



**WE THINK
INNOVATION**

Advanced Gelcoats, Adhesives and Crestapol® Resins for Land Transport Applications

Composites Engineering Show, 5 November 2015

By Sergio Velosa



- *Company introduction*

For land transport we offer:

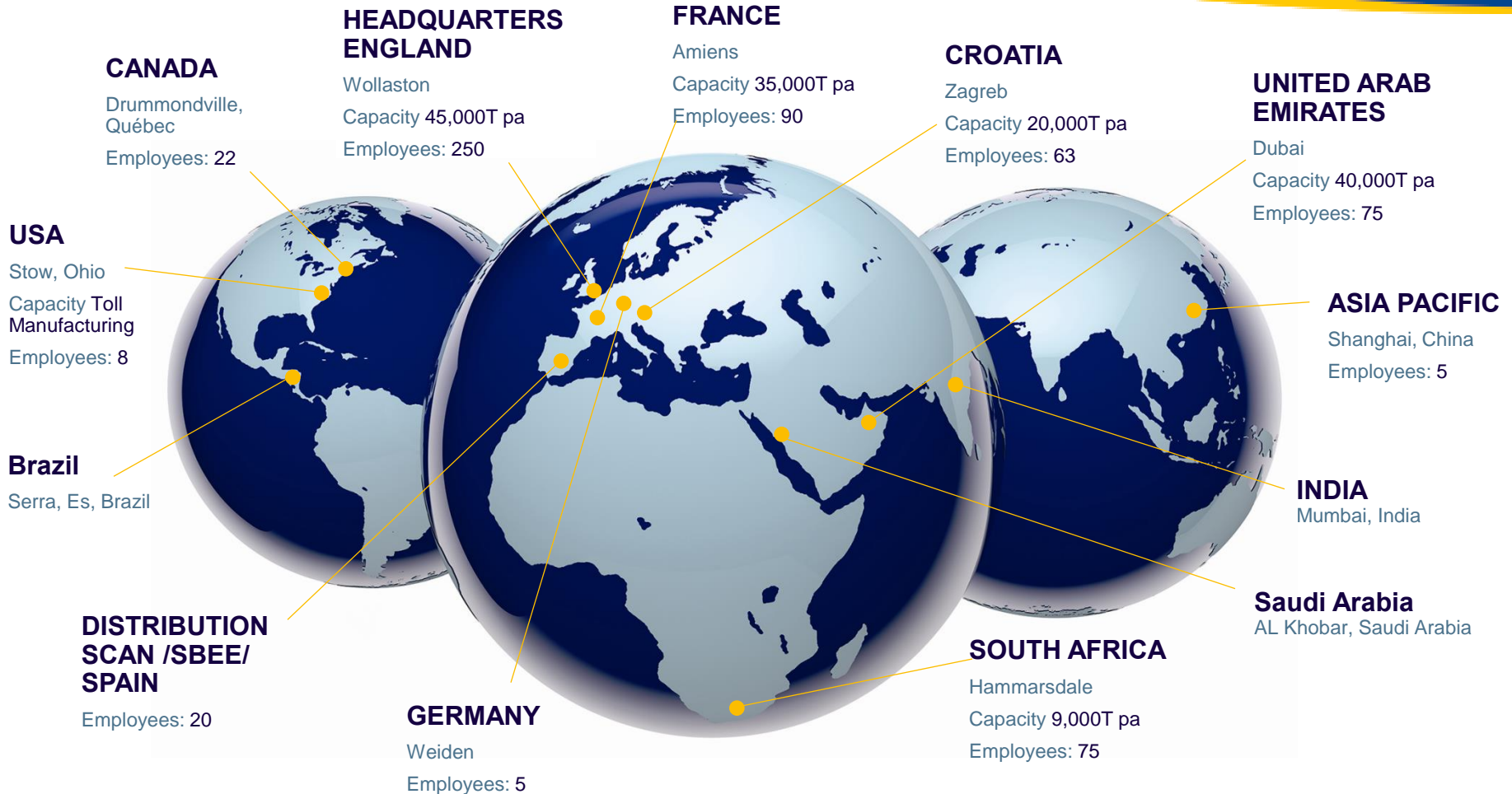
- *Crystic[®] Gelcoats*
- *Adhesives*
- *Crestapol[®] Resins*



Scott Bader Headquarters Wollaston, UK

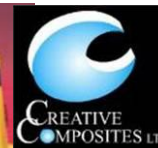
Over 65 Years of Reliability, Experience
and Innovation

Production and R&D Locations



Scott Bader Group Turnover in 2014 was £186m

Crystic[®] Gelcoats
For
Land Transport



Crystic[®] Gelcoats have been used in the Transport Market for over 50 years in Luxury Cars, Recreational Vehicles, Buses, Trucks, Vans, Caravans, Horse Boxes, Rail...

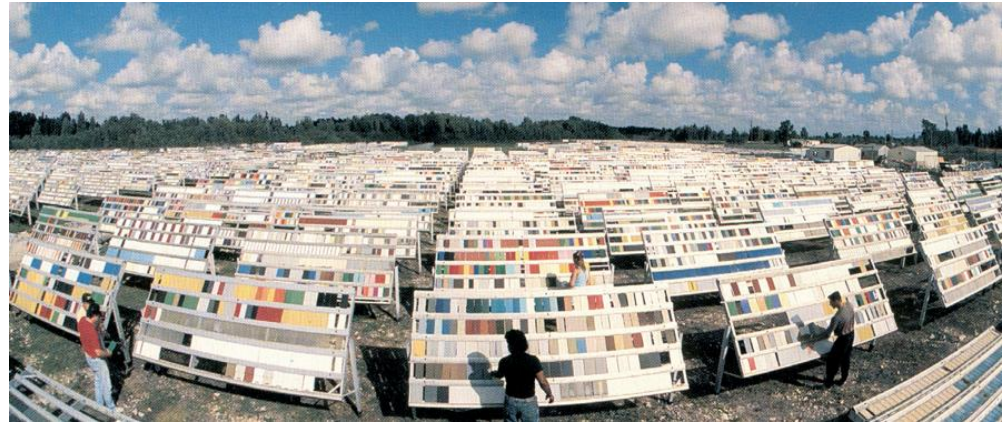
Crystic[®] Gelcoats for land transport are designed to outperform competitive gelcoats in the following areas -

- Excellent long-term performance
- Minimal porosity
- Easy to sand
- Excellent gloss retention
- Superior flexibility – crack resistance
- Excellent fire performance properties, especially when in combination with Crestapol[®] FR resins.



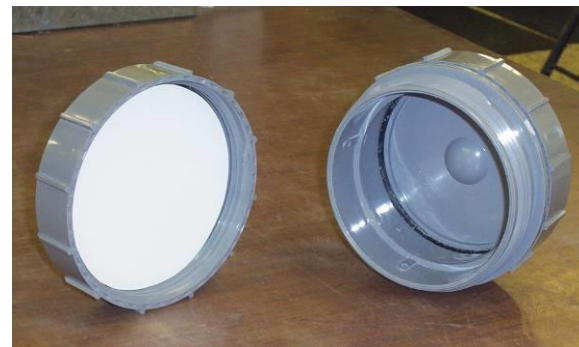
Weathering Tests

- Florida (12 months)
- Xenon (1000 hours)
- QUVA (1000 hours)



Blistering Test

- 12 month water immersion
at 40°C



Iso & Iso-NPG spray Gelcoats for superior weathering with low styrene emissions

- **Crystic[®] LS96PA Spray Gelcoat**
Low styrene content filled gelcoat with good handling properties
- **Crystic[®] LS97PA Spray Gelcoat**
Low styrene content superior weathering gelcoat with excellent water resistance
- **Crystic[®] Ecogel**
Market leading technology spray gelcoat with only 16% styrene content which may cut styrene emissions by over 50%
- **Crystic[®] LS30PA Iso-NPG Spray Gelcoat**
Superior Weathering Iso/NPG Spray Gelcoat

New technology fire retardant, halogen free, designed to protect composites from fire

- **Crystic[®] Fireguard Gelcoat 70PA**
Low Smoke and Low Surface Spread of Flame
Spray Gelcoat for the Most Stringent Fire Approvals
- **Crystic[®] Fireguard Gelcoat 72PA**
Low Surface Spread of Flame Spray Gelcoat
- **Crystic[®] Fireguard 75PA (IMS) Excel**
Intumescent fire retardant gelcoat for spray application
Meets BS476 Part 7 class 1 with 1355PA and M1 with Crestapol[®] 1212



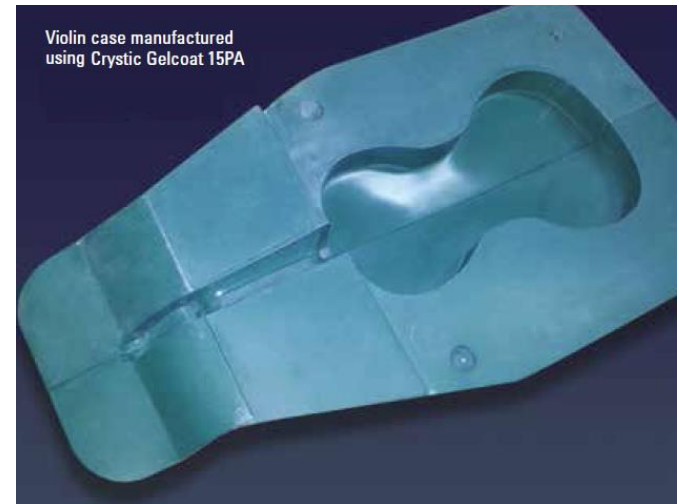
High Performance Vinylester Spray Gelcoat

Crystic[®] 15PA

Superior performance VE spray tooling gelcoat for making moulds designed to have a long service lifetime and retain high gloss levels after multiple pulls

Key benefits:

- Easy to spray and achieve good coverage
- Superior gloss retention
- Very low porosity surface
- Use with a standard MEKP catalyst



Crestabond[®] Adhesives
For
Land Transport

- Two component Methacrylate Adhesives (Activator & Adhesive)
- Based on Acrylic technology
- High performance, high strength
- Room temperature cure
- Range of cure speeds
- Ability to bond dissimilar substrates
- Alternative to Urethanes and Epoxies
- 3 main groups of substrates to bond to: Metals, Composites & Plastics

Market Applications



Automotive

Marine

Land transportation

Renewable energy

Pipes & tanks

Building & Construction

Product	Description	Colour	Mix ratio by volume	Viscosity (cP)	Working Time (mins)	Fixture Time (mins)	Tensile Elongation (%)	Tensile Strength (MPa)	Tensile Modulus (MPa)	Gap Fill (mm)
M1-04	Universal Bonder	Grey	10:1	100,000 - 140,000	3 - 5	8 - 10	70	14 - 17	400 - 600	1 - 15
M1-05	Universal Bonder	Grey or Black	10:1	100,000 - 140,000	4 - 7	12 - 18	70	14 - 17	400 - 600	1 - 15
M1-20	Universal Bonder	Grey or Black	10:1	100,000 - 140,000	16 - 22	25 - 35	70	16 - 19	600 - 850	1 - 25
M1-30	Universal Bonder	Grey or Black	10:1	200,000 - 240,000	25 - 35	60 - 80	>100	17 - 20	750 - 1000	1 - 50
M1-60	Universal Bonder	Grey	10:1	200,000 - 240,000	50 - 70	150 - 180	>100	16 - 18	650 - 850	1 - 50
M1-90HV	Universal Bonder	Off White	10:1	340,000 - 380,000	80 - 100	210 - 240	60	20 - 25	1400 - 1800	1 - 50
M7-05	Universal Bonder	Off White or Black	1:1	30,000 - 70,000	4 - 7	18 - 22	35	23 - 25	1200 - 1700	1 - 5
M7-15	Universal Bonder	Off White or Black	1:1	30,000 - 70,000	10 - 20	30 - 45	33	22 - 24	1200 - 1700	1 - 5

Packaging & Dispensing Equipment

Pack Sizes

- 10:1 = 50ml side by side cartridges
- 10:1 = 400ml co-axial cartridges
- 10:1 = 825ml side by side cartridges
- 1:1 = 50ml side by side cartridges
- 1:1 = 400ml side by side cartridges
- 20 litre pails (18kg)
- 200 litre drums (180kg)



Dispensing Equipment for Cartridges, 10:1 and 1:1

- Manual gun 10:1 and 1:1
- Pneumatic gun 10:1 and 1:1

Dispensing Equipment for Bulk Applications, 10:1 and 1:1

- 20 litre pails and 200 litre drums require machines that can be arranged via Scott Bader partners



- **No primer required** on any substrates
- Minimal surface preparation needed
- Excellent fatigue and impact resistance
- Range of working and fixture times
- Good resistance to water, diesel and other common chemicals
- Good gap filling capability: 1mm – 50mm
- High elongation reducing stress on parts
- Service temperature from -40°C to +100°C

- **Transportation Trailer Applications**



Aluminium Corner Profiles



Bonding Al stiffeners to ABS roof skin in horse boxes

- **Transportation Bus Applications**



One piece aluminium roof bonding



Body panel bonding.

Front and rear end caps, roof profiles

- **Transportation Truck Applications**



Stowage Lockers



Truck Cabs (Hoods, Fairing, Bumpers, Wheels arches, Wing mirrors, etc.)

- **Transportation Train Applications**



GRP front and rear end caps



Aluminium panels, Stainless
Steel fittings



Internal Bonding (window surrounds, heating
ducts floors, ceiling panels, light boxes)

Crestapol[®] Resins
For
Land Transport

Crestapol[®] 1212

High performance resin for highest fire smoke & toxic fume for land transport applications.

Characteristics:

- Urethane Acrylate resin in styrene/methyl methacrylate
- Tough, low viscosity resin for closed mould, infusion and pultrusion
- Can be heavily filled with ATH for the very highest Fire, Smoke and Toxic Fume performance
- High toughness for demanding applications
- High quality technical support for formulation development, production trials etc.

Fire Performance

High levels of Aluminium Trihydrate (ATH) can be incorporated to achieve a range of stringent fire, smoke & toxic fume standards. For example, 170phr ATH can achieve M1, F0 to the French Epiradiateur standards.

Fire requirement	Minimum ATH loading	Results
French NFP 92-501	170	M1
French NFF 16-101	170	F0
UNE 23721 : 1990 / UNE 23727 : 1990	170	M1
DIN 5510	100	S4/SR2/ST2
ASTM 162	100	Is = 10 (limit <35) Meets Federal Railroad Admin requirements for surface flammability
ASTM 662	100	Ds (max) = 119 Dm (1.5) = 1 Dm (4) = 4
ASTM E84	165	smoke index 110, flame index 15
ISO 5658-2	170	HL2
ISO 5659-2	170	HL2
ISO 5660-1&2	170	HL2

- Numerous projects using vacuum infusion in Spain and China for FST rail type applications. (Flooring, wall/construction panels, etc)
- Used heavily throughout the UK and Europe for FST pultruded sections.

Crestapol® 1212 Rail Applications

- **China High Speed Train - VIP Chairs**



*FR Standard:
German DIN 5510,
S4/SR2/ST2*

- **Spain Madrid Metro - Gate Post**



*FR Standard:
Spanish M1 F1*

Crestapol® 1212 Rail Applications

- **Bangkok Subway - Interior parts and Chairs**



*FR Standard:
German DIN 5510,
S4/SR2/ST2*

- **Europe Train - Carrier cover board**



*FR Standard:
French NFP 92-501
M1 F2*

Low viscosity urethane acrylate type resin suitable for infusion, RTM and similar processes at room temperature

Key features:

- Excellent mechanical performance and durability
- High temperature performance
T_g 130°C / HDT 109°C
- Compatible with CF and general purpose sizing agents
- Can process/ manufacture as with a polyester/ vinylester *and achieve improved properties*
- Excellent surface finish with minimal fibre print through





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