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**Battery cell coating
made by Sturm**



Why are battery cells coated with UV Paint?

The main task of the UV coating is the electrical insulation of the cell.

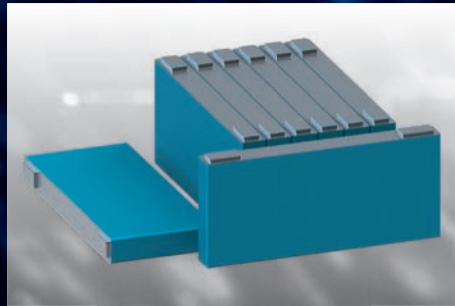
UV coating is a higher quality alternative to the foiling of the cells.

Advantages of UV coating compared to the foiling process

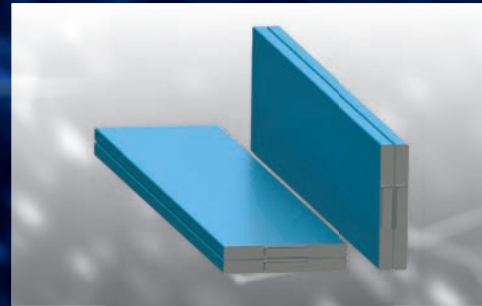
- + Uniform coating thickness, even on edges → complete edge coverage
- + No risk of melting due to heat-inducing subsequent processes
- + Better adhesion, especially at higher temperatures and alternating loads
- + Less thermal insulation
 - better heat distribution → lower risk of overheating
- + Better insulation at higher voltages
 - low reject rates (high voltage test)



Cylindrical cell



Prismatic cell



Blade cell

FOIL WRAPPING

Delamination

Not design-free

Not recyclable

Not reworkable



UV-COATING

Durability

System performance

Thermal conductivity

Suitability for liquid cooling

Adhesion to the substrate

Process quality

Electrical insulation effect

Flexibility of the surface





Why Sturm? #worldmarketleader

The Sturm-Gruppe - your strong partner.

For over 30 years, we have been offering our customers complete solutions in our three business areas of **Material Handling Systems, Surface Coating Systems and Thermal Surface Technology with Automation Technology.**

Our strength lies in the fast and creative development of customized special systems for your challenges! Thanks to flat hierarchies and maximum responsibility, our around 500 employees around the world can always be a competent and reliable partner for each of our renowned customers.

Whether from our headquarters in Salching in Lower Bavaria or one of our other locations throughout Germany, whether in other European countries, in the USA or in Asia: no matter where you are and what you are planning - we ensure that you are ready for the future in your market.

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Experience is the main source of all knowledge.

Many years of experience

- + First STURM UV coating system in 1994
- + First STURM battery cell coating system 2015
- + To date, we have delivered 23 cell coating systems.

We are world market leader

Customers with battery cell coating systems:



BBA

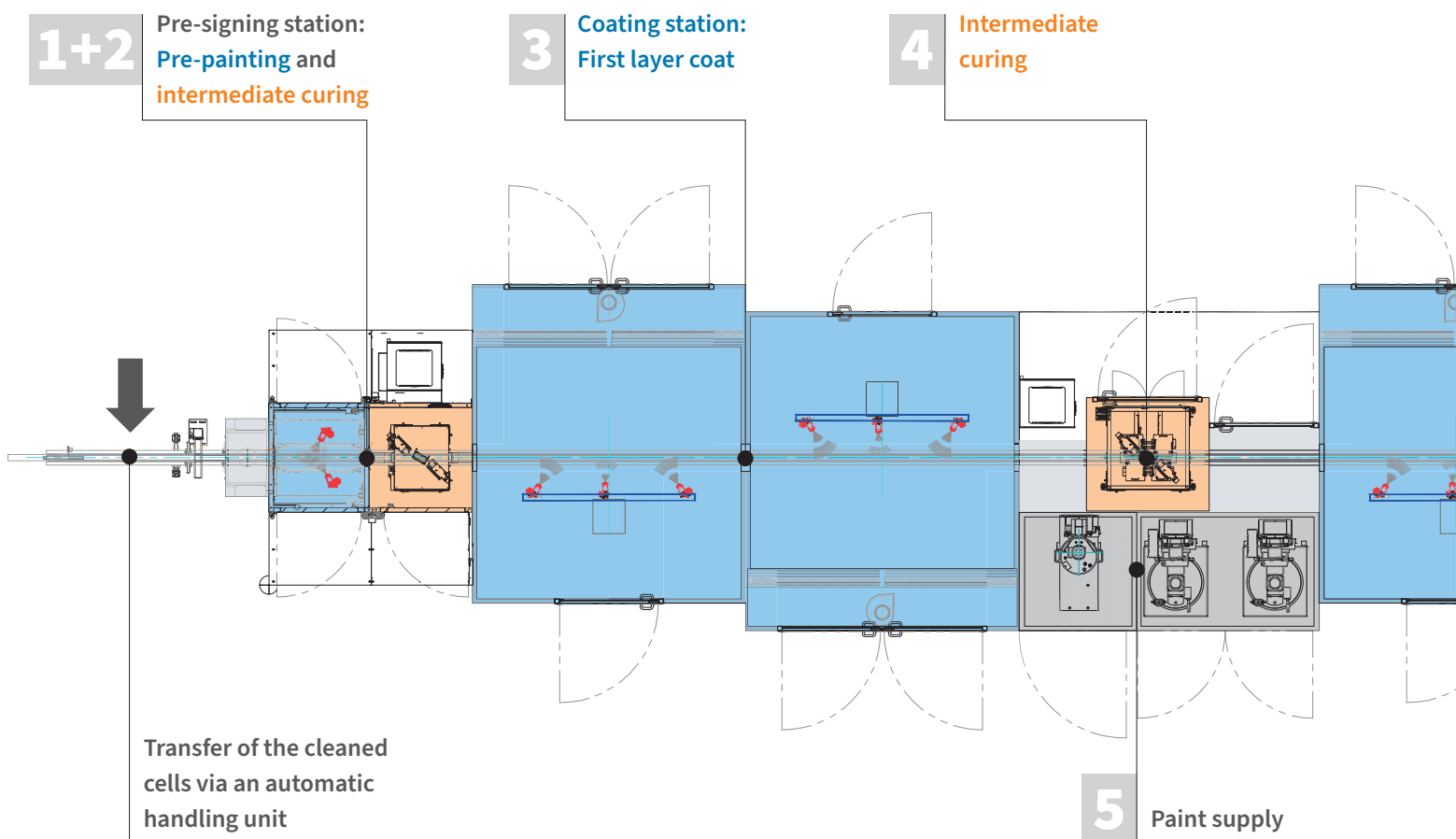
CATL

Advantages of UV coating compared to conventional coating systems

- + Fast curing (3 seconds)
- + High recycling rates of overspray possible
- + No solvents; reduction of emissions
- + No explosion protection of the system required
- + Low energy consumption



System overview (Serial production, 4th generation)





Coating station:
Second layer coat

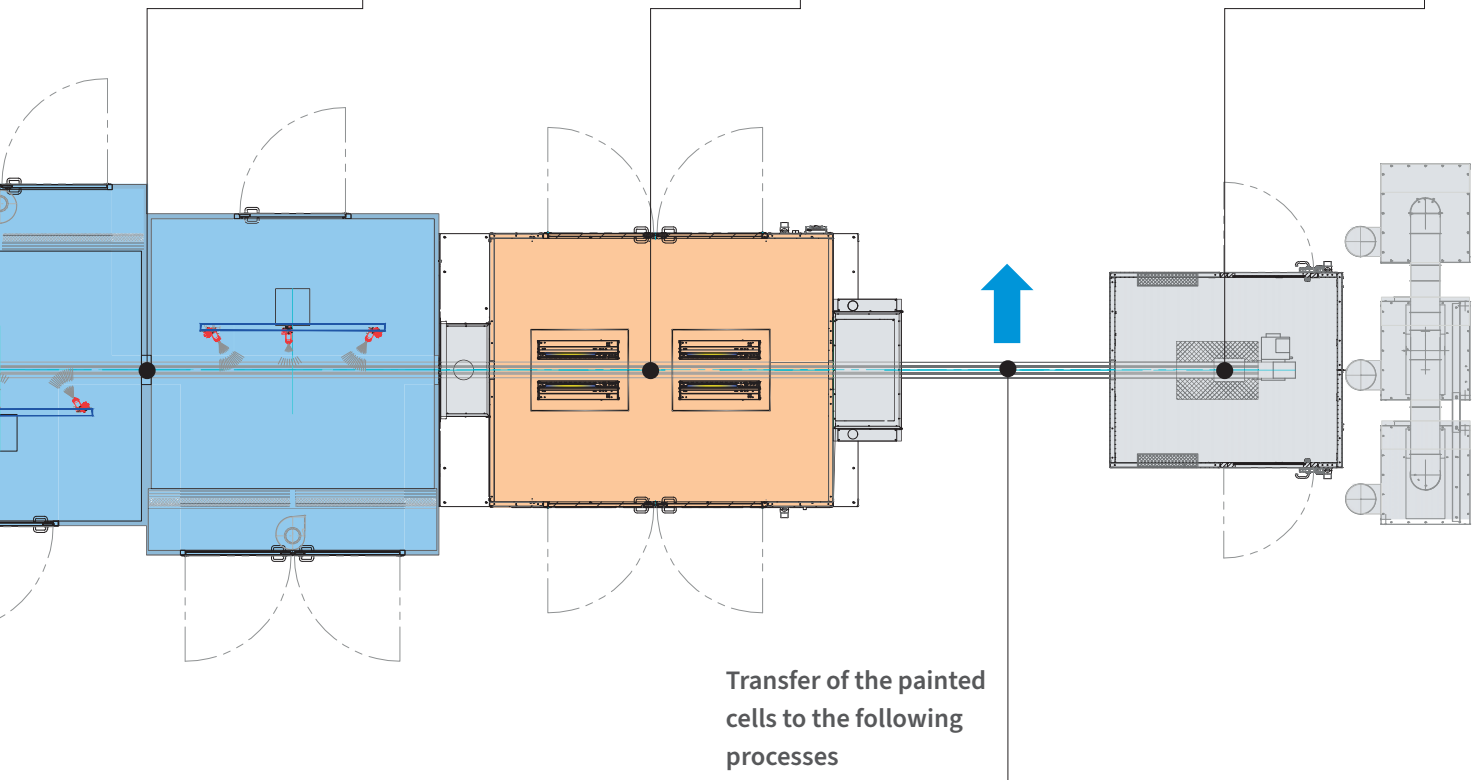
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Final curing

7

Workpiece
carrier cleaning

8



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Stations in detail

Complete system

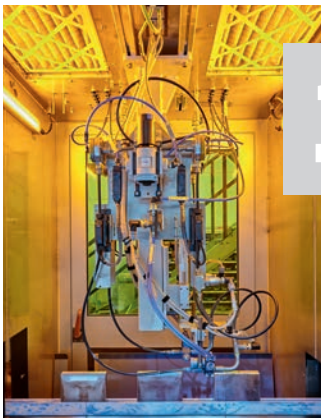
Features

- + Cycle time 1-2.5 sec (ultrafast)
- + 1,200 - 3,000 cells/h (OEE included)
- + Start-up time <2 min
- + Workpiece carrier
 - Highly precise
 - Customised
 - Paint-resistant
- + Clean terminal side

- + Different cell formats possible
- + Automatic recycle preparation and reuse
- + Redundant paint filtration
- + Continuous conveying system
- + VOC-free coating system
- + Coating of critical edges

Lessons learned

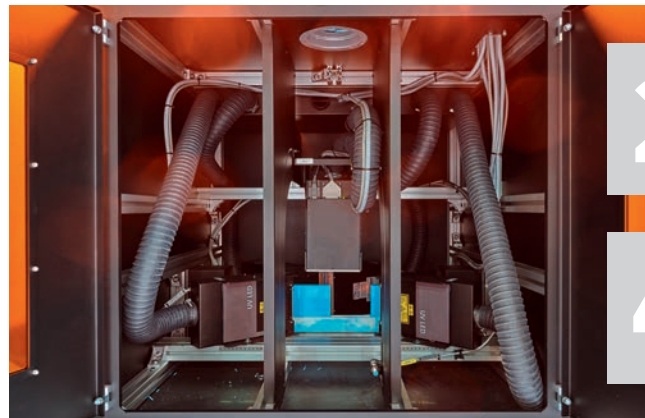
- + Lower maintenance costs
- + Lower maintenance effort
- + Booth size
- + Number of guns
- + Cleaning station



1

Pre-signing station

- + Coating of critical edges
- + Optional



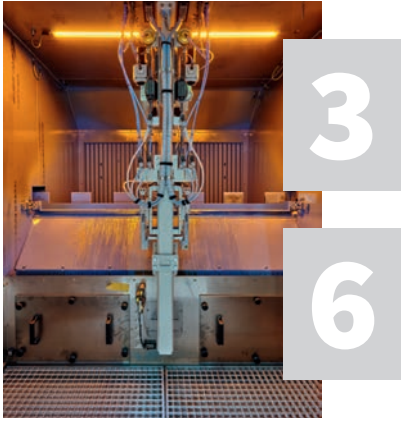
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Intermediate curing

- + LED
- + Energy efficient
- + Long life

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Coating station(s)

- + Overspray separation
- + Including automatic recycling



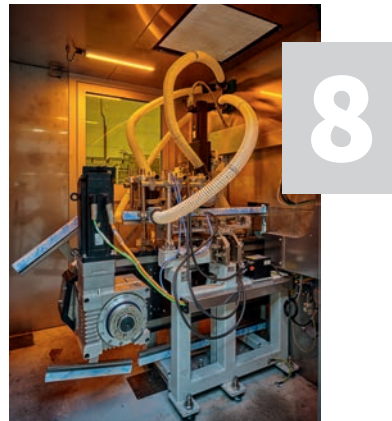
Paint supply

- + Working tank 60 litres
- + Refill container 200 litres
- + Recycling container 200 litres



Final curing

- + Sturm UV lamps
- + In-house developed technology



Workpiece carrier cleaning

- + Milling station
- + Scraper station/brush cleaning
- + Suction unit



Ventilation unit and ventilation ducts

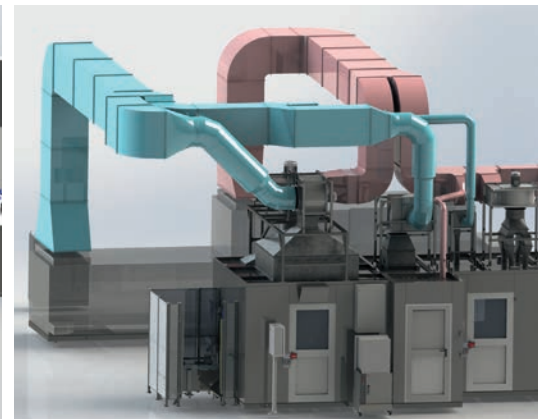
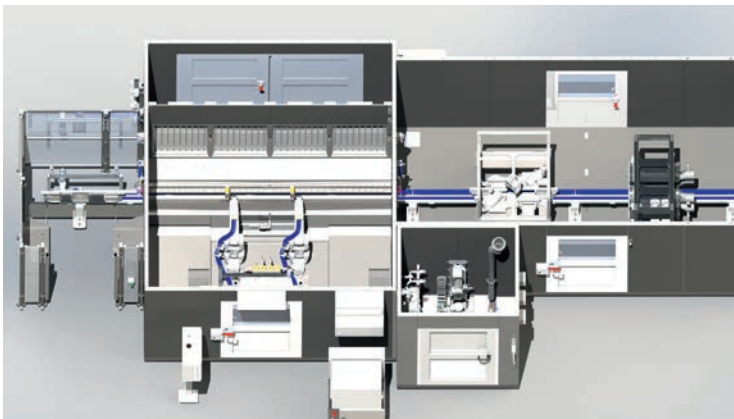
- + Maintenance platform
- + Volume flow monitoring
- + Flexible solutions for different outdoor conditions



Low Volume

Entry through a low volume line into battery production with lower quantities in order to gain experience for series production (peripheral interfaces, near-series production, etc.).

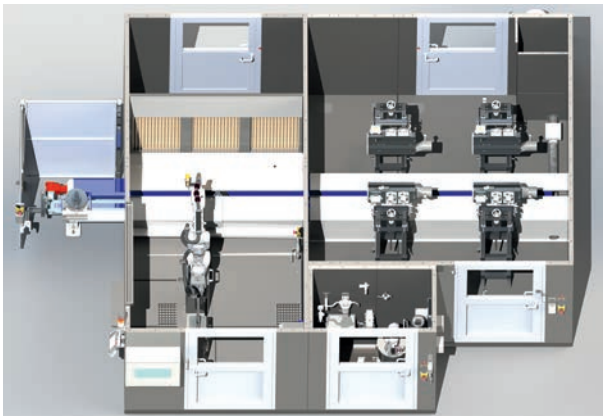
- + Capacity depending on cell geometry and cell size approx. 30-90 cells per hour
- + Manual or automated loading and unloading possible
- + Paint application with robot-guided or stationary spray guns
- + Various cell geometries possible
- + Can be quickly converted to other cell formats



Test facility

Installation of a test system for a technical centre to define processes and parameters for your series production/product development (coating type, cell format, cycle time, etc.).

- + Paint supply from small containers (e.g. 30kg hobbocks)
- + Paint application with robot-guided spray gun
- + Various cell geometries possible
- + Can be quickly converted to other cell formats



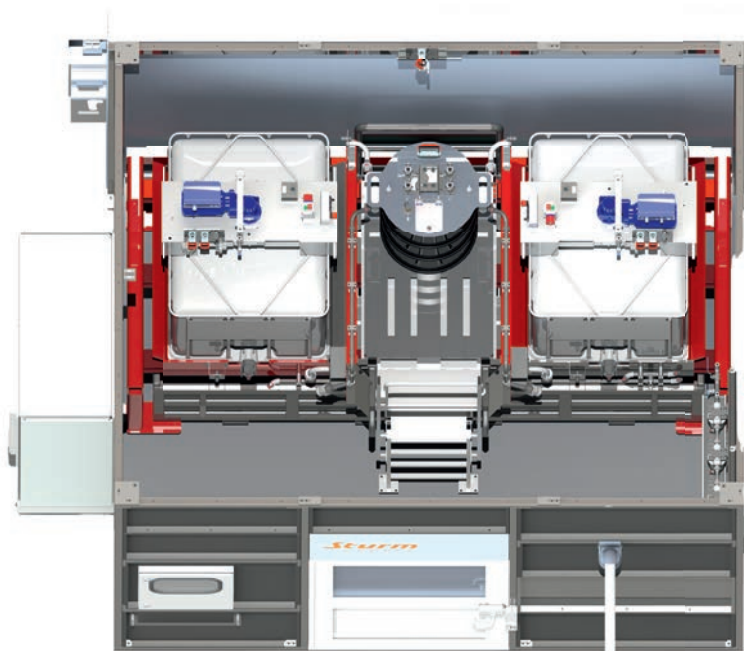
Option for series production



Central paint supply IBC

To optimise series production with several systems in a production facility, this option can offer added value.

- + Up to 6 lines can be connected to a central paint supply system
- + Designed for forklift loading
- + Reduces the change interval of the delivery containers
- + Possible with or without enclosure
- + With integrated rinsing station and paint collection leakage tray
- + 1 or 2 IBC containers possible



High-Volume production systems

Current experience and general process aspects

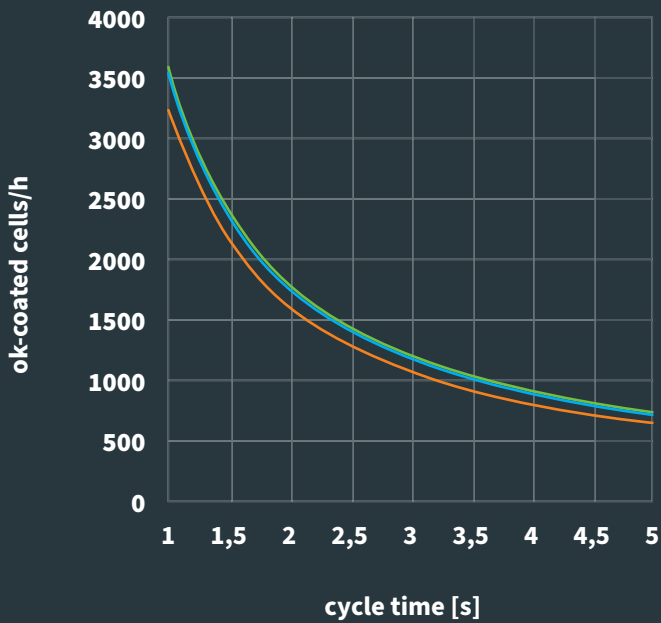
High importance of quality, especially with low cycle times due to decoating capacity and costs!

Nr.	Location	SOP	Sturm Status	Cell length	Cycle time
1	Germany	2019	FA	173 mm	3,0 s
2	China	2020	FA	301 mm	4,5 s
3	China	2020	FA	301 mm	4,5 s
4	China	2020	FA	301 mm	4,5 s
5	Germany	2020	FA	301 mm	4,5 s
6	China	2022	FA	301 mm	2,0 s
7	China	2021	FA	148 mm	1,96 s
8	China	2022	FA	148 mm	1,96 s
9	China	2022	FA	148 mm	1,96 s
10	China	2022	FA	148 mm	1,17 s
11	China	2022	FA	148 mm	1,17 s
12	Germany	2022	FA	148 mm	1,17 s
13	Germany	2023	FA	148 mm	1,17 s
14	Germany	2023	FA	148 mm	1,17 s
15	Germany	2023	FA	148 mm	1,17 s
16	Germany	2023	FA	148 mm	1,17 s
17	Germany	2023	FA	148 mm	1,17 s
18	China	2023	FA	148 mm	1,17 s
19	China	2024	FA	148 mm	1,17 s

- + List of industrial battery cell coating systems
- + A system with a 1s cycle time is currently under development
- + FA – Final Acceptance
- + COM – Commissioning
- + HO – Handover
- + SOP – Start of Production

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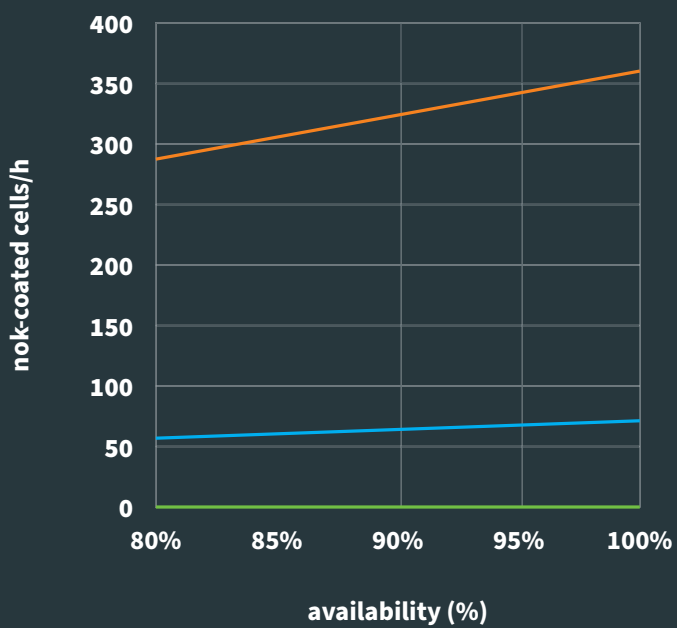
ok-coated cells/h depending on different cycle times and FRQs



— FRQ 100% — Sturm-FRQ 98% — FRQ 90%

The output of ok cells depends largely on the first run quote (FRQ), especially with short cycle times.

nok-coated cells/h at 1 s cycle time depending on availabilities and FRQs



The nok cells/h increase in line with the system availability, which results in high investments/expenditure for paint stripping.

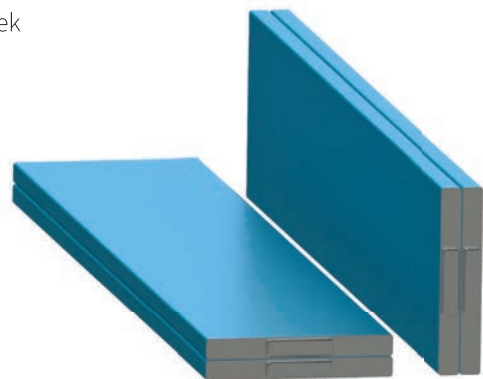


Sturm Technical Centre

Prototypes can be painted under laboratory conditions in our technical centre in order to gain an insight into the component, the paint and the process.

In-house test laboratory

- ✓ In-house R&D
- ✓ Prototype coating for customers
- ✓ Test series for customers with up to 750 cells per week
- ✓ Scientific test evaluation
- ✓ In-house process development team

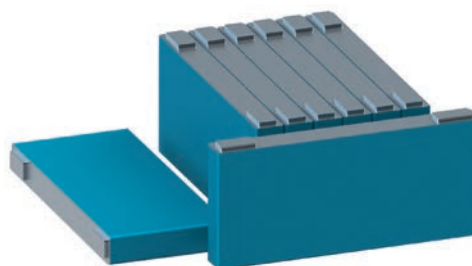


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Sturm Technical Centre equipment Surface Coating Systems

- ✓ Linear UV coating system with 2 coating stations
- ✓ LED curing and final curing (FE-doped lamps)
- ✓ Rotary table UV coating machine
- ✓ Coating thickness measurement
- ✓ Cross-cut test
- ✓ UV measurement
- ✓ High-voltage testing



Sturm

Oberflächentechnik

Get in touch with our experts on the subject of Surface Coating Systems!

Sturm Maschinen- & Anlagenbau GmbH · Industriestraße 10 · 94330 Salching · Germany

☎ +49 9421 5520-229

✉ oberflaechentechnik@sturm-gruppe.com

Sturm
GRUPPE

Head office: Industriestraße 10 · 94330 Salching · Germany
Phone +49 9421 5520-0 · www.sturm-gruppe.com



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