

Support Mat and Insulation Solutions



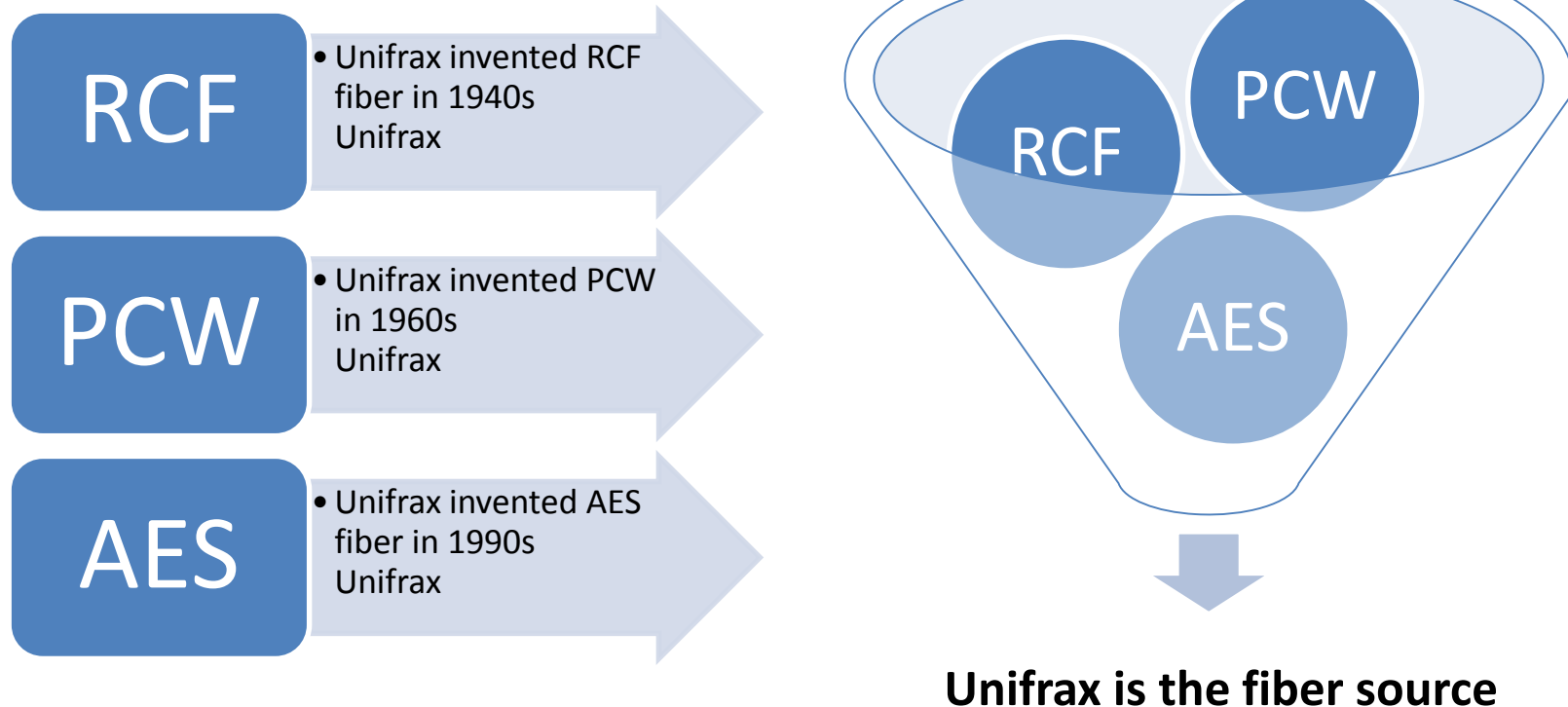
Engineered Solutions
for Emission Control



Unifrax is a **Vertically Integrated** Company Offering a **Complete Product Portfolio** for Emission Control Applications in **Worldwide Markets**

Who are Unifrax?

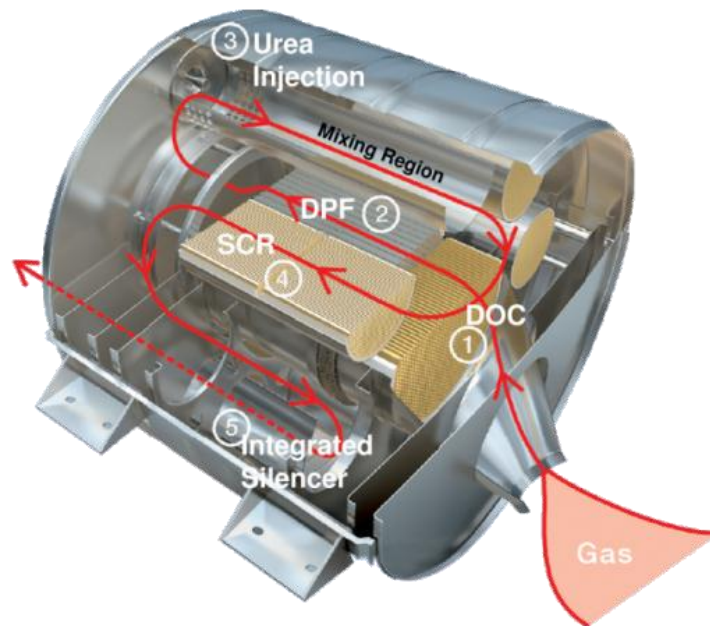
- Vertically Integrated Materials Technology Company
- Involved in various, globally diverse industrial markets
- Produce our own fibers for use in converter support mats



Unifrax is the only support mat supplier capable of making all three types of fibers

Euro 6 systems

- For Heavy Duty Vehicles, Euro 6 Was Introduced January 2014
- To meet emissions requirements, the emission control system must contain DOC, DPF and SCR substrates.



- Different sized substrates installed in one muffler
- Muffler must be insulated to improve catalyst efficiency
- Canning should be GBD Controlled

Euro 6 System Challenges

- Multiple substrates in a single muffler
 - Small gap between can and substrate desirable
 - Need for improved Gap tolerance control
 - Different Insulation requirements in different sections
- Large Diameter Substrates from 9 to 12”
 - Increased Gap expansion
- 1 Million Kilometer warranty
 - Support mat should provide sufficient holding force

Unifrax Euro 6 Programs



MD & HD	MD & HD	MD & HD	MD & HD
Euro 6 SCR+DOC+DPF	Euro 6 SCR+DOC+DPF	Euro 6 SCR+DOC+DPF	Euro 6 SCR+DOC+DPF
Ecoflex® 200M 2HF-D 1700-2700 gsm	Ecoflex® 200LB 1850-2700gsm	Isomat® AV5 4200gsm	Ecoflex® 400 2400 & 2700 gsm

All have passed validation and in production

EU applications use high end products partly due to fiber regulations



Application Information

- Cordierite Substrates

	DPF	DOC	SCR
Diameter(mm)	304.8 (12")	304.8 (12")	241.3 (9.5")
Length(mm)	254 (10")	101.6 (4")	127 (5")
Weight(g)	14734	3670	2875
Gap(mm)	6	5.5	5
Mat	Ecoflex® 400 2700gsm	Ecoflex® 400 2100gsm	Ecoflex® 400 1800gsm
Min GBD(g/cm ³)	0.41	0.34	0.32

- Test Conditions: Iso-thermal
- Shell Material: SS 441

Test Result

- 11 step test at 180Hz, 20G for 200hrs
- Temperature range from 150C to 600C
- All Parts Completed the Test
- No signs of erosion
- Ecoflex[®] 400 Mounting Mat fully intact



SCR



DPF



DOC

Durable Solutions for Mass Markets

- Unifrax Experience in China

Weichai	Sinotruk	FAW	Yuchai
China 4 and 5 SCR			
CCMax 5 [®] 2700gsm	XPE [®] -MP 3600gsm	CCMax 5 [®] 2700gsm	CCMax 5 [®] 2400gsm
SOP 2013	SOP 2013	SOP 2014	SOP 2013



- Non intumescent mats preferred due to high low temperature performance
- Lower Cost RCF mats acceptable from regulatory standpoint
- Value for Money solutions



Application Data

- Cordierite Substrate

	SCR 1	SCR 2
Diameter(mm)	304.8 (10.5")	304.8 (13")
Length(mm)	76.2 (3")	101.6 (4")
Weight(g)	2810	3742
Gap(mm)	6	6
Mat and Basis Weight	CCMax [®] 5 2400gsm	CCMax [®] 5 2700gsm
Nominal GBD(g/cm ³)	0.40	0.45

- Test Conditions: Iso-thermal
- Shell material: SS 441

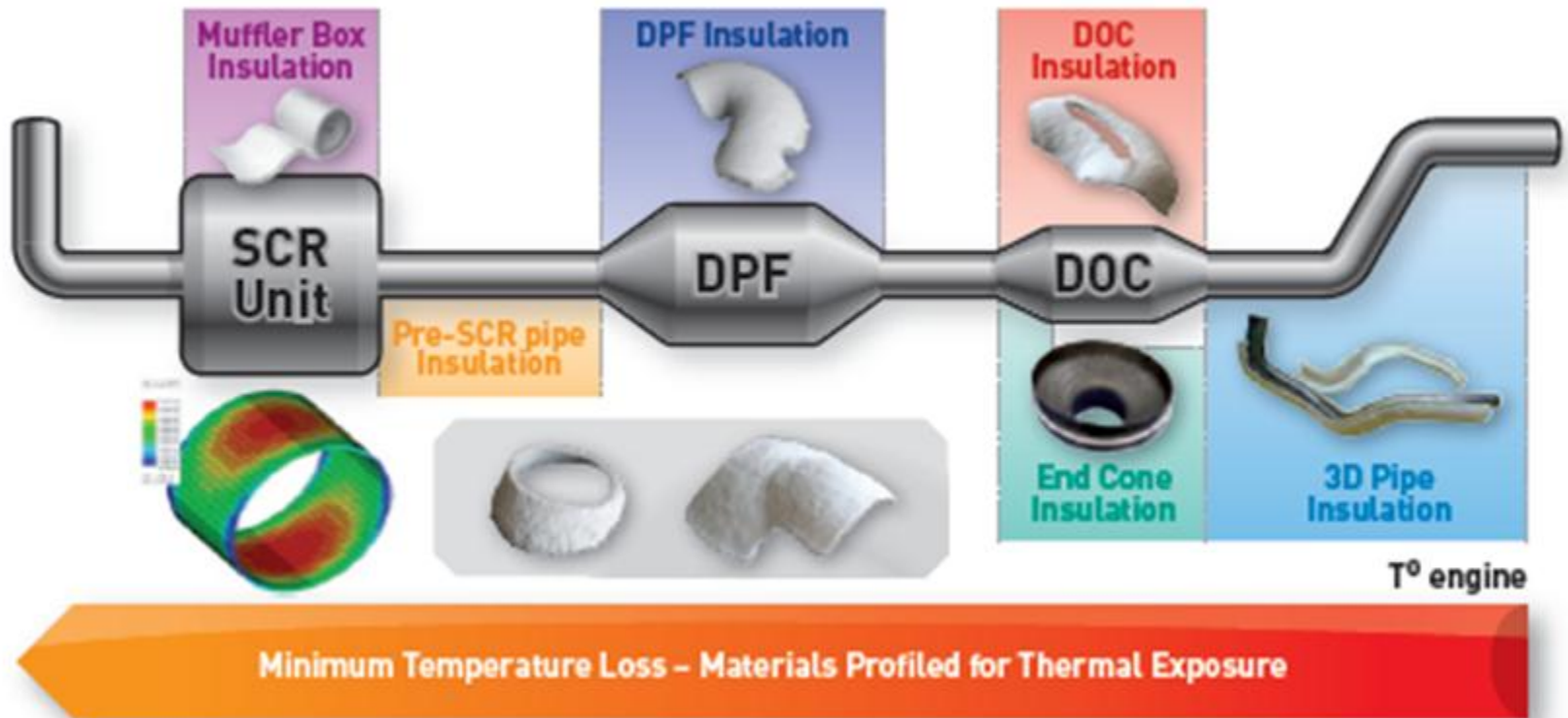
Warm Vibration Testing Data

Step	Gas inlet Temperature (°C)	G-Load(g-peak)	Time(hr)	Cumulative Time(hr)
1	250	20	10	10
2	300	20	10	20
3	350	20	10	30
4	400	20	10	40
5	450	20	10	50

- Converter installed at 90°
- Total test time 50hrs @ 20G
- Mat performance good at low temperatures
- No need for heat treatment to activate mat
- CCMax[®] 5 mounting mat passed the validation
- To date over 500,000 mats supplied with no recalls

Thermal Management

- Best in class thermal insulation materials
- We design insulation from CAD drawings
- Minimize packaging space needed
- Cost effective thermal management



THANK YOU!