Development Products

Mitsubishi Chemical's thermoplastic carbon fiber composite material

Kyron™ULTRA

Kyron™ULTRA is a new sheet-like intermediate material developed by Mitsubishi Chemical, in which carbon fibers are impregnated with engineering plastics. It is a high performing carbon fiber composite material in the form of a UD (Uni-Directional) prepreg with carbon fiber in one direction.

Features

Kyron™ULTRA, which is benefited from Mitsubishi Chemical's expertise in carbon fiber technology, resin engineering, and composite material design, offers the following characteristics:

1 Performance

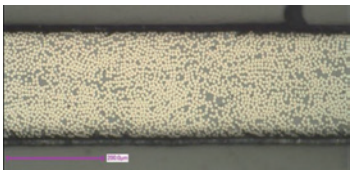
A prepreg that makes the most of the characteristics of carbon fiber and thermoplastic resin with our composite material technology.

2 High quality

Kyron™ULTRA features ultra-low voids and high dimensional accuracy, making it applicable for thermoplastic ATL (Auto Tape Layup) molding technology, general-purpose stamping technology, etc.

3 High formability

With ultra-low voids, takt time (process work time)can be shortened in general-purpose stamping. In addition, freezer storage of materials is not required.



Kyron™ULTRA cross-sectional photo (enlarged from 100.0 μm)
This image demonstrates that the internal void is kept to a minimum.

Kyron™ULTRA Product appearance

UD (Uni-Directional) Prepreg

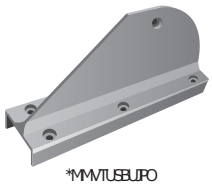
Kyron™ULTRA (under development)

Resin type			PEEK		Heat Resistant PEEK		PEI	Remarks
Name of product	Development code		TR K42G190S	MR K42G190S	TR K44F190S	MR K44F190S	MR K71F190S	
	Reinforced fiber		General Purpose 24t CF	HighStrengthPurpose 30t CF	General Purpose 24t CF	HighStrengthPurpose 30t CF	HighStrengthPurpose 30t CF	
	Reinforced fiber Structure		UD	UD	UD	UD	UD	
	FAW	g/㎡	190	190	190	190	190	
	Resin Content	wt%	32	33	32	33	32	
	Vf	vol%	60	60	60	60	60	
	Calculated thickness CPT	mm	0.17	0.18	0.17	0.18	0.18	
Physical Properties	Density	g/cc	1.61	1.60	1.61	1.60	1.58	
	Matrix resin Melting Point	℃	343	343	343	343	–	Only matrix resin
	DMA-Tg (E'-onset)	℃	145	145	165	165	215	CFRTP testpiece measurement
	DMA-Tg (tanδ)	℃	165	165	185	182	225	CFRTP testpiece measurement
Mechanical Properties	0°Flexural strength	MPa	2100	2100	2100	2100	1890	
	90°Flexural strength	MPa	145	175	170	170	85	
	Interlaminar shear strength (ILSS)	MPa	145	140	116	129	106	
	Compression strength After Inmapct (6.7J/mm)	MPa	–	360	260	–	–	
Chemical Resistance	Flame resistance	Example of aviationstandards	Good	Good	Good	Good	Good	
	Water Absorption	Example of immersion in warmwater	Good	Good	Good	Good	Average	
	Chemical resistance	Example of immersion indiesel oil	Good	Good	Good	Good	Average	

Note: The values in this table are typical and do not imply any kind of guarantee.

Component Design Examples

In the case of the parts (below), the parts made of Kyron™ULTRA PEEK are 60% lighter than the same parts made of Titanium. By using Heat and Cool press molding, the tact time has been reduced to less than half compared to conventional autoclave molding.



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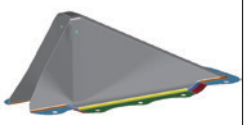
Metal Parts



(3D Model)

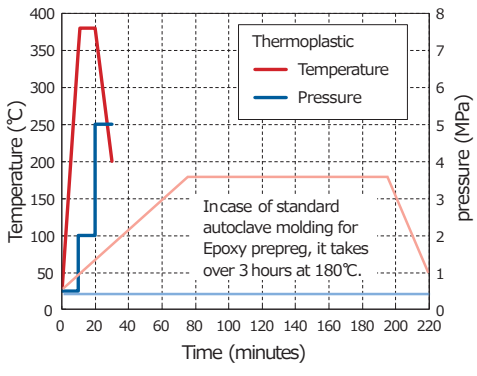
Design of composite materials using CAE

(Kyron™ULTRA Composites)

Manufacturing design and production

Recommended conditions for press molding

(compared to typical thermoset CFRP molding conditions)



Characteristic Example

Combustion gas test (Smoke density, LessVOC)

PEEK and PEIbased Kyron™ULTRA has extremely low smoke density and gas generation.

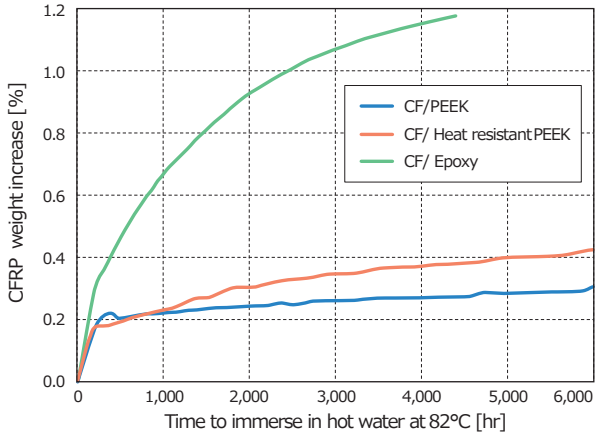
Resin type		Kyron™ULTRA			Comparison
		PEEK	Heat Resistant PEEK	PEI	[REF] Flame resisting Epoxy
Carbon Fiber		High strength 30t CF	High strength 30t CF	High strength 30t CF	General 24t CF
Smoke density	<200	1.5	1.7	1.4	173.6
CO	<1000 (ppm)	50-100	50-100	50-100	100-200
HCN	<150 (ppm)	< 0.5	< 0.5	< 0.5	4-5
HF	<100 (ppm)	N.D.	N.D.	N.D.	N.D.
HCl	<150 (ppm)	N.D.	< 50	N.D.	N.D.
SO2	<100 (ppm)	< 20	< 20	< 20	< 20
NOx	<100 (ppm)	< 2	< 2	2-5	10-20

Test method: REF BSS7239

Chemical resistance of various resins **https://www.mcam.com/en**

Hot water immersion test (Less water absorption)

Our data shows PEEK and PEI based Kyron™ULTRA 's water absorption is lower than general Epoxy.



Test method: Mitsubishi Chemical own method

Mitsubishi Chemical's Carbon Fiber Composite Materials

Mitsubishi Chemical's Carbon Fiber Line-up

Carbonfiber

PAN-based carbon Fiber **PYROFIL™**

Pitch-based carbon Fiber **DIALEAD™**

Intermediates

Thermoset prepreg

PYROFIL™ Prepreg

DIALEAD™ Prepreg

Thermoset SMC

FORGED MOLDING COMPOUND™

Thermoplastic prepreg

Kyron™ULTRA

Thermoplastic pellet

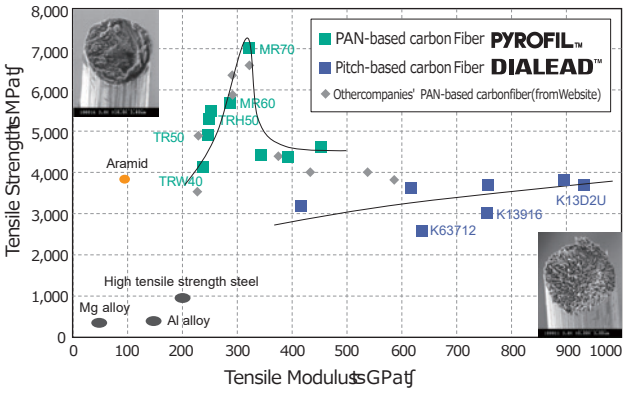
PYROFIL™ Pellet

Composites

Diamana

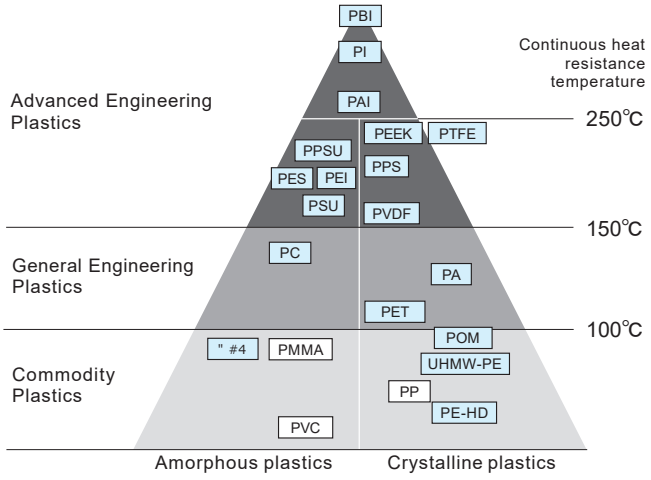
SMC (Sheetmolding compound)

Mitsubishi Chemical Carbon Fiber Grade



Mitsubishi Chemical's Carbon Fiber Composite Materials Website **https://www.m-chemical.co.jp/carbon-fiber/**

Reference MCAM's stock shape line-up



Standard packaging specifications

Paper tube size	6 inches Outer diameter Φ161 mm x Inner diameter Φ153 mm x Length 490 mm L
Cardboard size (insidesize)	Width 495mmW x Depth 300mmD x Height 320mmH

MITSUBISHI CHEMICAL GROUP MITSUBISHI CHEMICAL CORPORATION

https://www.m-chemical.co.jp/carbon-fiber/en/

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Attach business card of the handling company

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