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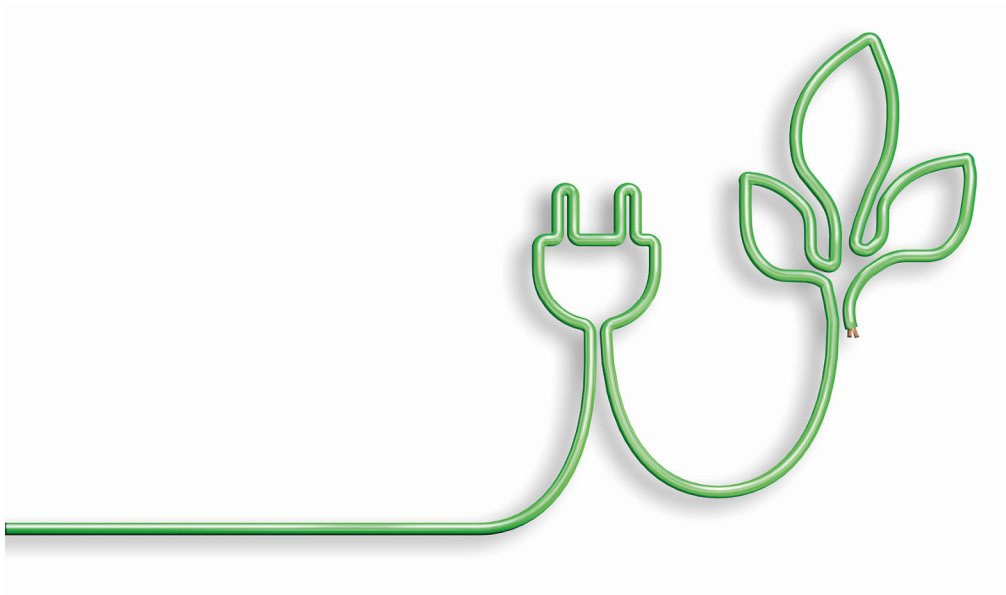


Less Energy – Less CO2 – Higher Output



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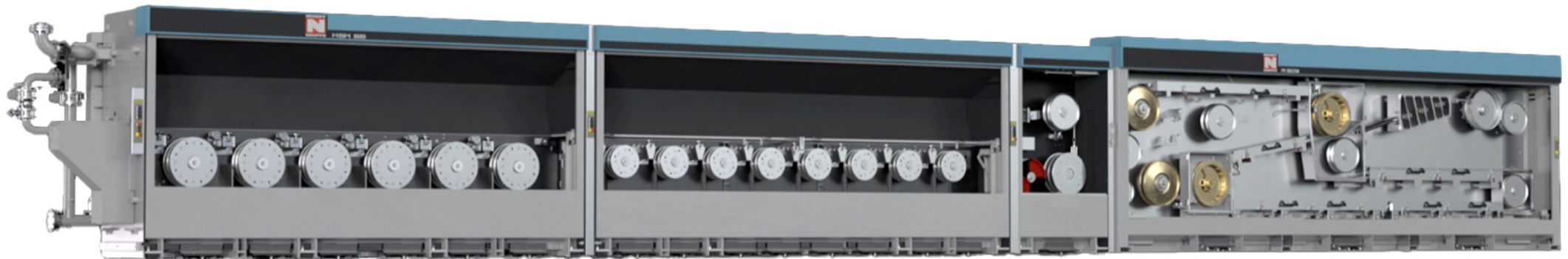
Effizienzsteigerung von Ziehmaschinen und Glühen durch neue Antriebs- und Glühtechnologien



New Generation RBD Line MSM 88 + R 503



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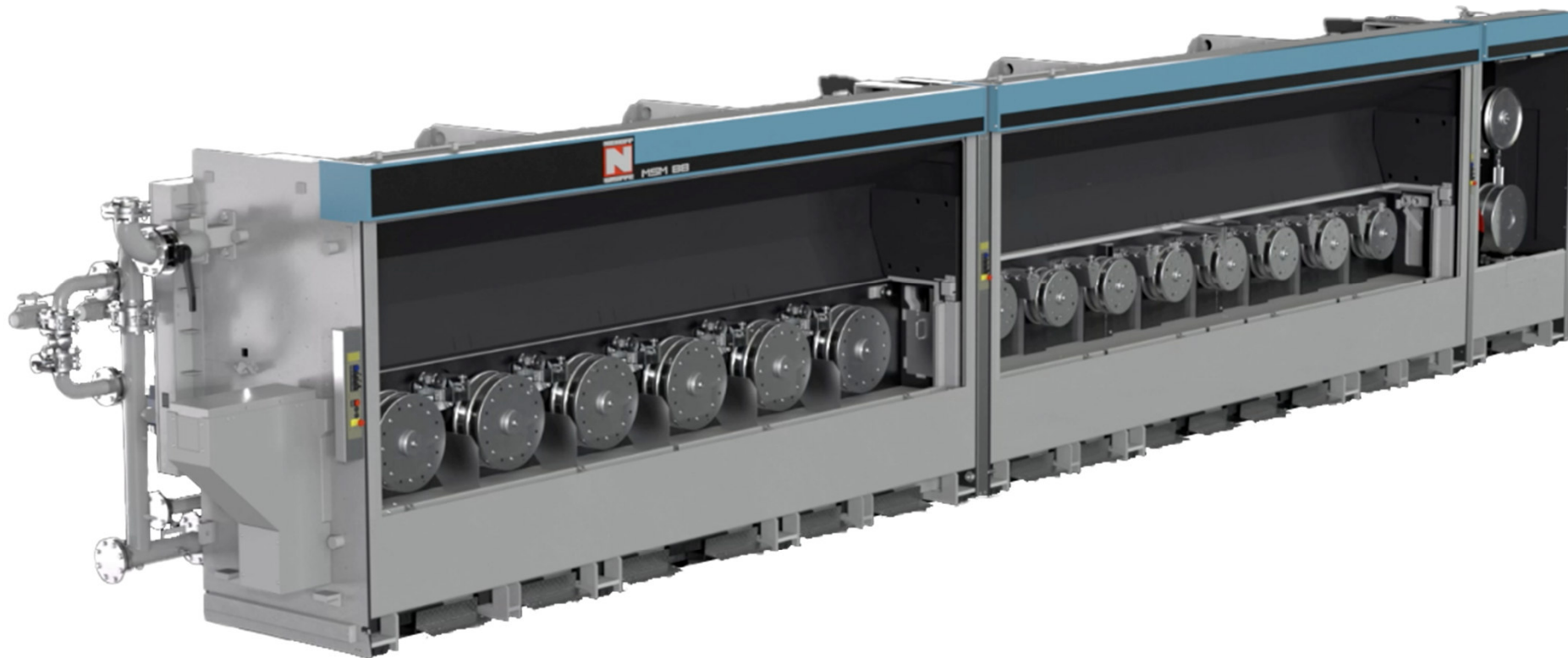
NEW: Drive Technology

NEW: High Efficiency Annealing Technology HEAT

Neue Antriebstechnik



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Neu: Torque Motoren



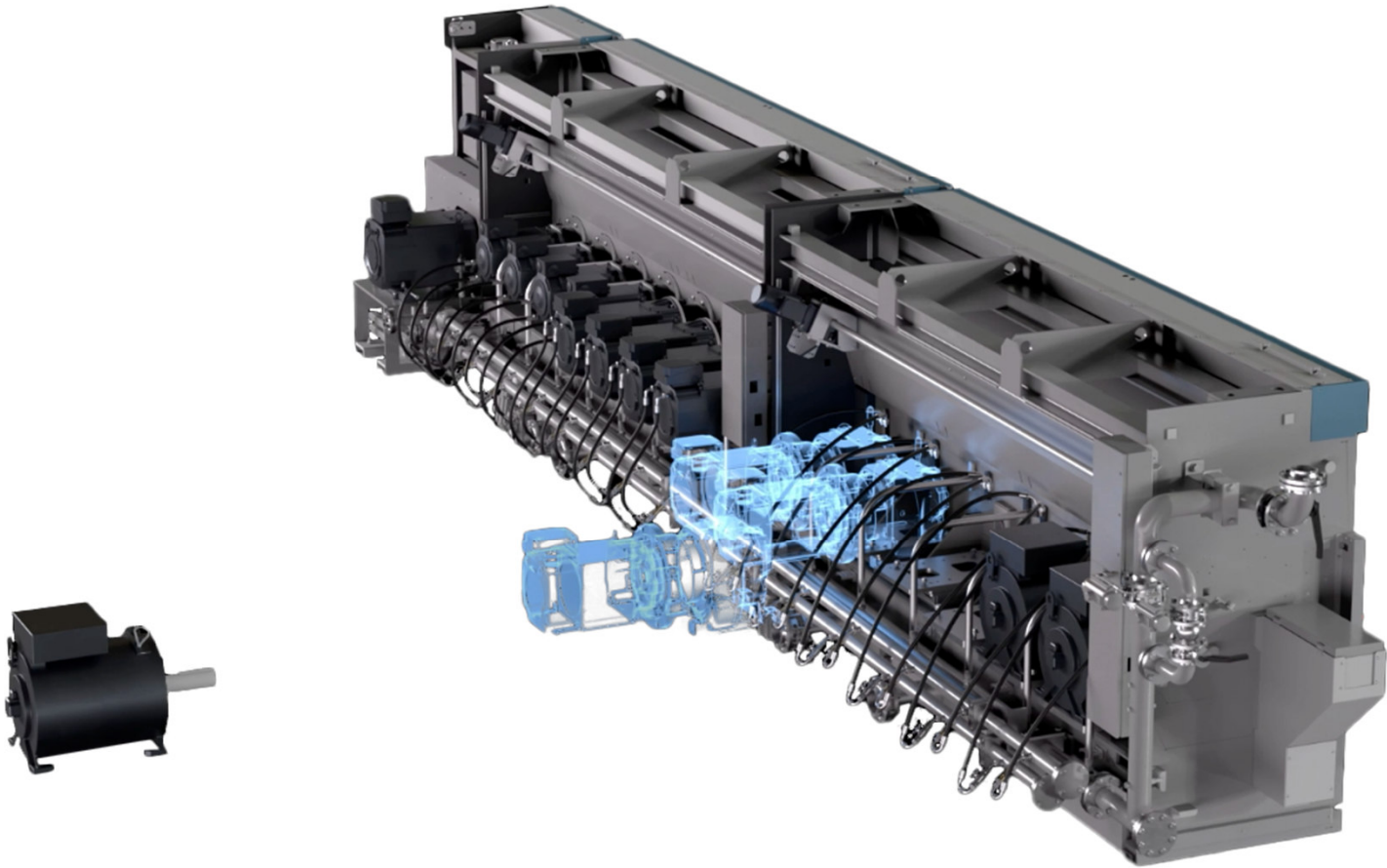
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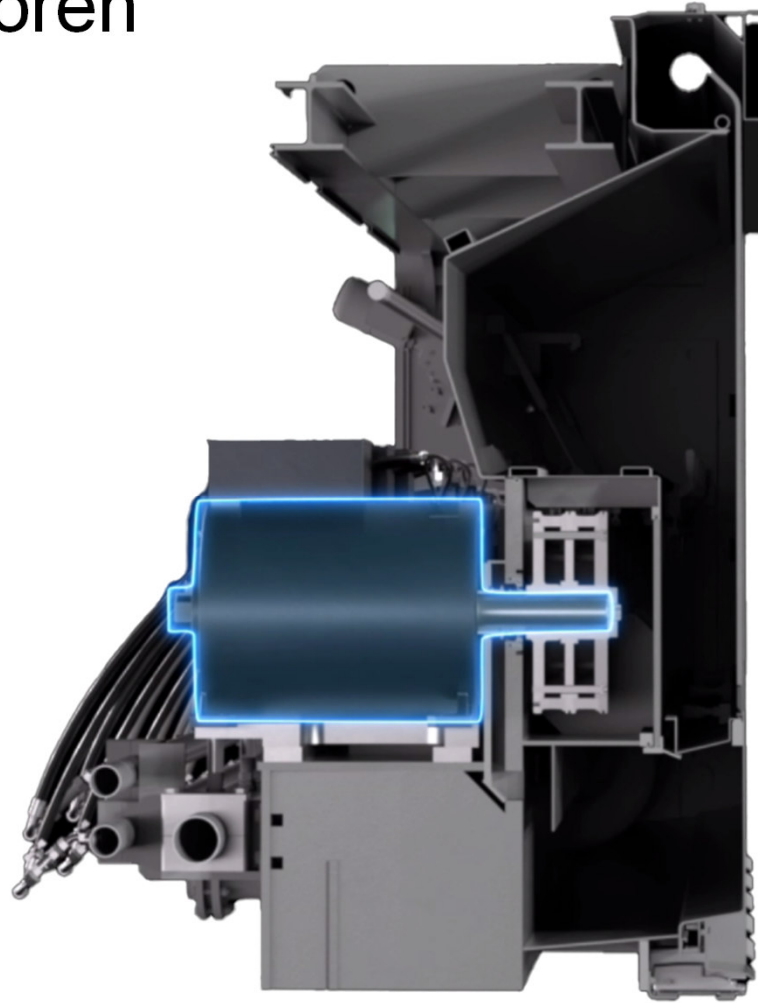
Neu: Torque Motoren



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Neu: Torque Motoren



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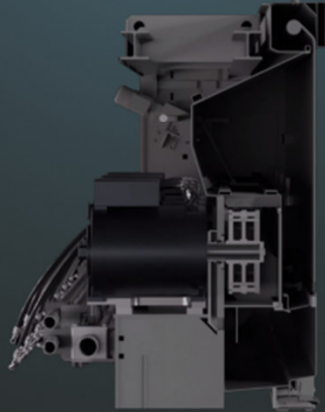
Direkt gekoppelte
Torquemotoren für
hohe Präzision und
Produktivität

Kundennutzen



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Direkt gekoppelt für hohe Präzision und Produktivität



Directly coupled for high precision and productivity



Minimum maintenance costs

minimale Wartungskosten



Less noise

weniger Lärm



NEW: Efficiency-increasing torque motors

neue effizienzsteigernde Torquemotoren



Power savings

Energieeinsparung



CO2 savings

CO2 Einsparung



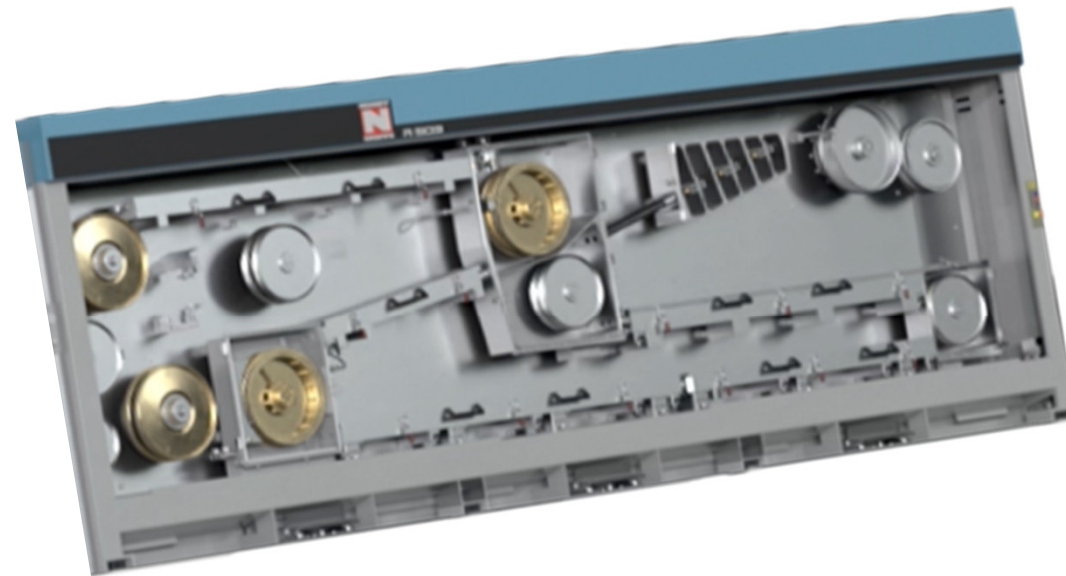
Potential for funding

Potenzial für eine Finanzierung

Neu: HEAT (High Efficiency Annealing Technology)



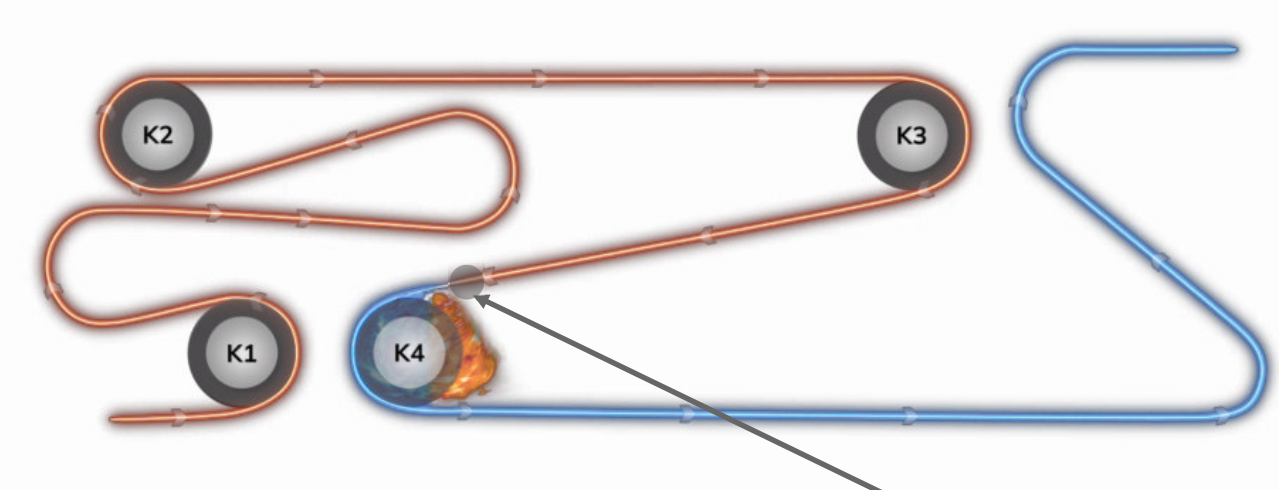
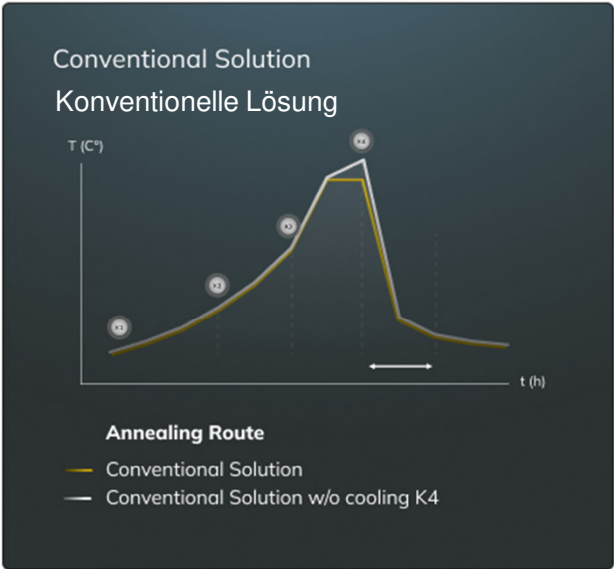
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Konventionelles Glühkonzept



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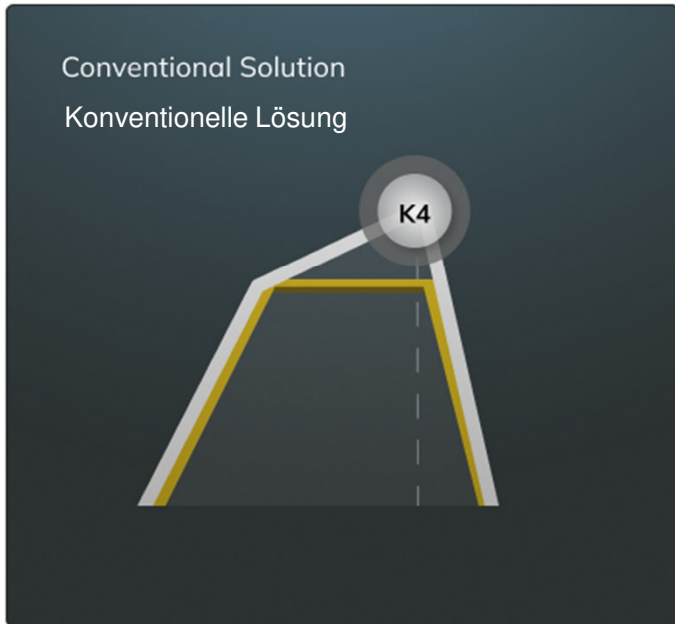


Eintauchpunkt

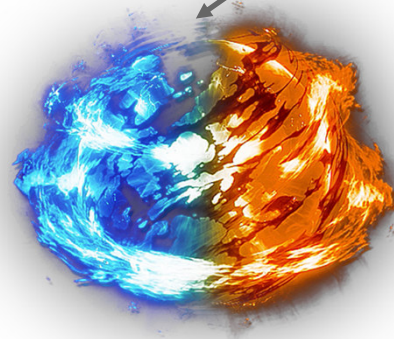
Konventionelles Glühkonzept



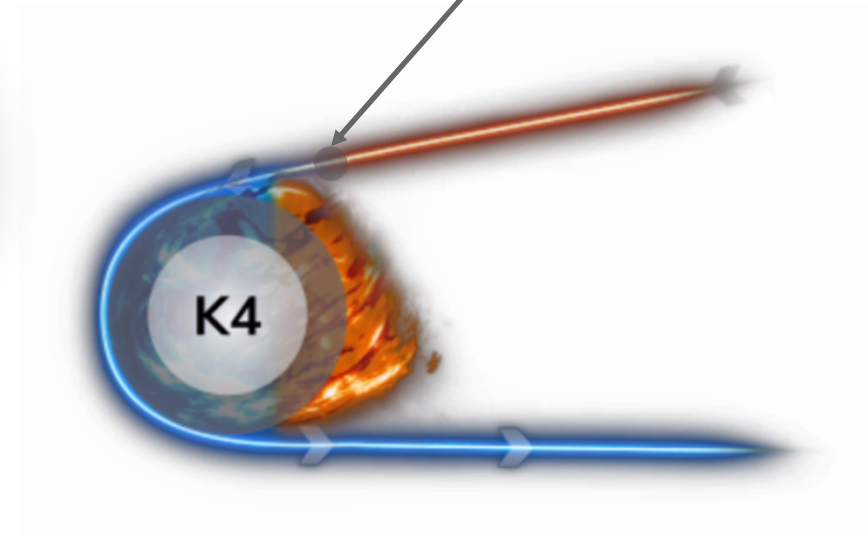
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Entgegenwirkende Energien



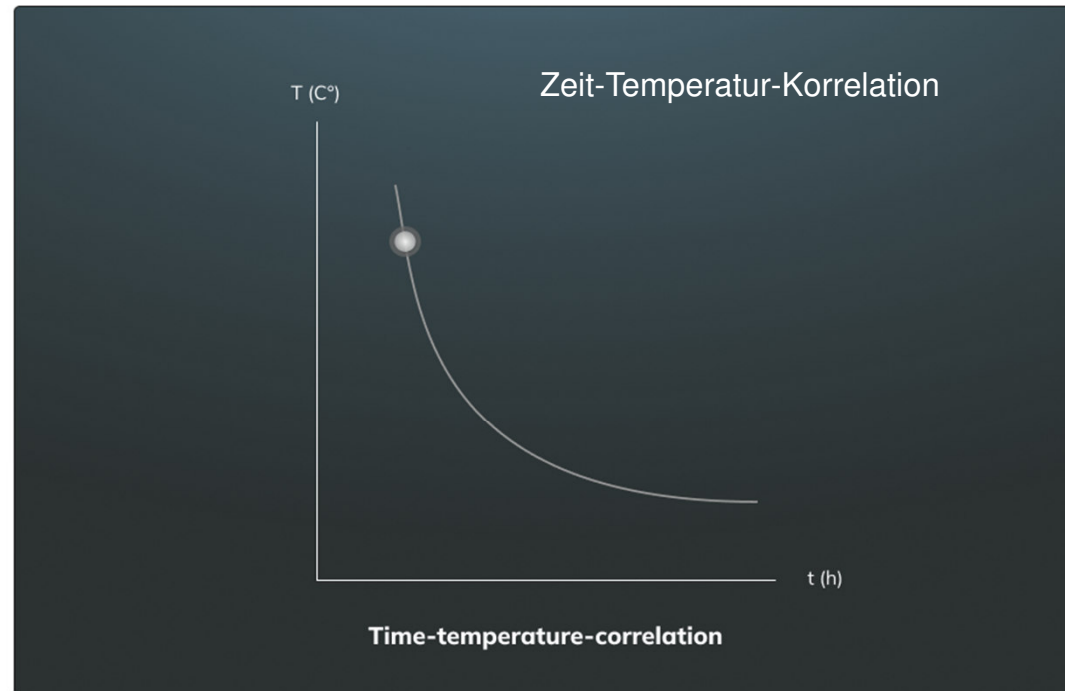
Eintauchpunkt



Physikalische Gesetze



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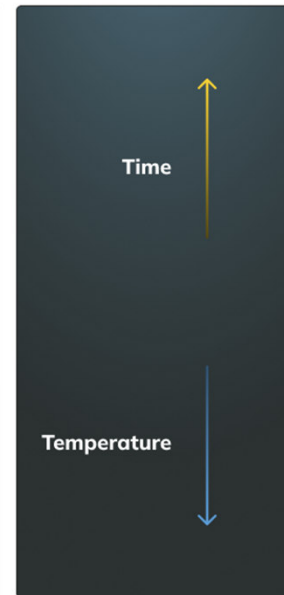
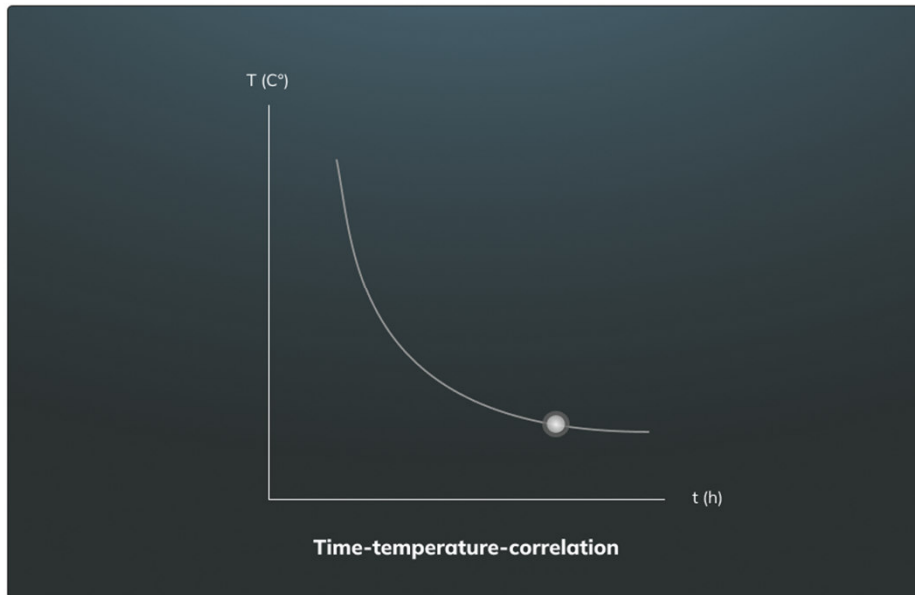


Was wäre, wenn wir das physikalische Gesetz nutzen würden?

Die Zeit-Temperatur-Korrelation in hoher Präzision im Bereich von Millisekunden?



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Was müsste sich aus maschineller Sicht ändern, wenn wir diese Erkenntnis nutzen wollen?

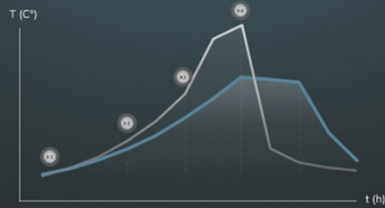
High Efficiency Annealing Technology - HEAT



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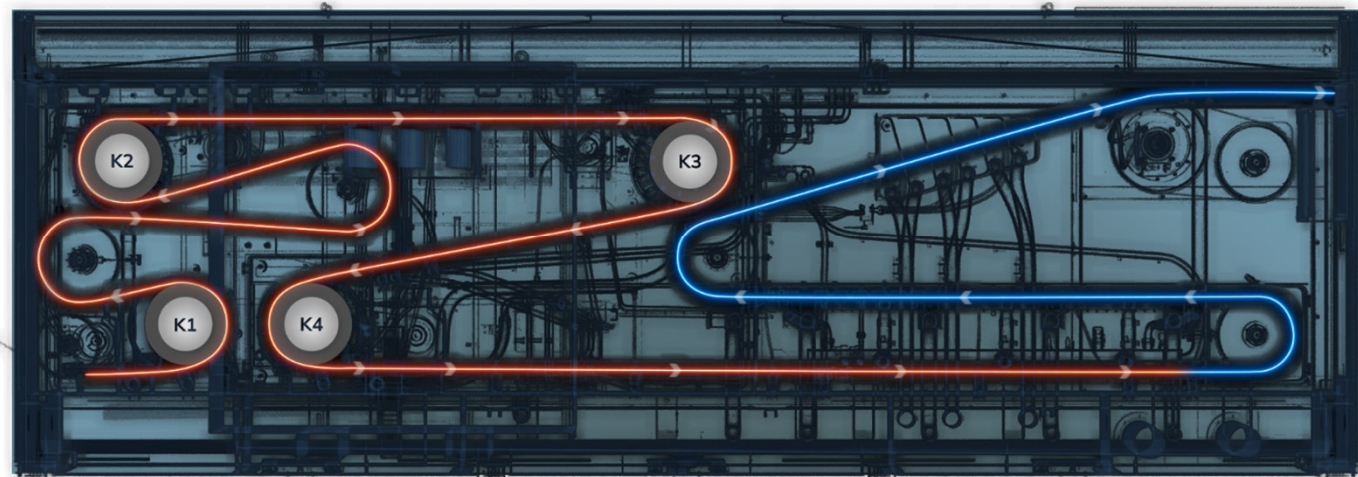
Vergleich der HEAT-Technologie mit konventioneller Lösung

Comparison HEAT Technology with Conventional Solution



Annealing Route

- Conventional Solution w/o cooling K4
- New HEAT Solution



Energieeinsparung
Power savings

New Generation of NIEHOFF Rod Breakdown Lines With High Efficiency Annealing Technology = HEAT



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Results: Speed Increase and Energy Savings for the Complete Line

Number of wires	Finished wire size [mm]	Speed (MM85+R501) in m/s before 1998	Energy consumption of complete line with spoolers MM85 + R501 [kWh/t]	Speed (MSM85) in m/s until 2012	Energy consumption of complete line with spoolers MSM85 + R501 [kWh/t]	Speed (MSM86) in m/s until 2023	Energy consumption of complete line with spoolers MSM86 + R502 [kWh/t]	Speed (MSM88) in m/s	Energy consumption of complete line with spoolers MSM88 + R503 [kWh/t]	Speed increase MM85 to MSM88 line	Energy Savings MM85 line to MSM88 line
2 x	1.628	35.0	173	35.0	155	40.0	149	40.0	131	+ 14%	- 24%
2 x	2.053	26.0	147	30.0	141	38.0	134	40.0	118	+ 54%	- 20%
2 x	2.588	16.0	137	20.0	127	24.0	119	32.0	102	+ 100%	- 26%
2 x	2.906	13.0	142	13.0	121	18.0	112	20.0	95	+ 54%	- 33%
2 x	3.264	8.0	128	8.0	118	11.0	106	12.0	89	+ 50%	- 30%

New Generation of NIEHOFF Rod Breakdown Lines With High Efficiency Annealing Technology = HEAT



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Energy and CO2 Savings

Kundennutzen – MSM88 + R503 + 2 Spoolers

Beispiel: 2 x 2.588mm mit 32 m/s

- 102 kWh/t (MSM88) anstelle von 137 kWh/t (MM85) $\Delta = 35 \text{ kWh/t}$
- Ausstoß: 10.8 to/h
- Produktionszeit 6,500 h/a, OEE 85% \rightarrow 60,000 t/a
- Energiekosten 0.20 €/kWh (Statistisches Bundesamt: durchschnittlicher Industriestrompreis Deutschland 2022)

➤ **420,000 € geringere Energiekosten/ Jahr / oder**

➤ **2,100,000 kWh Einsparung / Jahr**  **840 t CO₂ Einsparung / Jahr**

New Generation of NIEHOFF Rod Breakdown Lines
With High Efficiency Annealing Technology = HEAT



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Jährliche Gesamteinsparungen – MSM 88 + R503

Gesamte jährliche Energieeinsparungen = 420,000 €/a

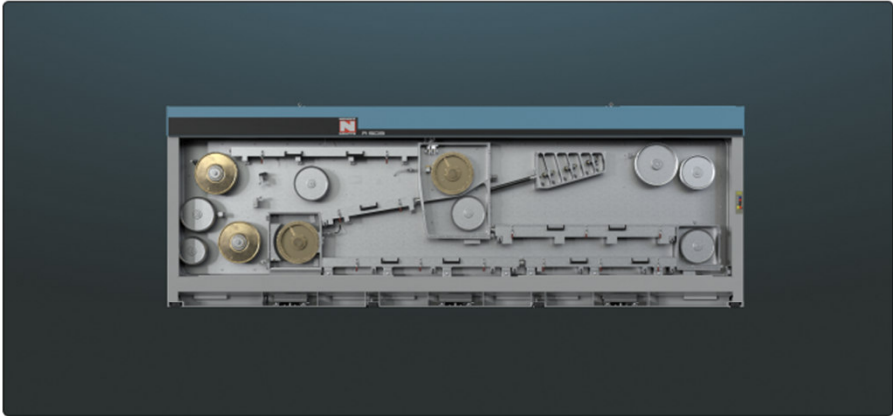
- 2,100,000 kWh Einsparung / Jahr
entsprechend 840 t CO₂ Einsparung / Jahr
- 2,100,000 kWh entspricht dem jährlichen Energieverbrauch
von 1000 Haushalte
oder
- 220 Flüge von Frankfurt nach New York und zurück (12,400 km)



Kleine Änderung – Große Wirkung



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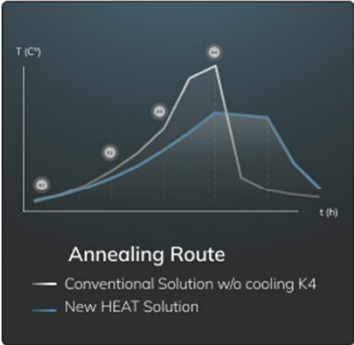


Power savings

Up to 100% speed increase Up to 100% more output

Remaining Annealing Power

530 kW R502 400 kW R503



Elongation
Surface
Oxidation

Thank you for your attention!



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