

# Compositi Expo Congress Modena 2010

**Welcome to the presentation**

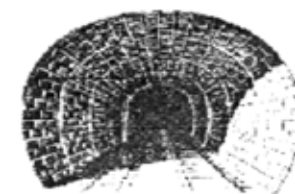
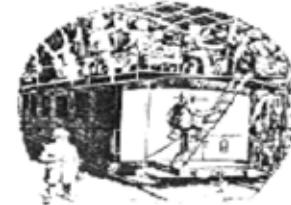
„Requirements on matrix for the use in gliders and small aircraft“



## Sika – a swiss company



founded 1910 by  
Kaspar Winkler



**First success:**  
electrification of the Gotthard road tunnel due to Mr.  
Kaspar Winklers special mortar with sealing  
properties



**Sika Deutschland GmbH**

## The Sika group corporation: A Global-Player

worldwide in more than 70 countries with a net of  
90 own companies

Netto-turnover 2008:  
Mio CHF 4.600



700 employees in research & development department

**Professional competence  
for polyurethan- and epoxid-resins**

More than 13.000 employees are responsible for a good  
customer relationship and for the success of all partners.



## The Business Unit Tooling & Composites intra Sika-group corporation

All corefunctions are located in Bad Urach / Germany for a fast and competent realization of **customized projects**:  
R&D, manufacturing, quality management, marketing and sales department.





## Sika Tooling & Composites – our coremarkets



design,  
styling & cubing

large modelmaking



foundry  
model-  
making



rapid  
tooling

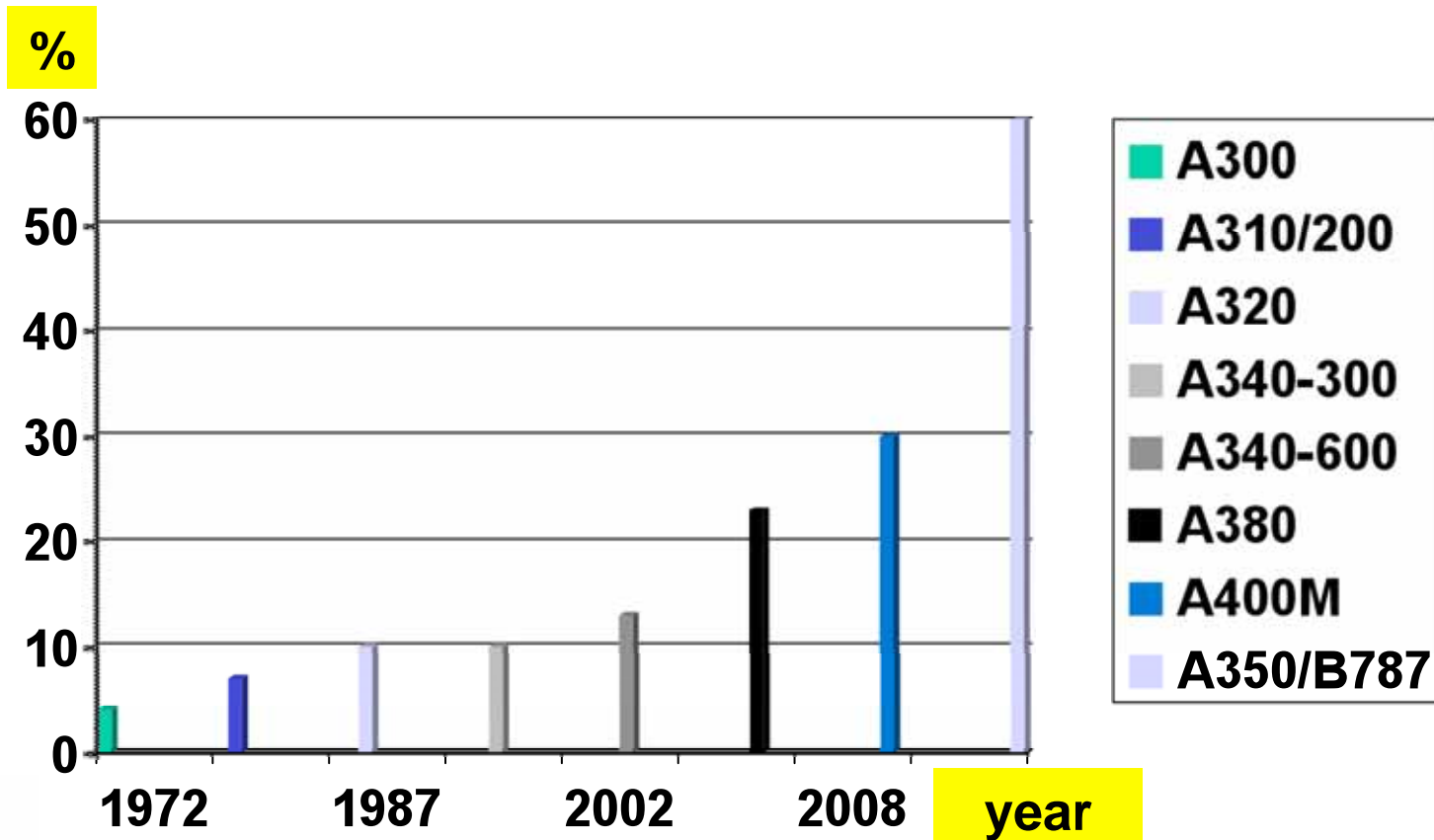


rapid prototyping

special taylormade  
solutions



## Development of using CRP for structural parts in Airlines



## Requirements on EP- matrix for the use in gliders and small aircrafts

### Main Topics :

1. **Technical demands:**
  - 1.1 mechanical properties
  - 1.2 thermal properties
  - 1.3 chemical resistance
  - 1.4 processing and working properties
2. **Commercial demands**
3. **Environmental and toxicological demands**
4. **Overview on Sika solutions according to the different requirements in approvals for gliders, motorgliders, motorplanes and business jets.**



## **Demands for EP-Matrix, depending on part and process**

### **1.1 Mechanical properties**

- structural parts
- non structural parts
- interior parts

### **1.2 Thermal properties**

- operation conditions
- white or darkly painted surfaces
- flame retardant

### **1.3 Chemical resistance**

- against brake fluid
- against hydraulic oil
- against cooling water



**Sika Deutschland GmbH**





## Demands for EP-Matrix, depending on part and process

### 1.4 Processing and working properties

- hand lay-up
- hand lay-up with vacuum bagging
- vacuum infusion
- automatically machined impregnation

Wet lay-up



Hand lay-up with vacuum bagging



Vakuum-Infusion



Automatically machined impregnation



## **Demands for EP-Matrix, depending on part and process**

### **2. commercial demands**

- choosing the right processing according to the estimated number of aircrafts**
- choosing the right material out of standard products or customized solutions**



## **Demands for EP-Matrix, depending on part and process**

### **3. Environmental and toxicological demands**

- **low allergical potential**
- **free of styrene**
- **non toxic classification**



## **Demands for EP-Matrix, depending on part and process**

### **4. Overview on Sika solutions according to the different requirements in approvals for gliders, motorgliders, motorplanes and business jets**

- Biresin<sup>®</sup>CR122
- Biresin<sup>®</sup>CR132
- further tailor-made solutions



## **Biresin® CR122 – EP System for High Flyers!**

- Tg ~120°C
- For processing by wet-lay-up and fully automatic laminating machines
- System with 3 hardeners
- Approved and released according RHV by German Luftfahrt Bundesamt for manufacturing of gliders and motorgliders with the hardeners Biresin CH122-3 and CH122-5
- Possible demoulding after RT curing due to very low brittleness
- Uniform mixing ratio 100:30
- Potlife depends on hardener: 30 min – 3 h
- Good UV resistance
- Nontoxic classification / Good physiological behaviour
- Germanischer Lloyd approval with Biresin CH122-3 and CH122-5 hardener



## Biresin® CR122 – EP System for High Flyers!

Physical Data		Resin	Hardener	
Individual Components		<b>Biresin® CR122</b>	<b>Biresin® CH122-3</b>	<b>Biresin® CH122-5</b>
Viscosity, 25°C	mPas	850	15	15
Density, 25°C	g/ml	1.17	0.94	0.93
Mixing ratio	in parts by weight	100	30	
		<b>Mixture</b>		
Potlife, 100 g / RT, approx. values	min		150	190
Mixed viscosity, 25°C, approx. values	mPas		370	380

Thermal data of neat resin specimen at different post curing conditions				
Biresin® CR122 resin		with hardener Biresin®	CH122-3	CH122-5
Post curing conditions				
Glass transition temperature	8 h / 55°C	ISO 11357 °C	78	79
	12 h / 60°C	ISO 11357 °C	82	84
	12 h / 120°C	ISO 11357 °C	114	119





## Biresin® CR122 – EP System for High Flyers!

New hardener – for quick repairs and smaller pieces (not LBA approved)

Physical Data		Resin	Hardener
Individual Components		Biresin® CR122	Biresin® CH122-1
Viscosity, 25°C	mPas	850	< 10
Density, 25°C	g/ml	1.17	0.95
Mixing ratio	in parts by weight	100	30
		Mixture	
Potlife, 100 g / RT, approx. values	min	30	
Mixed viscosity, 25°C, approx. values	mPas	310	

Thermal data of neat resin specimen			
Biresin® CR122 resin		with Biresin® CH122-1 hardener	
Heat distortion temperature	ISO 75B	°C	101*
	ISO 75C	°C	89*
Glass transition temperature	ISO 11357	°C	103*

\* values after post curing: 8 h / 100°C



## Approvals for Resins



**Approval and recommendation**  
according RHV by  
**German Luftfahrt Bundesamt**  
required for manufacturing of  
gliders and motorgliders  
is possible

With Sika rise up in to the sky



## Approvals for Resins

- **RHV-recommendation**

- (LBA - approval / certification)

- Richtlinie zur Führung und Anerkennung von*

- Harz-Faser-Verbunden im Anwendungsbereich der Herstellung und Instandhaltung von Segelflugzeugen/Motorseglern*

- RHV is the LBA guideline (LBA = german aerospace authority) to test reinforced plastic materials to manufacture gliders and motorgliders according the design and construction rules **PART 22**

- Part 22: the design and construction rules for gliders and motorgliders define the demands to mechanical properties, heat distortion etc.***



## Approvals for Resins

- The RHV approval is also useful for light aircraft
- **PART 23 + PART 25** regulations is required for motorplanes and business jets
- All approvals according to **PART 23 + PART 25** must be carried out on each individual approved aircraft. **PART23 + PART 25** is not approving a single Composite product.  
Part 25: approval for bigger commercial aircraft
- **Part 23: the design and construction rules for normal, utility, aerobatic and commuter aeroplanes.**



## **Biresin<sup>®</sup> CR132 – especially for dark painted surfaces**

- Tg ~135°C
- For processing by wet-lay-up and fully automatic laminating machines
- For high thermal loads due to strong solar heating especially on dark painted surfaces
- System with 3 hardeners for different potlives and properties
- Potlife depends on hardener: 60 min – 3,5 h
- Nontoxic classification / Good physiological behaviour



## Biresin® CR132 – especially for dark painted surfaces

Physical Data		Resin		Hardener	
Individual Components		Biresin® CR132	Biresin® CH132-2	Biresin® CH132-5	Biresin® CH132-7
Viscosity, 25°C	mPas	1,800	< 10	< 10	20
Density, 25°C	g/ml	1.4	0.95	0.93	0.93
Mixing ratio	in parts by weight	100	28	28	32
		<b>Mixture</b>			
Potlife, 100 g / RT, approx. values	min		60	150	210
Mixed viscosity, 25°C, approx. values	mPas		360	550	550

Thermal Data, neat resin specimen (approx. values after post curing)					
Biresin® CR132 resin		with hardener	Biresin® CH132-2	Biresin® CH132-5	Biresin® CH132-7
Heat distortion temperature	ISO 75A	°C	123	136	130
Glass transition temperature	ISO 11357	°C	130	135	135

after post curing:  
8 h / 140°C

after post curing:  
12 h / 125°C

after post curing:  
8 h / 125°C





**Conclusion: Sika does not offer...**

**„Eierlegende Vollmilchsau“**

**all-in-one device, suitable for every purpose**



**But we offer the right solution for aircraft manufacturer**

