DELTA MKS

DELTA® protects surfaces.

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DoD Workshop SUR/FIN 2010
Commercial Fastener Coatings
Dörken

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Report Documentation Page

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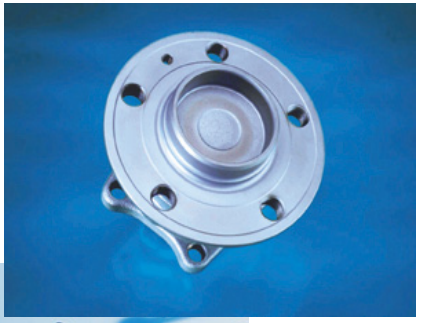
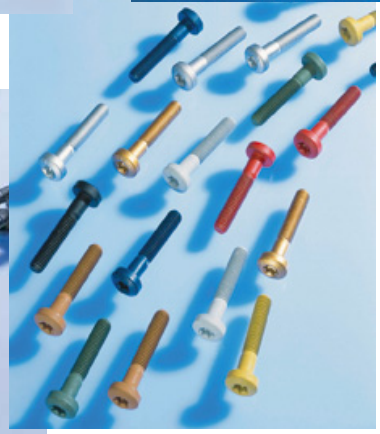




Dörken

- A manufacturer, developer, and supplier of zinc-rich corrosion protective coating systems and technology.

- Primary Products and Trademarks:
  - DELTA®-TONE 9000 (Zinc Rich Basecoat)
  - DELTA-PROTEKT® KL 100 (Zinc Rich Basecoat)
  - DELTA®-SEAL (Organic Sealer, multiple colors)
  - DELTA-PROTEKT® VH (Clear Water-based sealer)
  - DELTACOLL® (Inorganic Sealer, multiple colors)





Ewald Dörken AG.

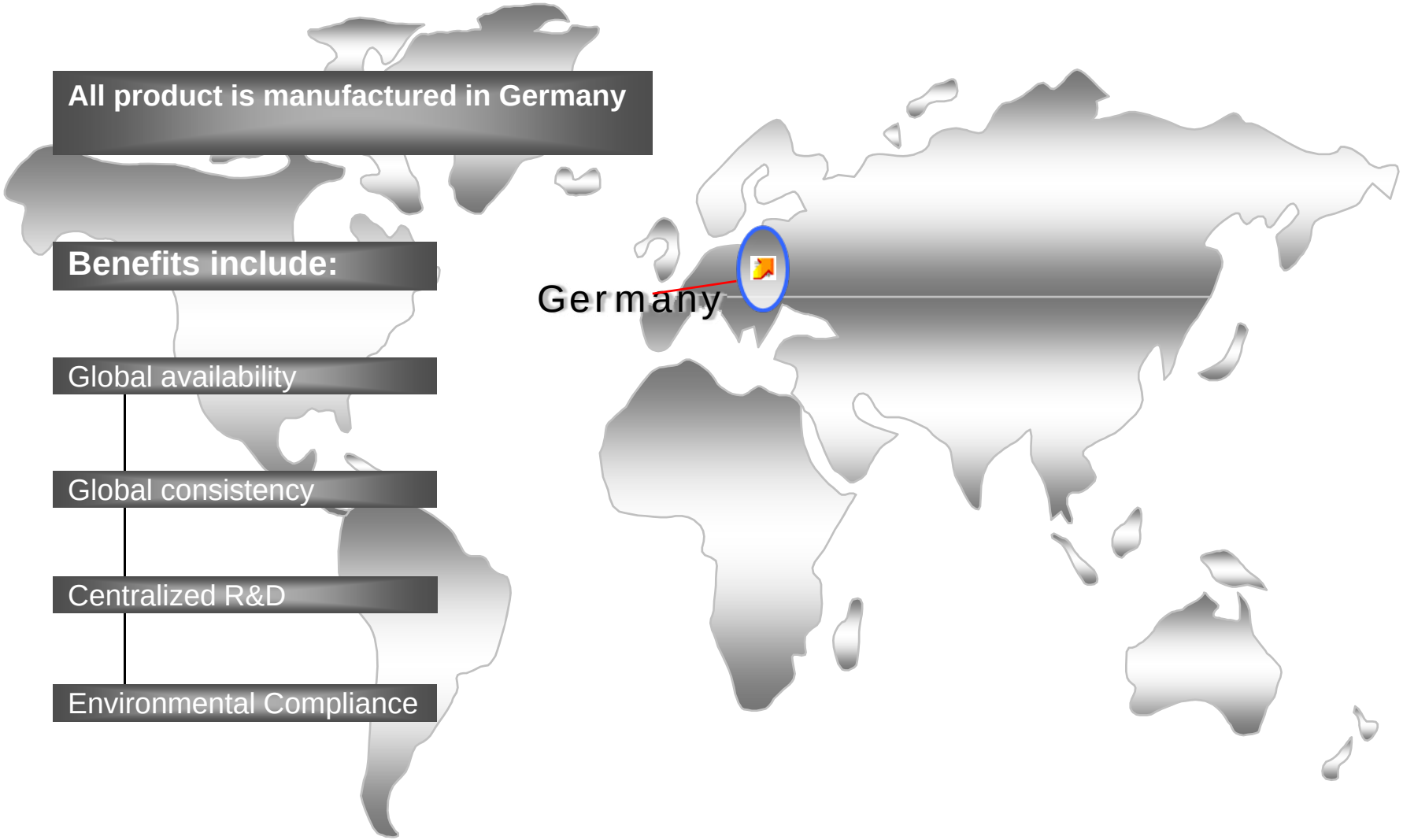
- Founded 1892
- 740 Employees, Exports to 30 countries, MKS reps. in 12 countries
- Global Tech-Center, Production, R&D located in Herdecke , Germany
- ~$250 Million Annual Sales

Central Manufacturing

All product is manufactured in Germany

Benefits include:

- Global availability
- Global consistency
- Centralized R&D
- Environmental Compliance



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Dörken MKS-Systems worldwide

Global Applicator List Available @ www.doerken-mks.com (infocenter, job coater)

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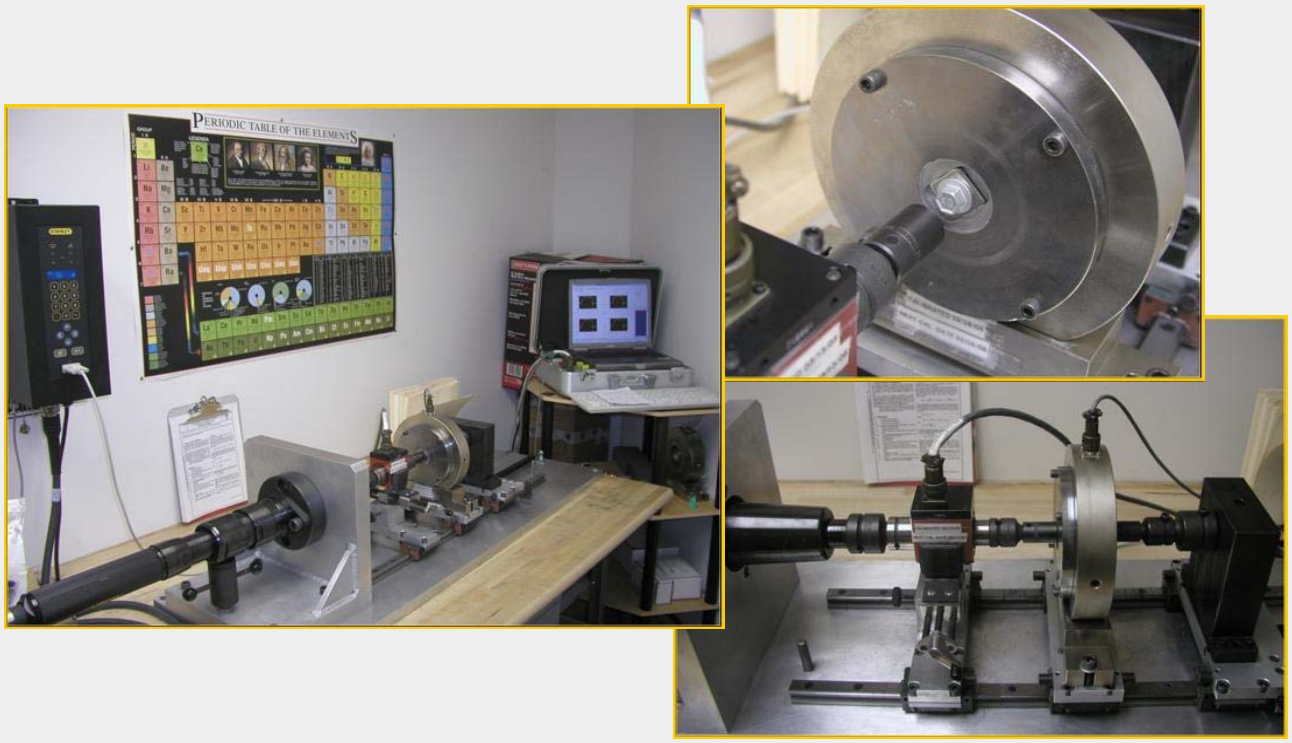
NA Technical Center 11200 Cedar Knoll Drive - Grass Lake, MI 49240

Technical Center - Fastener Application Testing

Torque, Tension, Angle, Friction Testing

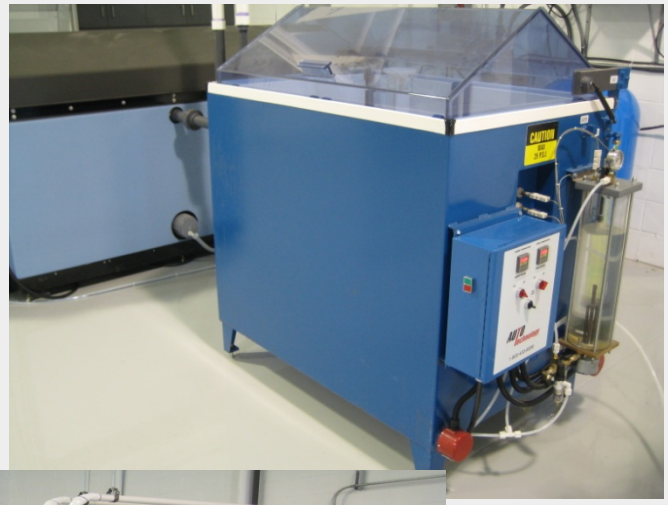


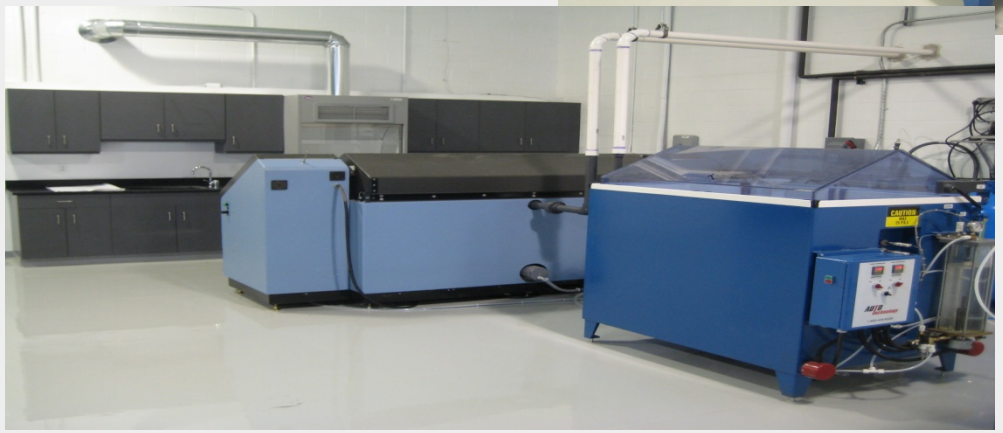
Technical Center – Coating Examination Testing

- Coating Thickness: X-Ray Fluorescence (Fischerscope)
- Coating Examination: Nikon Microscope
- Temperature and Humidity: ESPEC Platinous Chamber with Yokogawa Recorder

Technical Center – Corrosion Testing

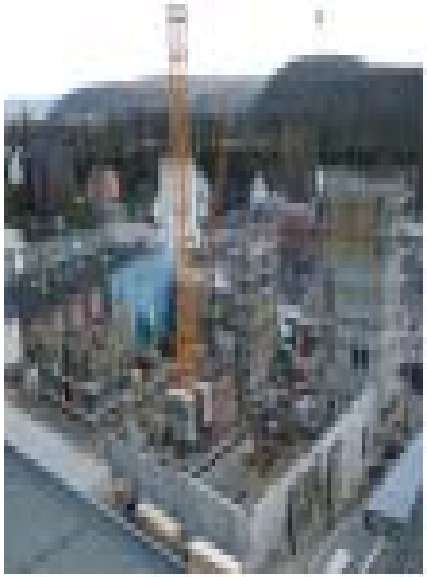
- Cyclical Corrosion: Auto Technology Cyclical Corrosion Chamber
- Neutral Salt Spray Testing: Auto Technology Corrosion Test Chamber





The Delta-MKS Division of Dörken

- Over 30 years manufacturing and developing Zinc-Rich Corrosion Protective coating systems. (Delta®-Tone 9000)
- Solvent Based Chemistry Zinc-Rich Basecoats and Organic Topcoats.
- Water Based Chemistry for Clear Silicate Topcoats (Delta-Protekt® VH Series)
- All Products are Composed of High Grade Materials which ensures the highest quality attributes in the finished product.



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Product Lines

Micro coating anti-corrosion systems

Basecoat
Zn-Flake

- DELTA ®-Tone 9000 *(Inorganic)*
- DELTA-PROTEKT® KL 100 *(Inorganic)*
- DELTA-PROTEKT® KL 105 *(Inorganic/Integral Lube)*
- DELTA-PROTEKT® KL 108 *(Inorganic/Hi CoF)*
- DELTA-PROTEKT® KL 101 *(Inorganic)*

Topcoat
for Zn-Flake Basecoat & Phosphate

- DELTA® -SEAL *(Organic)*
- DELTA-PROTEKT® VH 300, 301, & 302 *(Inorganic Water based)*
- DELTA-PROTEKT® VL 411 & 450 (UV) *(Organic)*
- DELTA®-Lube Clear, Blue & Green *(Organic Water Based)*

Topcoat
for Electroplating

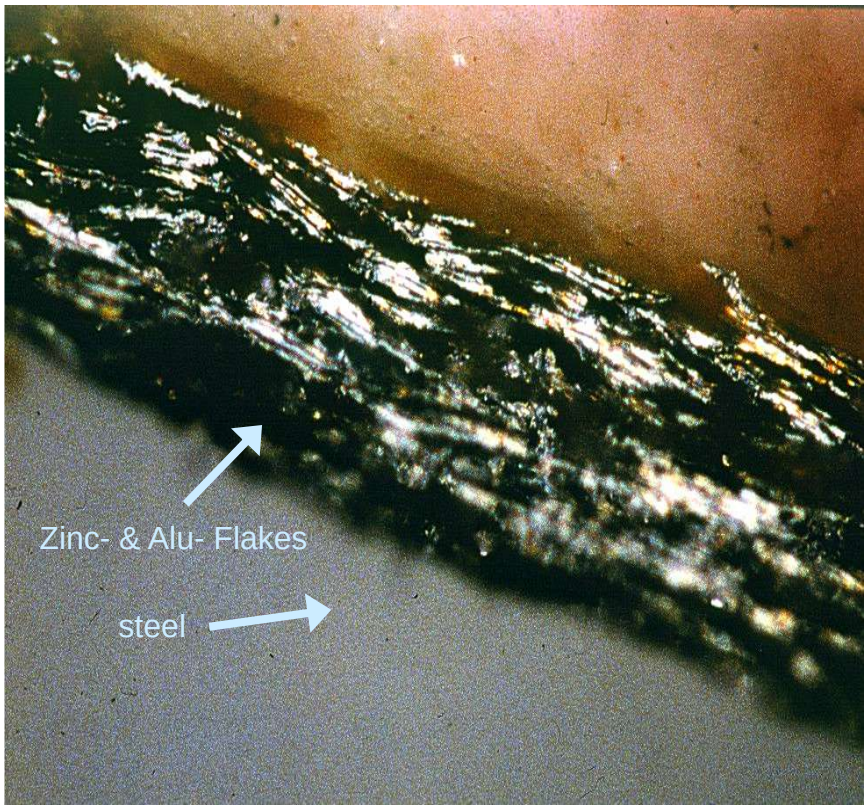
- DELTACOLL® *(Inorganic)*
- DELTA PROTEKT® VH 350, 351, & 352 *(Inorganic Water based)*

Zinc Rich Basecoats: DELTA® -Tone 9000 and DELTA-PROTEKT® KL 100

Composition:
- >70% Zinc Metal in Milled Flake Form
- Titanium Binder
- ~10% Aluminum

In Applied Form:
- Typical Coating Thickness <10µm
- Conductive
- Silver / Grey Appearance

May Be Applied To:
- Bare Steel Substrates (Degreased)
- Zn or Fe Phosphated Substrates
- Other Metal Alloy Substrates



Dörken Zinc-Rich Coating Systems

- May be applied to fasteners ≥M6. Smaller fastener sizes possible with special processing. (Thin coating system, 5-25 µm)
- No Hydrogen Embrittlement Due to Process Technique
  - Suitable for High Strength Fasteners.
- Always Chromium (VI)-free
- Integrated Friction Modification for Consistent Torque in Assembly
  - Average µtot = 0.10 – 0.16 (ISO16047)
  - Multiple friction levels available
- High Corrosion Protection
  - ASTM B117, ISO 9227 > 1000 Hours No Red Corrosion
  - ASTM G85 Annex 4 ($S0_2$) > 1000 Hours No Red Corrosion
  - GM9540P > 120 Cycles
  - SAE J2334 > 80 Cycles

DELTA®-TONE + DELTA®-SEAL

0 h SST

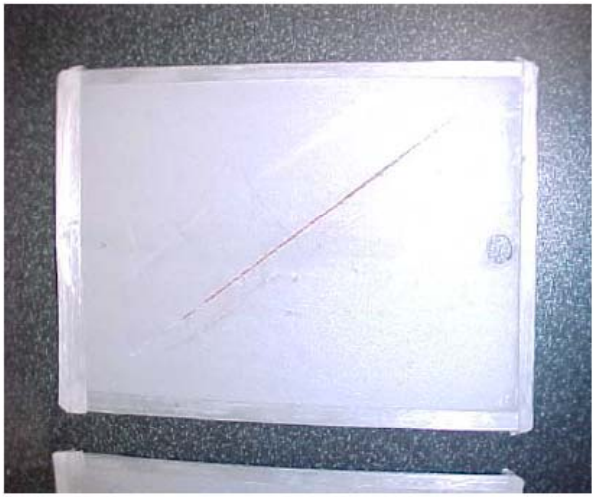
480 h SST

960 h SST

2000 h SST end of test without any red rust

120 Cycles GM9540P – Delta-Protekt KL 100 and Delta-Seal GZ Silver

PANEL #3

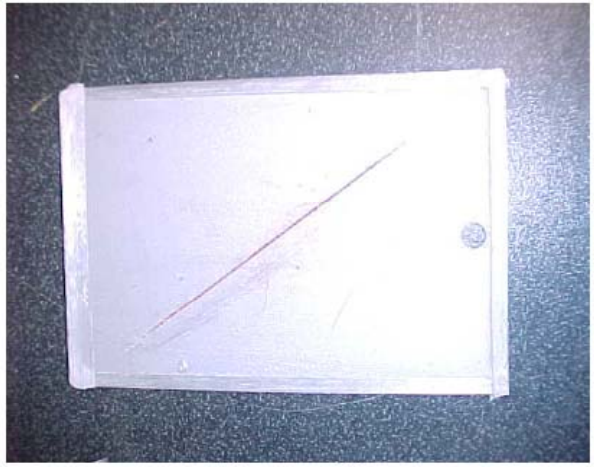


PANEL #4

PANEL #5

PANEL #6

PANEL #7



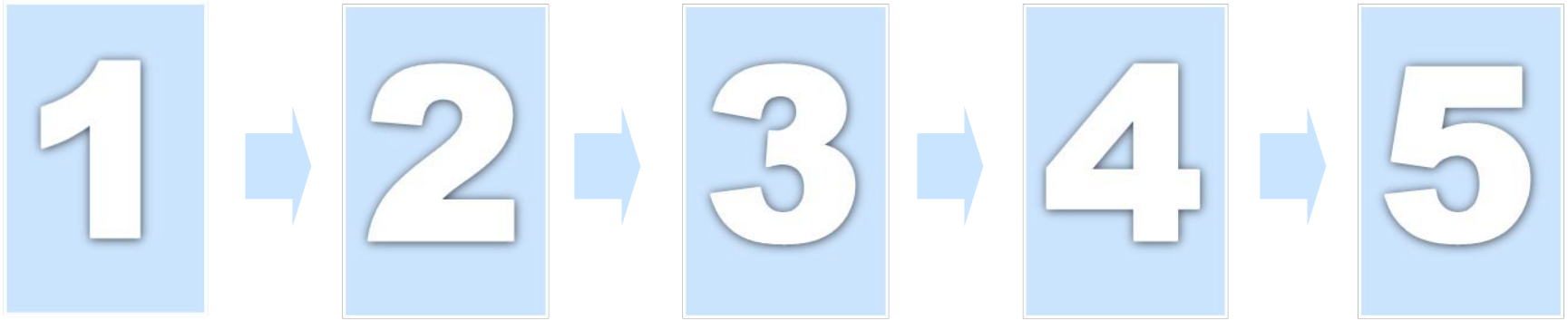
PANEL #8

ASTM G85-02 Annex 4 – Salt Fog/SO_2

Delta-Protekt KL 100 and Delta-Seal GZ Silver: 1008 Hours ASTM G85-02 Annex 4

Delta-Protekt KL 101
>5000 Hours ASTM B117

General application process.



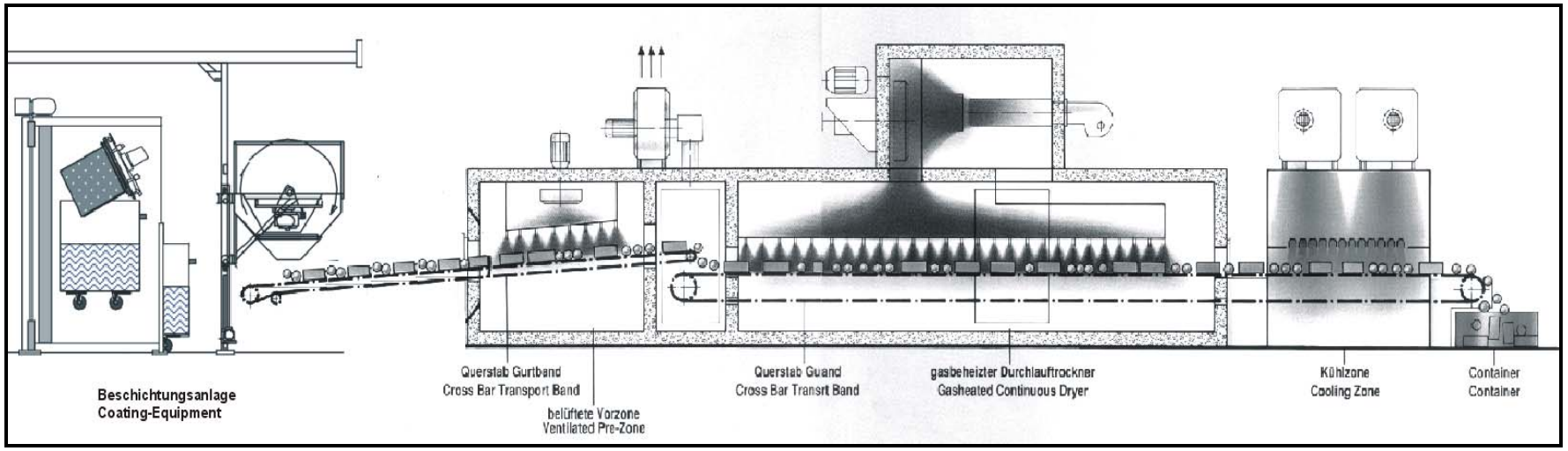
Pretreatment **Coating** **Preheating** **Curing** **Cooling**

Degreasing
Shot blasting
Phosphating*
*partly recommended

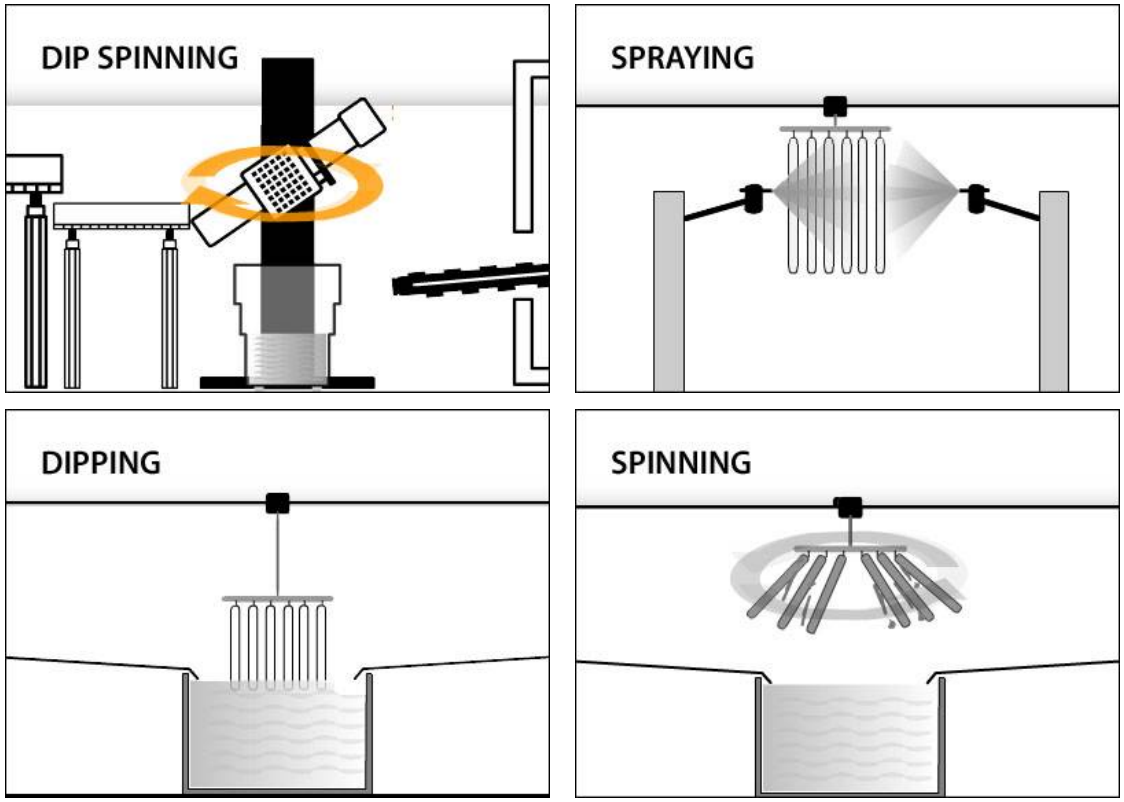
Dip Spinning
Dipping
Spraying
Spin coating

Conveyor oven
box oven
Inductive drying

Application Techniques - Dip Spin Coating



Coating application techniques.



FASTENER SYSTEMS

BIG FASTENER SYSTEMS

STAMP PARTS

BIG PARTS

BRAKE DISCS

SPRINGS

Performance Specifications:

- ISO 10683 *Fasteners-Non-electrolytically applied zinc flake coatings*
- ASTM – Pending
- GMW 3359

Our markets.

AUTOMOTIVE

WIND ENERGY

AEROSPACE

CONSTRUCTION

ENGINEERING

OTHERS

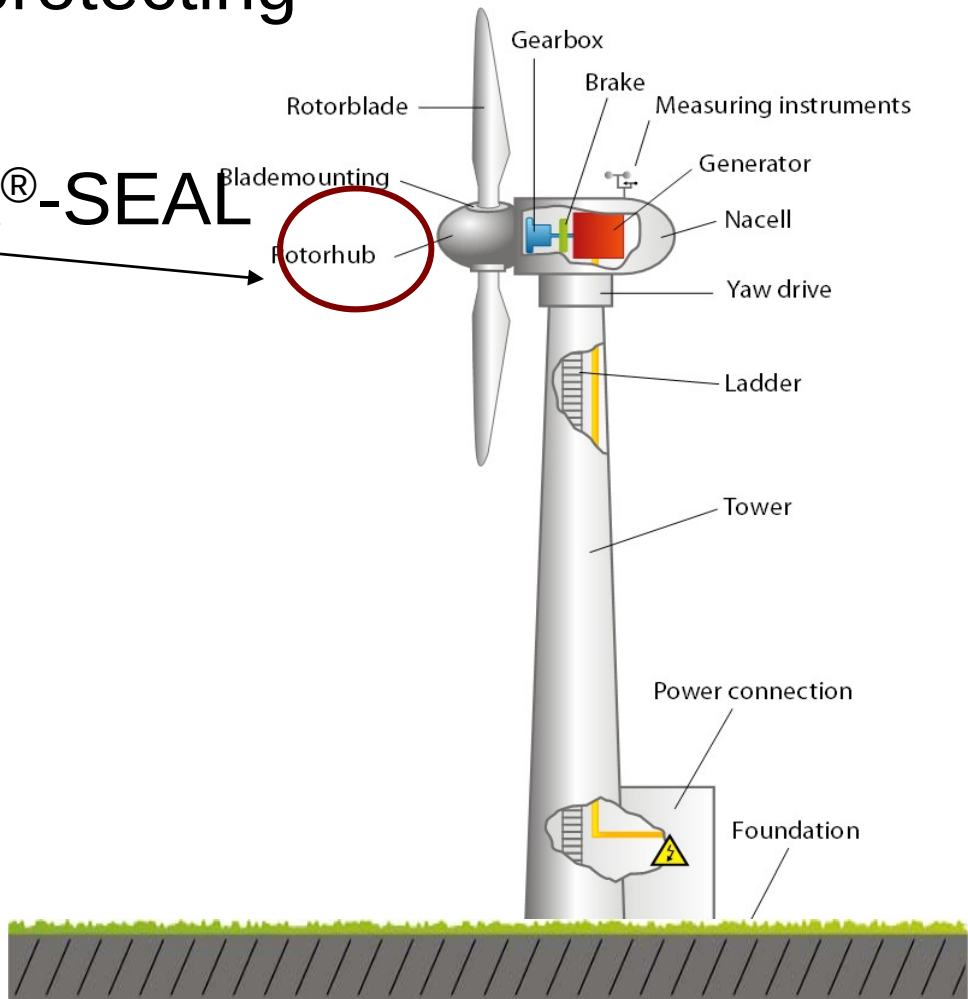
Approved by all major OEMs worldwide*

*just a selection

Wind Energy Applications

- 15 years experiences protecting rotorblade assemblies:

DELTA®-TONE + DELTA®-SEAL



Specification approval of the DELTA-MKS® systems.

Wind turbine manufacturer	Specification
Acciona Windpower (ES)	CS0129
BARD Engineering (GER)	Germanischer Lloyd Guidelines
Enercon (GER)	MK06000-0
Fuhrländer/W2E (GER)	W0402-G03-DASH
Gamesa Eólica (ES)	EQ630001
GE- Wind Energie (USA)	P14A-AL-0218
Kenersys (IND)	KSY_SPC_bolt
Suzlon (IND)	M0606600
Vestas (DK)	ERP 900182
Nordex (GER) Repower Systems (GER) Siemens Wind Power (DK)	In process

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