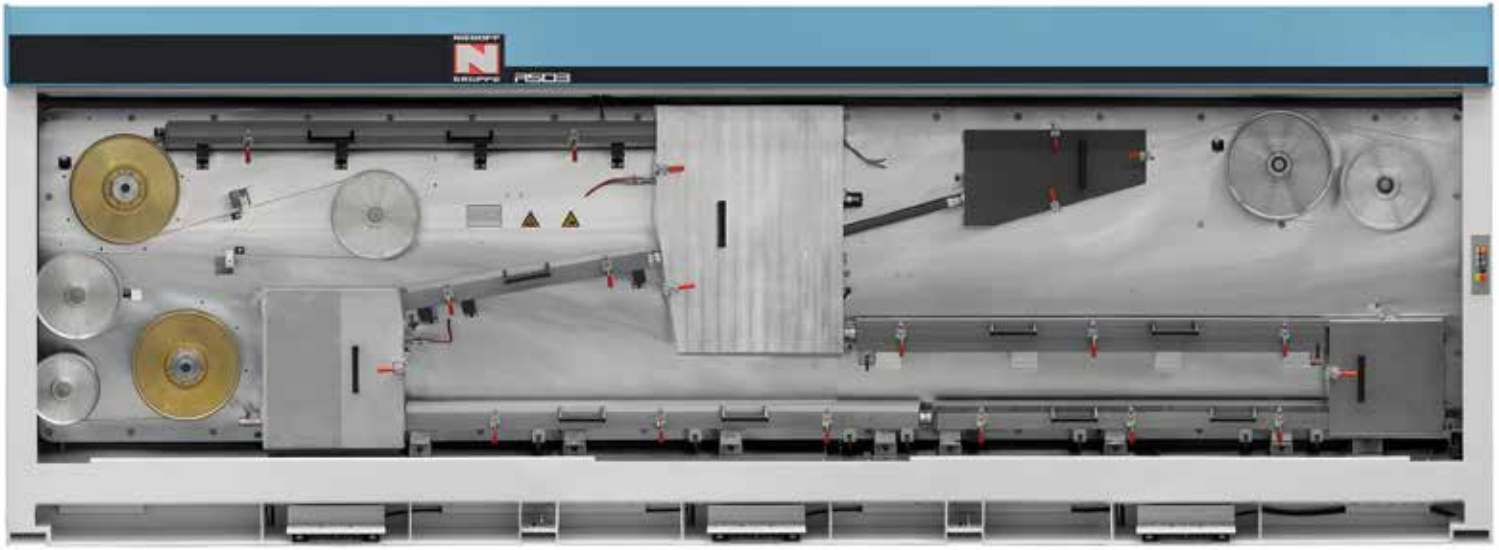
Technical data

type		**MSM 86**		**MSM 86**		**MSM 86**		**MSM 86**
material		Cu		Al		Al-Alloys		Cu-Alloys
max. production speed	m/s	40	40	40	40	40	40	20
production output (7,000 h and 80 % utilization)	t/a	25,000	50,000	23,000	40,000	13,000	20,000	18,000
no. of wires		1	2	1	2	1	2	1
max. inlet dia.*	mm	10.0 12.5	8.0 8.0	12.5	12.5	12.5	9.5	8.0
for max. inlet strength	N/mm²	450 250	450 250	110	110	220	220	400
finish-Ø (haul-off capstan Ø 450)*	mm	0.8...5.5	0.8...3.8	1.2...6.0	1.2...6.0	1.5...5.5	1.5 ... 3.8	1.0...4.0
finish-Ø (haul-off capstan Ø 560)*	mm	1.5...7.35	1.5...4.5	1.5...8.5	1.5...7.35	1.5...7.35	1.5 ... 4.5	1.2...6.0
numbers of drafts		5 ... 15		5 ... 15		5 ... 15		5 ... 15
wire elongation per draft	%	variable		variable		variable		variable
drive technology / AC motors		individual drives		individual drives		individual drives		individual drives

*Other dimensions on request.


NEMOFF
GRUPPE
MSM 88


F503



R 403 / R 503 / R 603
Continuous Resistance Annealer

Expertise, Customer Driven, Service – in Good Hands with NIEHOFF

R 403 / R 503 / R 603

Design:

- AC-continuous resistance annealer in single wire version (R 403 / R 603), two wire version (R 503)
- AC 3-zone annealing principle (R 503 / R 603), AC 3-zone annealing principle (R 403), electrically neutral (no current flow to other machines)
- driven by individual drives (R 503 / R 603) driven by own drive or individual drives (R 403)
- freely accessible slip rings and carbon brushes
- Contact pulley with inner cooling K3 / K4 (R 503 / R 603) Contact pulley with inner cooling K2 / K3 (R 403)
- oil-lubricated contact pulley bearings (R 503 / R 603) grease-lubricated contact pulley bearings (R 403)
- single wire path with no crossover

Increase in quality:

- digital annealing voltage control for consistent wire annealing quality
- consistent wire annealing from a speed of 0 m/s)
- effective wire drying

Increase in productivity:

- increased production output by HEAT annealing principle
- increased production speed by HEAT annealing principle
- controlled coolant supply via recipe management depending on the wire program by means of a frequency-controlled pump and solenoid valves

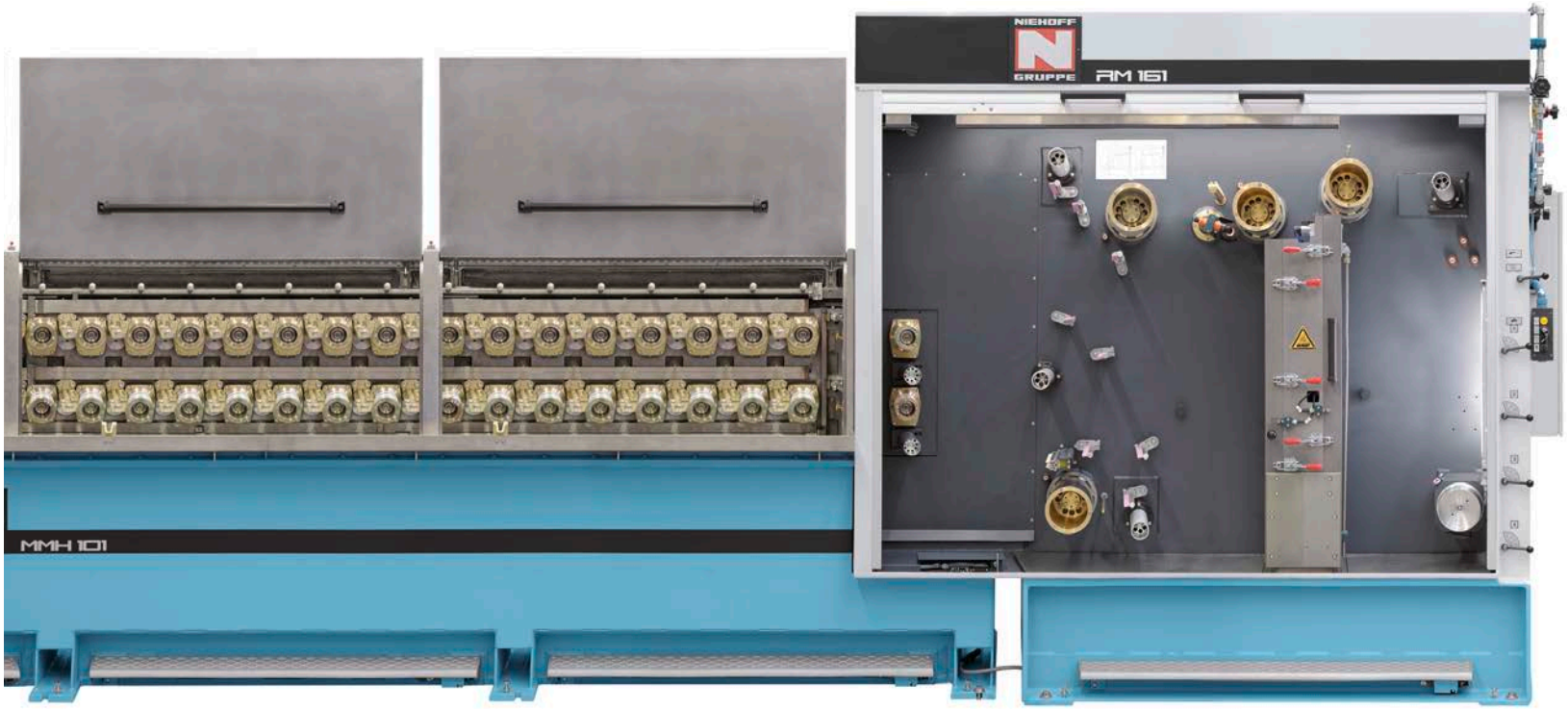
Energy and cost efficiency:

- reduced energy consumption thanks to HEAT annealing principle
- ergonomic and user-friendly machine design, with easy maintenance
- reduction of shielding gas consumption due to closed wire area

Technical data		R 403	R 503	R 503	R 603
Typ operating mode		**single-wire 5000 A**	**two-wire 8000 A single-wire**	**two-wire 8000 A two-wire**	**two-wire 5000 A**
max. individual wire dia.	mm AWG	0.8 ... 1.8 2.5 3.2 3.8 4.5 20 ... 13 10 ½ 8 6 ½ 5	0.8 ... 1.8 2.5 3.2 3.8 5.0 20 ... 13 10 ½ 8 6 ½ 4 ½	0.8 ... 1.6 1.8 2.6 2.8 3.6 20 ... 14 13 10 9 ½ 7	2.5 ... 5.5 6.0 6.5 6.8 7.35 10 ½ ... 3 ½ 3 2 1 ½ 1
max. production speed	m/s fpm	38 ... 38 36.1 13.4 6.7 3.4 7480...7480 7106 2637 1318 669	40 ... 40 40 28.4 20.2 10.4 7480...7480 7480 5590 3976 2047	40 ... 40 40 32.6 26.5 9.7 7480...7480 7480 6417 5216 1909	25 ... 8.2 6.9 5.9 5.0 3.7 4921...1614 1358 1161 984 728
finished dia. (for Cu-ETP)	mm AWG	0.8 ... 4.5 20 ... 5	0.8 ... 5.0 20 ... 4 ½	0.8 ... 3.6 20 ... 7	2.5 ... 7.35 10 ½ ... 1
contact pulley dia.	mm	400	500	500	600
max. annealing power (according to wire dia.)	kW HP	max. 280 max. 375	max. 530 max. 710	max. 530 max. 710	max. 320 max. 429
max. annealing current (according to wire dia.)	A	max. 5,000	max. 8,000	max. 8,000	max. 8,000
max. annealing voltage (according to wire dia.)	V	max. 70	max. 52	70	max. 64
air-cooled slip rings		standard	–	–	–
oil-cooled slip rings		–	standard	standard	standard
machine dimensions (W x D x H)	m	ca. 5.25 x 1.70 x 2.25	ca. 6.95 x 1.70 x 2.42	ca. 6.95 x 1.70 x 2.42	ca. 6.95 x 1.70 x 2.60
weight (without transformer)	kg	ca. 7,700	ca. 10,500	ca. 10,500	ca. 10,500

www.niehoff.de

Maschinenfabrik NIEHOFF GmbH & Co. KG
Walter-Niehoff-Strasse 2 · 91126 Schwabach, Germany · Phone +49 9122 977-0 · Fax +49 9122 977-155 · info@niehoff.de



MMH 101 / RM 161
Multiwire Drawing Line

Expertise, Customer Driven, Service – in Good Hands with NIEHOFF

NIEHOFF
GRUPPE

MMH 101

Design:

- compact design for space saving use of the production area
- vibration-damping cast iron housing for long service life
- stainless-steel drawing chamber cover and pipe
- safe and reliable separation of drawing emulsion and gear oil via mechanical labyrinth seal (long service intervals)
- integration of the capstans in the working chamber of the annealer
- user-friendly design

Increase in quality:

- extremely smooth operation and uniform load transmission by helical precision gear
- high surface quality of the wires due to the optimized wire path in the drawing machine and optimized coolant supply to the drawing dies

Increase in productivity:

- reduced downtime when changing the machine setup for different dimensions via multi-motor drive technology (quick drawing die change system)
- NMI (NIEHOFF Machine Interface) color touchscreen for data entry, display of production parameters and maintenance instructions

Energy and cost efficiency:

- uniform electrical properties of the individual wires (individual wire path)
- reduced consumption of electric power per ton of manufactured wire
- cost savings for downstream processing due to the use of uniform wire bundles
- long service intervals and extended drawing tool service life minimize the requirement to stock and use spare parts
- reduced media consumption

Technical data

type		MMH 101	
max. production speed:	m/s	36	
	fpm	7087	
max. no. of wires per level:		8	
max. no. of wires per machine:		24	
max. inlet dia.:	mm	1.8	1.6
	AWG	13	14
for max. inlet tensile strength:	N/mm^2	250	450
finished dia. drawing machine:	mm	0.10 ... 0.50	
	AWG	38 ... 24	
possible no. of drafts:		17/21/25/31	
drawing capstan dia.:	mm	80	
haul-off capstan dia.:	mm	80	

RM 161

Design:

- DC multi-wire resistance annealer with single-wire path
- single unit comprising drawing machine and annealer
- ergonomic machine design with openly accessible wire paths

Increase in quality:

- consistently high finished wire quality achieved through single-wire drying
- speed-controlled uniform wire annealing at speeds from 0 m/s
- contact tube cleaning device for longer service life and high wire quality in the production of tinned wires
- wire movement for longer life of the contact tubes
- optimum wire drying by patented 2/3-zone-system (with reheating)
- individually driven contact pulleys for high wire surface quality and longer service life of the contact tubes (optional)

Increase in productivity:

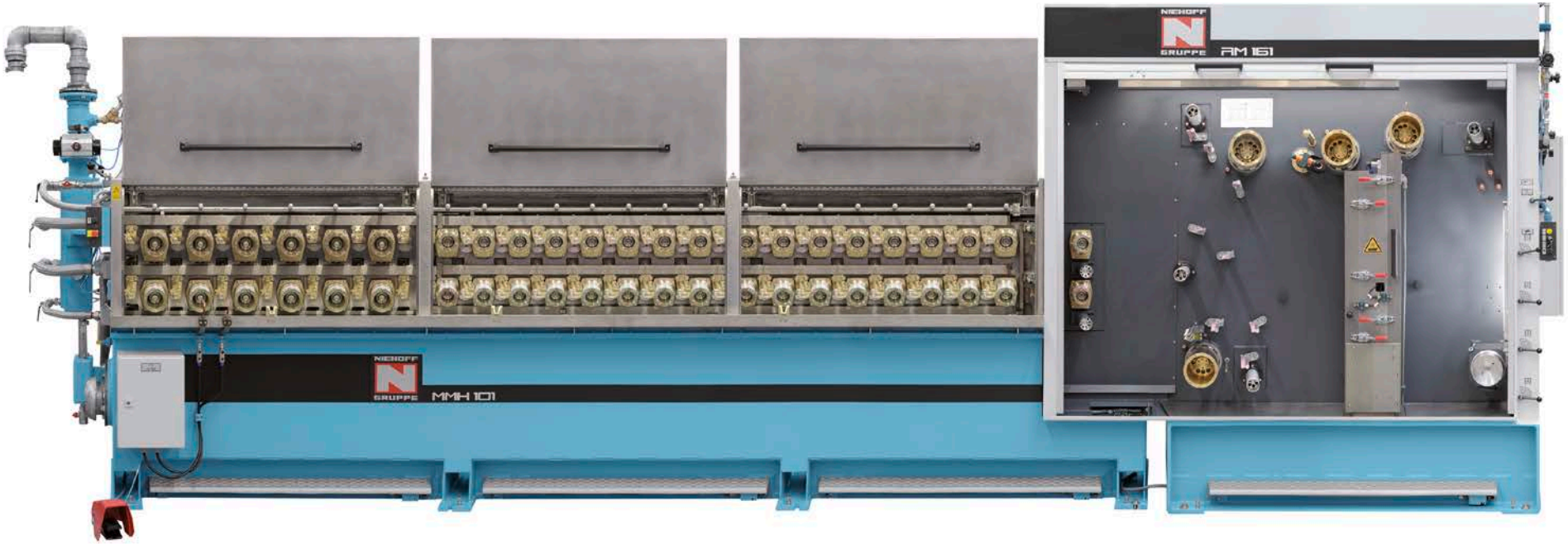
- wires can be drawn fast with the separately driven auxiliary pulley
- driven haul-off capstan (contact pulley) for constant wire tension in the annealer and reduced wire tension leading up to the downstream spooling system
- easy-to-change contact tubes with long service life

Energy and cost efficiency:

- quick return on investment by a high cost-benefit ratio
- high machine availability
- low energy consumption
- reduced costs of production resources and high product acceptance achieved by perfect quality

Technical data

type		RM 141	RM 161	RM 201
max. production speed:	m/s fpm	36 7,087	36 7,087	36 7,087
possible no. of wires:		8/16/24	8/16/20	8/16/24/32
finished dia. of the line:	mm AWG	0.10 ... 0.50/0.40/0.32 38 ... 24/26/26	0.10 ... 0.64/0.50/0.40 38 ... 22/24/26	0.15 ... 1.05/0.72/0.55/0.48 34 ... 18/21/23.5/24 ½
contact pulley dia.:	mm	140	160	200
max. annealing power:	kW	60	80	180
max. annealing current:	A	2,000	2,000	5,000
annealing principle:		switchable between 2/3 zones	switchable between 2/3 zones	switchable between 2/3 zones
separately driven auxiliary pulley:		standard	standard	standard
individual drives:		optional	optional	optional
water-cooled slip rings:		standard 2,000 A optional < 1,500 A	standard	standard


NIEHOFF
GRUPPE
AM 151
NIEHOFF
GRUPPE
MMH 101

Overall integration for superior performance

The entire line delivers technically innovative solutions for your production targets:

- convincing combinations of individual NIEHOFF components and the excellent quality standards guarantee superb line availability
- by using a freely programmable PLC control and standardized interfaces, the line can be combined very effectively with different spooling and coiling systems.

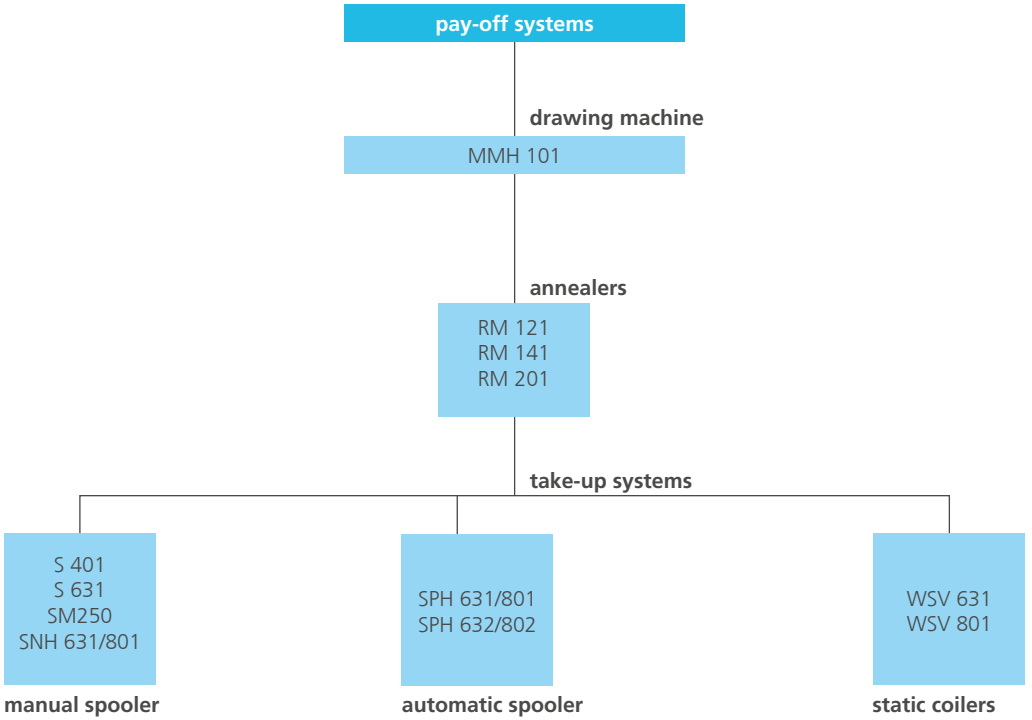
The MMH line concept already incorporates the potential for future integration of systems in overall production processes.

For example for areas such as:

- quality assurance
- operational data acquisition
- materials flow control

All possible combinations will deliver the ultimate in terms of quality and performance!

Suitable for combination and integration



(Further pay-off systems on request)

Example for NIEHOFF drawing die sequence MMH 101:

Einlauf-ø	1.250														1.194	1.190		-	1.190	1.134	MS
	1.285	1.265				1.260									1.210						DV
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	v [m/s]
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508	0.3189	0.2899	0.2635	0.2396	0.2178	0.1980	0.1800	31.5
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508	0.3189	0.2899	0.2635	0.2396		0.2156	0.1960	31.5
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508	0.3189	0.2899	0.2635				0.2440	30.0
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508	0.3189	0.2899					0.2700	29.0
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508	0.3189						0.3000	24.0
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508							0.3200	22.0
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937								0.3500	18.0
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420									0.3980	12.2
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961										0.4500	7.6
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569										14x	0.5000	6.5

EINLAUFDURCHMESSER max. 1.80mm Cu-weich / 1.60mm Cu-hart 16 Draehte (8 pro Etage)
Inlet diameter max. 1.80mm Cu-soft / 1.60mm Cu-hard 16 wires (8 per level)

AC-MOTOREN 185kW/29kW (mit RM161.2000A)
AC-Drives 185kW/29kW (with RM161.2000A)

- modular system for variable number of drafts
- system modules can be arranged in up to 3 levels above each other
- variable number to 8 wires per level

Maschinenfabrik NIEHOFF GmbH & Co. KG
Walter-Niehoff-Strasse 2 · 91126 Schwabach, Germany · Phone +49 9122 977-0 · Fax +49 9122 977-155 · info@niehoff.de

MMH 112 / RM 202
Multiwire Drawing Line

Expertise, Customer Driven, Service – in Good Hands with NIEHOFF

NIEHOFF
GRUPPE

MMH 112

Design:

- compact design for space saving use of the production area
- vibration-damping cast iron housing for long service life
- stainless-steel drawing chamber cover and pipe
- safe and reliable separation of drawing emulsion and gear oil via mechanical labyrinth seal (long service intervals)
- integration of the capstans into the annealer
- user-friendly design

Increase in quality:

- extremely smooth operation and uniform load transmission by helical precision gear
- high surface quality of the wires due to the optimized wire path in the drawing machine and optimized coolant supply to the drawing dies

Increase in productivity:

- reduced downtime when changing the machine setup for different dimensions via multi-motor drive technology (quick drawing die change system)
- NMI (NIEHOFF Machine Interface) color touchscreen for data entry, display of production parameters and maintenance instructions

Energy and cost efficiency:

- uniform electrical properties of the individual wires (individual wire path)
- reduced consumption of electric power per ton of manufactured wire
- cost savings for downstream processing due to the use of uniform wire bundles
- long service intervals and extended drawing tool service life minimize the requirement to stock and use spare parts
- reduced media consumption

Technical data			
type		**MMH 112**	
max. production speed:	m/s	40	
	fpm	7873	
max. no. of wires per level:		16	10
max. no. of wires per machine:		32	20
max. inlet dia.:	mm	2.05	2.6
	AWG	12	10
for max. inlet tensile strength:	N/mm^2	450	
finished dia. drawing machine:	mm	0.10 ... 0.70	
	AWG	38 ... 21	
possible no. of drafts:		21/28	
drawing capstan dia.:	mm	6 x 100, further drawing capstan dia. 80 mm	
haul-off capstan dia.:	mm	100	

RM 202

Design:

- DC multi-wire resistance annealer with single-wire path
- single unit comprising drawing machine and annealer
- ergonomic machine design with openly accessible wire paths

Increase in quality:

- consistently high finished wire quality achieved through single-wire drying
- speed-controlled uniform wire annealing at speeds from 0 m/s
- contact tube cleaning device for longer service life and high wire quality in the production of tinned wires
- wire movement for longer life of the contact tubes
- optimum wire drying by patented 2/3-zone-system (with reheating)
- individually driven contact pulleys for high wire surface quality and longer service life of the contact tubes (optional)

Increase in productivity:

- wires can be drawn fast with the separately driven auxiliary pulley
- driven haul-off capstan (contact pulley) for constant wire tension in the annealer and reduced wire tension leading up to the downstream spooling system
- easy-to-change contact tubes with long service life

Energy and cost efficiency:

- quick return on investment by a high cost-benefit ratio
- high machine availability
- low energy consumption
- reduced costs of production resources and high product acceptance achieved by perfect quality

Technical data			
type		**RM 162**	**RM 202**
max. production speed:	m/s fpm	40 7873	40 7873
possible no. of wires:		8/16/20	8/16/24/32
finished dia. of the line:	mm AWG	0.10 ... 0.64/0.50/0.40 38 ... 22/24/26	0.15 ... 1.05/0.72/0.55/0.48 34 ... 18/21/23.5/24 ½
contact pulley dia.:	mm	160	200
max. annealing power:	kW	80	180
max. annealing current:	A	2,000	5,000
annealing principle:		switchable between 2/3 zones	switchable between 2/3 zones
separately driven auxiliary pulley:		standard	standard
individual drives:		optional	optional
water-cooled slip rings:		standard	standard


NIEHOFF
GRUPPE
MMH 112
NIEHOFF
GRUPPE
AM 202

Overall integration for superior performance

The entire line delivers technically innovative solutions for your production targets:

- convincing combinations of individual NIEHOFF components and the excellent quality standards guarantee superb line availability
- by using a freely programmable PLC control and standardized interfaces, the line can be combined very effectively with different spooling and coiling systems.

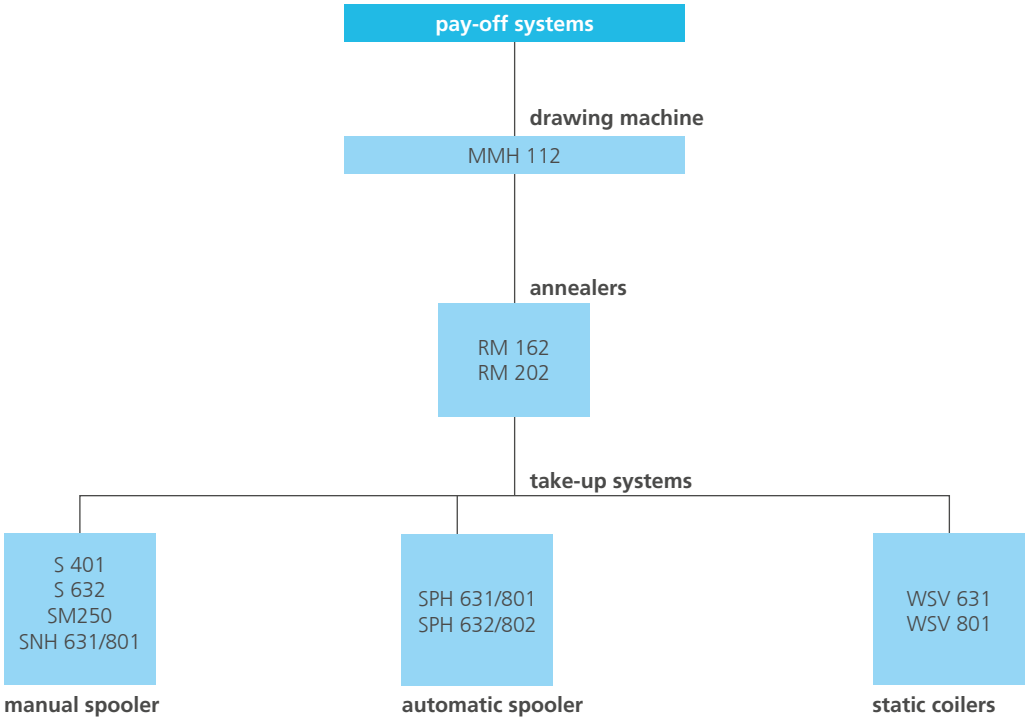
The MMH line concept already incorporates the potential for future integration of systems in overall production processes.

For example for areas such as:

- quality assurance
- operational data acquisition
- materials flow control

All possible combinations will deliver the ultimate in terms of quality and performance!

Suitable for combination and integration



(Further pay-off systems on request)

Example for NIEHOFF drawing die sequence MMH 112:

- modular system for variable number of drafts
- system modules can be arranged in up to 2 levels above each other
- variable number to 16 wires per level

Einlauf-ø	1.250						-	1.250						-	1.20				-	1.20	-	MS	DV Uebergang
	1.284	1.260													1.210							DV	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	v [m/s]	
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508	0.3189	0.2899	0.2635	0.2396	0.2178	0.1980	0.1800	40.0 *	21.0%
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508	0.3189	0.2899	0.2635	0.2396	0.2178		0.1960	36.0 *	23.5%
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508	0.3189	0.2899	0.2635				0.2440	34.0 *	16.6%
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508	0.3189	0.2899					0.2700	28.0 *	15.3%
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508	0.3189						0.3000	23.0 *	13.0%
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937	0.3508							0.3200	18.0 *	20.2%
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420	0.3937								0.3500	14.5 *	26.5%
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961	0.4420									0.3980	11.5 *	23.3%
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569	0.4961										0.4500	9.5 *	21.5%
1.8000	1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876	0.7017	0.6251	0.5569											0.5000	7.5 *	24.1%
1.8000				1.5881	1.4120	1.2554	1.1162	0.9924	0.8841	0.7876										20x	0.7100	7.5 *	23.0%
1.8000	1.6035	1.4285	1.2726	1.1337	1.0100	0.8998	0.8016	0.7141	0.6362	0.5667	0.5049	0.4498	0.4007			0.3570	0.3246	0.2950	0.2682	0.2438	0.2200	40.0 *	22.8%
1.8000	1.6035	1.4285	1.2726	1.1337	1.0100	0.8998	0.8016	0.7141	0.6362	0.5667	0.5049	0.4498	0.4007			0.3570	0.3246	0.2950	0.2682		0.2500	36.0 *	15.1%
1.8000	1.6035	1.4285	1.2726	1.1337	1.0100	0.8998	0.8016	0.7141	0.6362	0.5667	0.5049	0.4498	0.4007			0.3570	0.3246	0.2950			0.2750	34.0 *	15.1%
1.8000	1.6035	1.4285	1.2726	1.1337	1.0100	0.8998	0.8016	0.7141	0.6362	0.5667	0.5049	0.4498	0.4007			0.3570	0.3246				0.3250	28.0 *	20.7%
1.8000	1.6035	1.4285	1.2726	1.1337	1.0100	0.8998	0.8016	0.7141	0.6362	0.5667	0.5049	0.4498	0.4007			0.3570					0.3600	23.0 *	26.5%
1.8000	1.6035	1.4285	1.2726	1.1337	1.0100	0.8998	0.8016	0.7141	0.6362	0.5667	0.5049	0.4498	0.4007								0.3800	18.0 *	7.3%
1.8000	1.6035	1.4285	1.2726	1.1337	1.0100	0.8998	0.8016	0.7141	0.6362	0.5667	0.5049	0.4498									0.4000	14.5 *	22.1%
1.8000	1.6035	1.4285	1.2726	1.1337	1.0100	0.8998	0.8016	0.7141	0.6362	0.5667	0.5049										0.4500	11.5 *	21.5%
1.8000	1.6035	1.4285	1.2726	1.1337	1.0100	0.8998	0.8016	0.7141	0.6362	0.5667											0.5000	9.5 *	24.0%

EINLAUFDURCHMESSER max. 24x 1,80mm Cu weich (12x proEtage)

Maschinenfabrik NIEHOFF GmbH & Co. KG
Walter-Niehoff-Strasse 2 · 91126 Schwabach, Germany · Phone +49 9122 977-0 · Fax +49 9122 977-155 · info@niehoff.de

MMH 121 / RM 201
Multiwire Drawing Line

Expertise, Customer Driven, Service – in Good Hands with NIEHOFF

NIEHOFF
GRUPPE

MMH 121

Design:

- compact design for space saving use of the production area
- vibration-damping cast iron housing for long service life
- stainless-steel drawing chamber cover and pipes
- safe and reliable separation of drawing emulsion and gear oil via mechanical labyrinth seal (long service intervals)
- integration of the capstans in the working chamber of the annealer
- user-friendly design

Increase in quality:

- extremely smooth operation and uniform load transmission by helical precision gear
- high surface quality of the wires due to the optimized wire path in the drawing machine and optimized coolant supply to the drawing dies

Increase in productivity:

- reduced downtime when changing the machine setup for different dimensions via multi-motor drive technology (quick drawing die change system)
- NMI (NIEHOFF Machine Interface) color touchscreen for data entry, display of production parameters and maintenance instructions

Energy and cost efficiency:

- uniform electrical properties of the individual wires (individual wire path)
- reduced consumption of electric power per ton of manufactured wire
- cost savings for downstream processing due to the use of uniform wire bundles
- long service intervals and extended drawing tool service life minimize the requirement to stock and use spare parts
- reduced media consumption

Technical data

type		MMH 121	
max. production speed:	m/s	40	40
	fpm	7874	7874
max. no. of wires per level:		14	16
max. no. of wires per machine:		42	16
max. inlet dia.:	mm	8 x 2.6	16 x 2.05
	AWG	8x10	16x12
for max. inlet tensile strength:	N/mm²	450	450
finished dia. drawing machine:	mm	0.15 ... 1.40	0.18 ... 0.64
	AWG	35½ ... 15	33 ... 22
possible no. of drafts:		16/19/22/25	22
drawing capstan dia.:	mm	100	100
haul-off capstan dia.:	mm	100	100

RM 201

Design:

- DC multi-wire resistance annealer with single-wire path
- single unit comprising drawing machine and annealer
- ergonomic machine design with openly accessible wire paths

Increase in quality:

- consistently high finished wire quality achieved through single-wire drying
- speed-controlled uniform wire annealing at speeds from 0 m/s
- contact tube cleaning device for longer service life and high wire quality in the production of tinned wires
- wire movement for longer life of the contact tubes
- optimum wire drying by patented 2/3-zone-system (with reheating)
- individually driven contact pulleys for high wire surface quality and longer service life of the contact tubes (optional)

Increase in productivity:

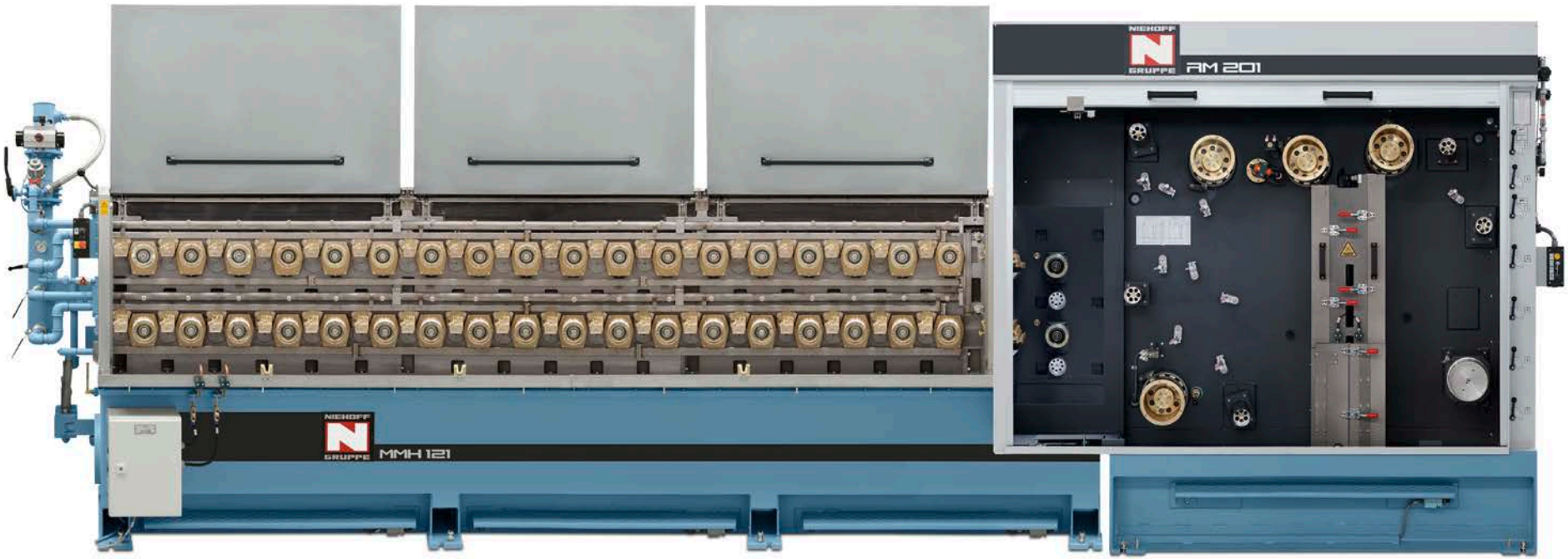
- wires can be drawn fast with the separately driven auxiliary pulley
- driven haul-off capstan (contact pulley) for constant wire tension in the annealer and reduced wire tension leading up to the downstream spooling system
- easy-to-change contact tubes with long service life

Energy and cost efficiency:

- quick return on investment by a high cost-benefit ratio
- high machine availability
- low energy consumption
- reduced costs of production resources and high product acceptance achieved by perfect quality

Technical data

type		RM 161	RM 201	RM 301
max. production speed:	m/s fpm	40 7,874	40 7,874	40 7,874
possible no. of wires:		8/16/20	8/16/24/32	8/16/24/28
finished dia. of the line:	mm AWG mm AWG	0.10 ... 0.64/0.50/0.40 38 ... 22/24/26	0.15 ... 1.05/0.72/0.55/0.48 35 ½ ... 18/21/23 ½/24 ½	0.40 ... 1.35/0.35 ... 1.15 26 ... 15 ½/27... 17 0.25 ... 0.90/0.25 ... 0.70 30 ... 19/30... 21
contact pulley dia.:	mm	160	200	300
max. annealing power:	kW	80	180	350
max. annealing current:	A	2,000	5,000	7,000
annealing principle:		switchable between 2/3 zones	switchable between 2/3 zones	not switchable between 2 or 3 zones
separately driven auxiliary pulley:		standard	standard	standard
individual drives:		optional	optional	standard
water-cooled slip rings:		standard	standard	standard


NIEHOFF
GRUPPE
AM 201
NIEHOFF
GRUPPE
MMH 121

Overall integration for superior performance

The entire line delivers technically innovative solutions for your production targets:

- convincing combinations of individual NIEHOFF components and the excellent quality standards guarantee superb line availability
- by using a freely programmable PLC control and standardized interfaces, the line can be combined very effectively with different spooling and coiling systems.

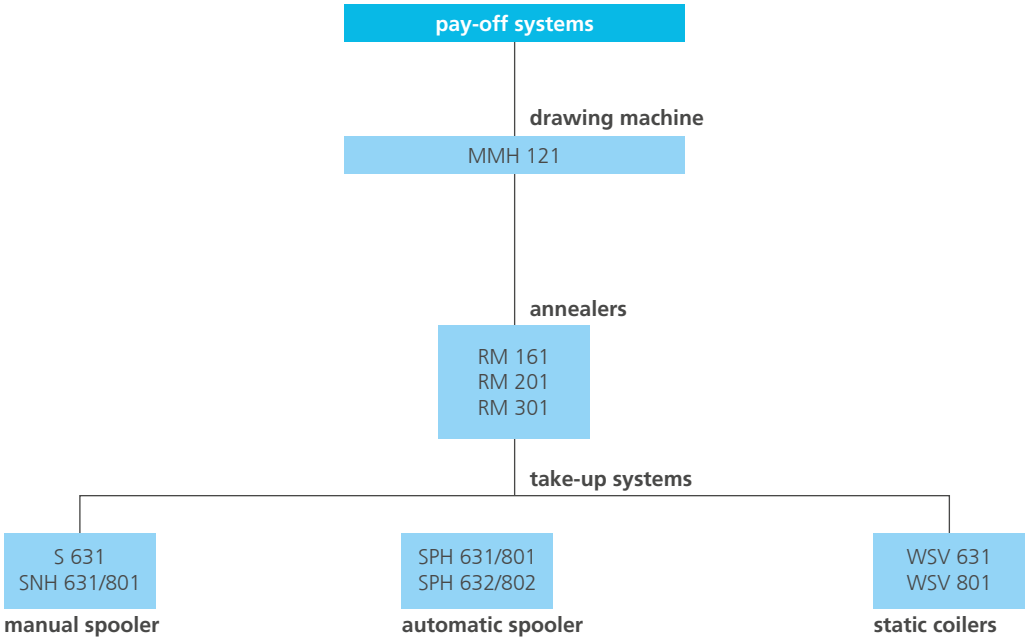
The MMH line concept already incorporates the potential for future integration of systems in overall production processes.

For example for areas such as:

- quality assurance
- operational data acquisition
- materials flow control

All possible combinations will deliver the ultimate in terms of quality and performance!

Suitable for combination and integration



(Further pay-off systems on request)

Example for NIEHOFF drawing die sequence MMH 121:

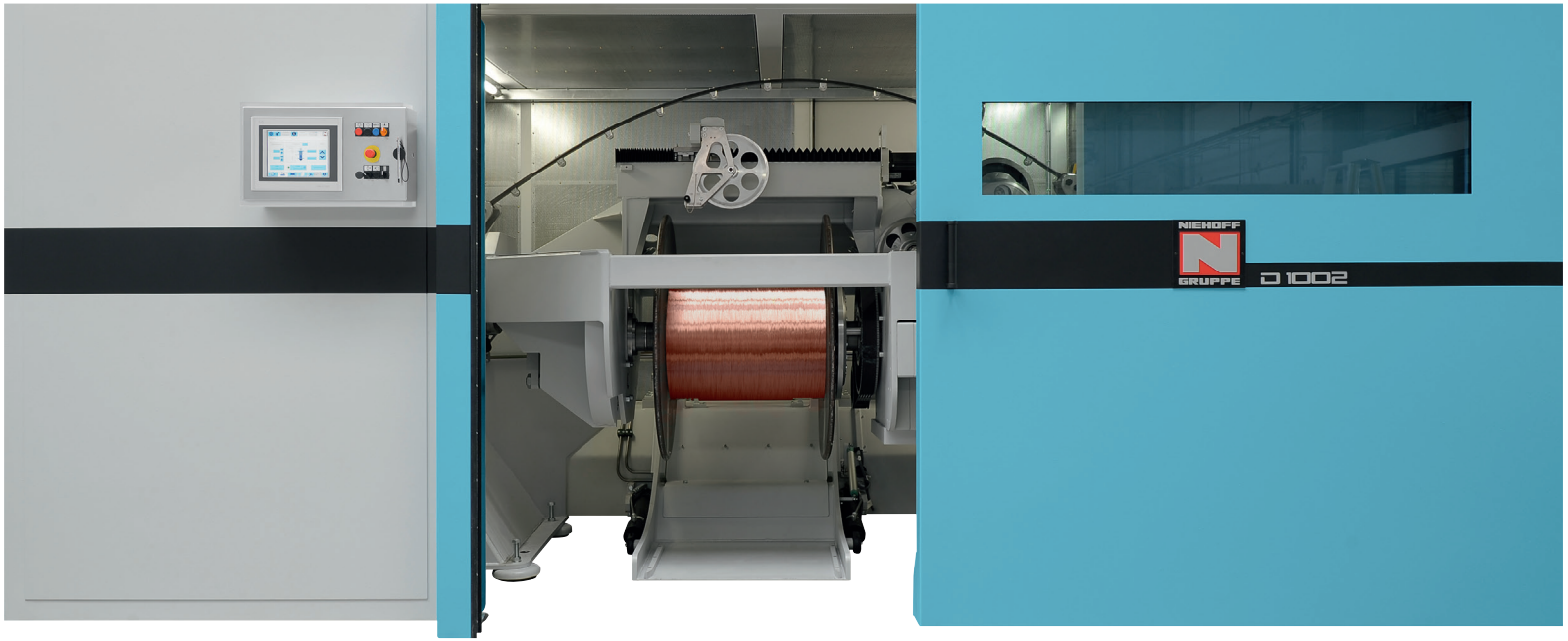
Einlauf-ø	1.241						1.250										1.200				-	1.128	MS
	1.260																1.210				-	1.198	DV
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	v [m/s]
2.0000	1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998	0.4453	0.3967	0.3534	0.3148	0.2862	0.2602	0.2365	0.2150	0.1970	0.1800	35.0
2.0000	1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998	0.4453	0.3967	0.3534	0.3148	0.2862	0.2602	0.2365	0.2150		0.2000	35.0
2.0000	1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998	0.4453	0.3967	0.3534	0.3148	0.2862	0.2602				0.2400	35.0
2.0000	1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998	0.4453	0.3967	0.3534	0.3148	0.2862					0.2600	35.0
2.0000	1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998	0.4453	0.3967	0.3534							0.3200	27.0
2.0000	1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998	0.4453	0.3967								0.3600	21.0
2.0000	1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998	0.4453									0.4000	17.0
2.0000	1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998										0.4500	14.0
2.0000	1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610											0.5000	11.0
2.0000		1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998	0.4453	0.3967	0.3534						0.3200	34.0
2.0000		1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998	0.4453	0.3967							0.3600	27.0
2.0000		1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998	0.4453								0.4000	22.0
2.0000		1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610	0.4998									0.4500	18.0
2.0000		1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298	0.5610										0.5000	14.0
2.0000		1.7817	1.5873	1.4141	1.2598	1.1223	0.9998	0.8907	0.7935	0.7069	0.6298											0.6000	8.0

EINLAUFDURCHMESSER max. 2.00mm Cu-weich / hart 24 Draehte (12 pro Etage)
Inlet diameter max. 2.00mm Cu-soft / hard 24 wires (12 per level)

AC-MOTOREN 370kW/60kW (mit RM201.5000A)
AC-DRIVES 370kW/60kW (with RM201.5000A)

- modular system for variable number of drafts
- system modules can be arranged in up to 3 levels above each other
- variable number to 14 wires per level

Maschinenfabrik NIEHOFF GmbH & Co. KG
Walter-Niehoff-Strasse 2 · 91126 Schwabach, Germany · Phone +49 9122 977-0 · Fax +49 9122 977-155 · info@niehoff.de



D 1002 A
Double Twist Bunching Machine

Expertise, Customer Driven, Service – in Good Hands with NIEHOFF

NIEHOFF
GRUPPE

D 1002 A

Design:

- universally applicable for bunching and stranding of insulated conductors
- machine available in left and right-hand versions for maximum space utilization and optimum material flow
- foundation-free installation on vibration damping elements

Increase in quality:

- adjustable winding force, controlled via a load cell in the spool carrier
- die holder for compacting die or control die in the spool carrier

Increase in productivity:

- NMI (NIEHOFF Machine Interface) color touchscreen for data entry, display of production parameters (winding force, laying width, lay length) and maintenance instructions
- infinitely variable lay length for max. flexibility by virtue of the haul-off capstan with separate drive without change gear
- highest flexibility for the production of sector-shaped conductors, insulated cables, ropes and strands
- telemetric system for reliable contactless data transfer

Energy and cost efficiency:

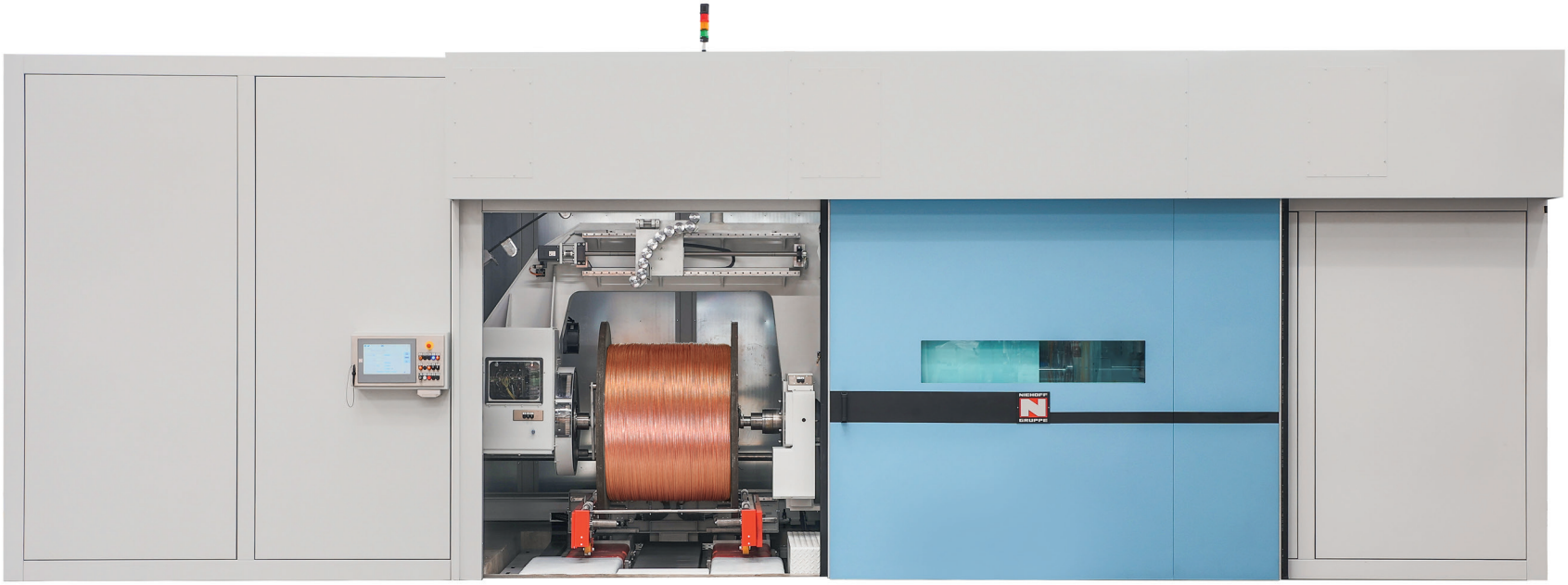
- AC technology for precise synchronization and reduced maintenance requirement
- reduced energy consumption and low noise emission due to one-bow system
- IE3 energy-saving main drive

Technical data (for Cu soft)

type		**D 1002 A**
max. production speed	m/min	300
production range for copper		
strand / conductor cross section	mm^2	2.5 ... 50
	AWG	13 ...1/0
lay length, infinitely variable	mm	20 ... 300
max. no. of twists, infinitely variable	twists/min	3,200
spool sizes		
flange dia.	mm	1,000
spool width	mm	750
drive for		
rotor bow (AC motor)		standard
winding spool (AC motor)		servo
max. sound pressure level (acc. to EN ISO 3743-2 and DIN 45635-1)	dBA	80
machine dimensions (W x D x H)	m	5.20 x 2.50 x 2.30
weight (incl. noise protection cabin and switch cabinet)	kg	approx. 13,000

www.niehoff.de

Maschinenfabrik NIEHOFF GmbH & Co. KG
Walter-Niehoff-Strasse 2 · 91126 Schwabach, Germany · Phone +49 9122 977-0 · Fax +49 9122 977-155 · info@niehoff.de



D 1252 / D 1602 / D 2002
Double Twist Stranding Machine

Expertise, Customer Driven, Service – in Good Hands with NIEHOFF

NIEHOFF GRUPPE

D 1252 / D 1602 / D 2002

Design:

- universally applicable for bunching and stranding of insulated conductors
- working height of 1300 mm for all range of double twist stranders
- rotor bearings with temperature control & vibration sensor
- automatic traverse with flange detection

Increase in quality:

- adjustable winding force
- strong compacting degree achievable
- smooth cable passage for highest quality of conductor
- compacting rollers or long set of post-formers useful for special cables
- motorized compacting die with cable lubrication
- dancer tension control for winding the cable onto the spool (optional)
- perfect repeatable product quality

Increase in productivity:

- NMI (NIEHOFF Machine Interface) color touchscreen for data entry, display of production parameters (winding force, laying width, lay length) and maintenance instructions
- infinitely variable lay length for max. flexibility by virtue of the haul-off capstan with separate drive without change gear
- highest flexibility for the production of sector-shaped conductors, insulated cables, ropes and strands
- telemetric system for reliable contactless data transfer
- highest automation, best production control via recipe management

Energy and cost efficiency:

- AC technology for precise synchronization and reduced maintenance requirement by means of contactless data transfer
- single bow type machine, minimum energy consumption, low noise emission
- wireless telemetry for all signals including encoders
- excellent efficiency and fast return on investment

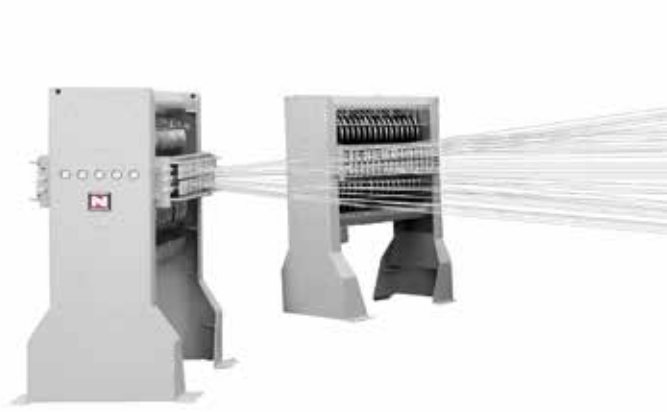
Technical data		D 1252	D 1602	D 2002
max. line speed	m/min fpm	300 984	200	150
max rotating speed	twists/min (tpm)	2000	1200	1000
wire diameter	mm	1.0 – 3.2	1.5 – 4.8	1.5 – 4.8
strand cross-section conductors, Al + Cu, Class 5	mm² AWG - KCMIL	6 – 120 9 – 250	16 – 240 5 – 450	16 – 400 5 – 800
conductors Class 2 Cu	mm² AWG - KCMIL	6 – 95 9 – 2/0	16 – 150 5 – 300	16 – 400 5 – 800
conductors Class 2 Al	mm² AWG - KCMIL	6 – 120 9 – 250	16 – 150 5 – 300	16 – 500 5 – 1000
compacting Cu Al	mm² mm²	70 120	150 150	300 400
lay length, steplessly variable	mm	25 – 750	40 – 400	50 – 500
max. cable diameter	mm	25	30	30
max. spool size				
flange diameter	mm	1250	1600	2000
spool width	mm	950	1180	1500
max spool weight	kg	4000	8000	12000

www.niehoff.de

Maschinenfabrik NIEHOFF GmbH & Co. KG
Walter-Niehoff-Strasse 2 · 91126 Schwabach, Germany · Phone +49 9122 977-0 · Fax +49 9122 977-155 · info@niehoff.de

Barrel pay off

- fast speed achievable, with wire break detector
- non-stop operation availability



Tension equalizing unit, braking unit

- wire brake for concentric strand structures to increase the retention force of paying-off products
- easy tension control from operator's panel / receipt management

Stranding plate and compacting die holder for the production of conductors with e.g. 19 elements

- suitable for stranding & compacting up to 61 wires (5 layers)
- rotating stranding nipples with freely selectable speed and direction of rotation for the outer layers. Freely rotating stranding nipple for the inner layer, lubrication system for the drawing dies
- water-blocking tapes available

Rotating capstan

- high pulling capacity (60 kN), capstan diameter 1000 mm
- best surface quality thanks to smooth and polished wire or cable passage

The entire line delivers technically innovative solutions for your product requirements:

- convincing combinations of individual NIEHOFF components and excellent quality standards
- the line can be effectively tailored to customer needs

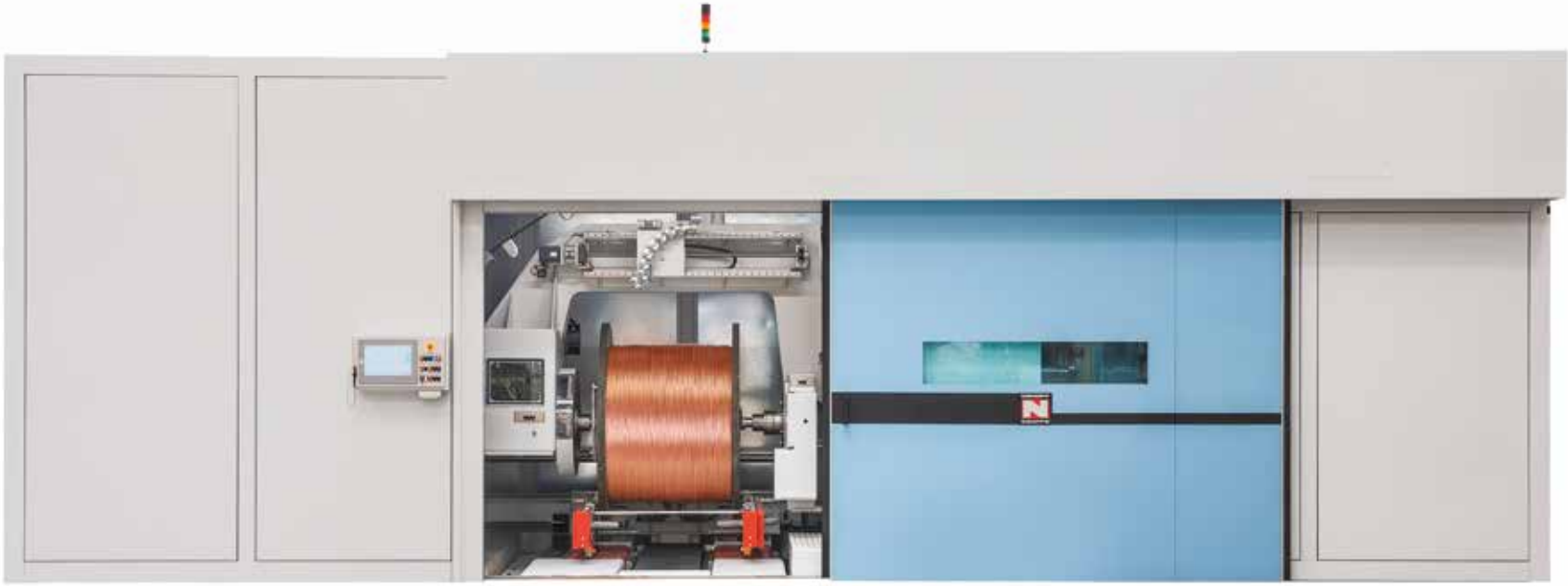
NIEHOFF benefits:

- perfectly reproducible product quality
- excellent efficiency
- fast return of investment
- NIEHOFF customer service by highly trained NIEHOFF service technicians, resulting in short commissioning times and perfect user training of operators at the customer's plant

All possible combinations will deliver the ultimate in terms of quality and performance!

www.niehoff.de

Maschinenfabrik NIEHOFF GmbH & Co. KG
Walter-Niehoff-Strasse 2 · 91126 Schwabach, Germany · Phone +49 9122 977-0 · Fax +49 9122 977-155 · info@niehoff.de



TU - FP - PTD - D 2002
Double twist stranding line

Expertise, Customer Driven, Service – in Good Hands with NIEHOFF

NIEHOFF GRUPPE

TU - FP - PTD - D 2002

Design:

- universally applicable for bunching and stranding of Al, Cu and insulated conductors
- working height of 1350 mm for all double twist stranding machines
- automatic flange detection

Increase in quality:

- adjustable winding force
- strong compacting degree achievable
- optimized cable passage for highest quality of conductort
- compacting rollers or straightening device suitable for special cables
- motorized compacting die with lubrication
- perfectly reproducible product quality

Increase in productivity:

- NMI (NIEHOFF Machine Interface) color touchscreen for data entry, display of production parameters (winding force, traverse width, lay length) and maintenance instructions
- infinitely variable lay length for max. flexibility by means of haul-off capstan with separate drive without change gears
- maximum flexibility for the production of sector-shaped conductors, insulated conductors, ropes and strands
- telemetry for contactless data transmission
- highest degree of automation, optimum production monitoring via recipe management

Optional:

- water-blocking tapes application for MV cables
- rotor bearing with temperature control and vibration monitoring for machine condition analysis

Energy and cost efficiency:

- drives in AC and digital technology, precise synchronization and reduced maintenance effort due to contactless data transmission
- single bow type machine, minimum energy consumption, low noise emission
- wireless telemetry for all signals including encoders
- excellent efficiency and fast return on investment

Technical data		D 2002	D 2002 + PTD	D 2002
		metric		imperial
max. line speed	m/min ft/min	150	120	 490
max. rotating speed	twists/min (tpm)	1.000	500	1.000
wire diameter	mm MIL	1,5 – 4,8	1,5 – 4,8	 59 – 189
compressed & compacted Al	mm^2 AWG - KCMIL	16 – 500	16 – 500	 5 – 1.000
compressed & compacted Cu	mm^2 AWG - KCMIL	16 – 400	16 – 400	 5 – 800
sector shaped Cu & Al	mm^2 AWG - KCMIL	up to 150	up to 150	 up to 300
flexible conductors Cu & Al	mm^2 AWG - KCMIL	16 – 400	16 – 400	 5 – 800
lay length, steplessly variable	mm inch	60 – 900	60 – 900	 2,3 – 35,4″
max. product diameter	mm inch	30	30	 1,2″
max. spool size:				
flange diameter	mm inch	2.000	2.000	 78″
spool width	mm inch	1.500	1.500	 54″
max. spool weight	kg	12.000	12.000	26.450 lb