



We are supporting global environment protection of an enterprise through quality improvement of thermophysical property measurement.



Since we can evaluate the fiber orientation inside the CFRP structural parts, we can use it especially in the "development site of electric cars and quality control", "development site of fiber plastic manufacturer".

■ Specifications

Name	Thermal Evaluation of Fiber Orientation Distribution	
Basic Function	Measurement object	Thermal diffusivity, It is possible to grasp the fiber state in the sample. (orientation of fibers, dispersion of fibers), distribution
	Measurement time	About 1 minute / point
Accessories	Analysis software	○
	PC	○
Measurement environment	Temperature	Room temperature
	Measurement frequency	0.01 [Hz] ~
Laser diode	Wavelength	638 [nm]
	Output max	0.4 [W]
Radiation thermometer	Element	InSb
	Cooling method	Electronic cooling
Stage displacement	Sample stage	100 × 200 [mm]
Power supply	AC 100 [V], 50/60 [Hz], 5 [A]	
Usage environment	Temperature	10 ~ 40 [°C]
Terms of use	Sample	CFR(T)P, GFRP, Nanocellulose, Filler filled resin, etc
	Shape	Any shape
	Surface	Sample substrates should be flat and smooth for the best results (Thickness should be measurable)
	Coating	Not need. (Blackening treatment is required only for those that the laser transmits)
	Sample size (Max)	200 × 100 × 4 [mm]
	Sample size (Min)	30 × 10 × 0.1 [mm]
Main body	Dimensions	W710 × D710 × H576 [mm]
	Weight	60 [kg]

- The numbers shown in this catalog are results from our examination. The same results are not guaranteed in different circumstances.
- The performance and appearance may be changed for improvement without notice.
- For delivery date and prices, please contact our dealer. We will submit quotation separately.
- For those who are considering purchasing of our equipment, trial measurements are carried out. Please feel free to tell us. (If you have many samples, you may be charged separately.)

Caution for Safety Before using, please read manual and operate correctly for the safety.

Inquiry about products : <https://hrd-thermal.jp/en/contact/>

<Manufactured and Distributed>
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<https://hrd-thermal.jp/en/>

<Agent>

We wish to contribute to technological innovation and creating the future through our thermal measurement technology.



Orientation identification method

Thermal Evaluation of FOD (Fiber Orientation Distribution)

BETHEL

Evaluate the internal structure of CFRP and GFRP by heat
 Quantify fiber orientation and thermal diffusivity at high speed and non-contact !!



open price

Thermal Evaluation of Fiber Orientation Distribution

FEATURES

A system that visualizes the fiber state inside the sample by "fiber orientation identification method"

Non destructive

Applicable to non destructive and complicated shape products !

Quick

Speedy measurement at 1 minute per point !

Quantitative

Quantify fiber orientation and thermal diffusivity!

THEORY

Spot heating the sample with the laser and measure the heat transfer!

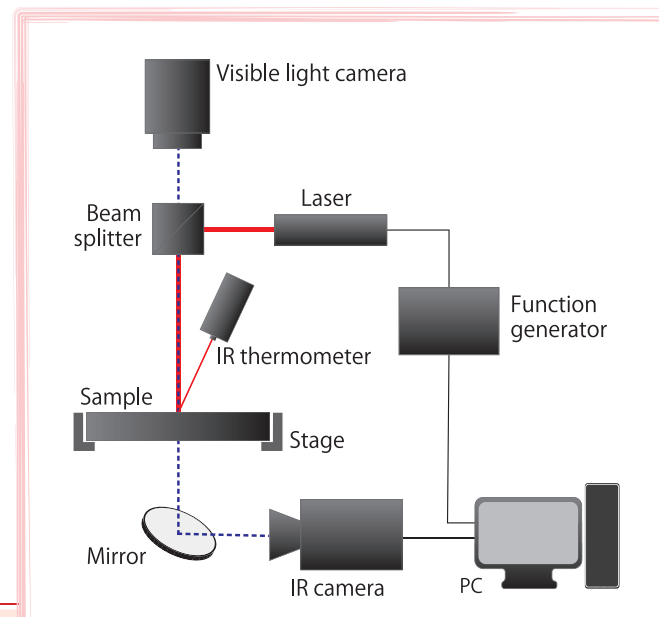
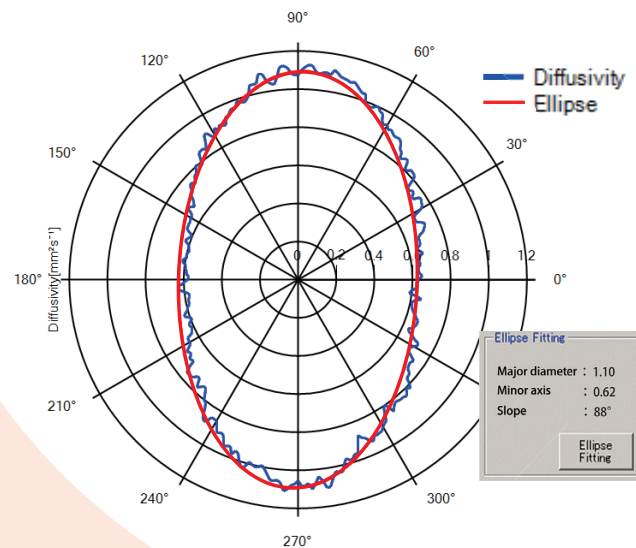
Orientation identification method

A method of applying in-plane thermal diffusivity angle distribution measurement. The speed of heat transfer (thermal diffusivity) differs depending on the fiber content and orientation. Therefore it becomes possible to clarify the fiber orientation distribution by measuring the thermal diffusivity in all directions.

Measurement track record

- ◇ CFRP, CFRTTP
- ◇ GFRP ◇ Nanocellulose
- ◇ Carbon nanotube
- ◇ Filler filled resin

... etc



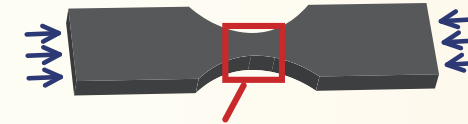
CONFIGURATION

APPLICATION



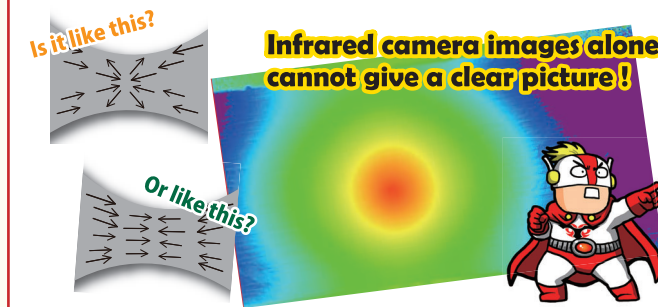
Application example of CFRTTP ①

Fiber orientation of dumbbell-shaped CFRTTP sample

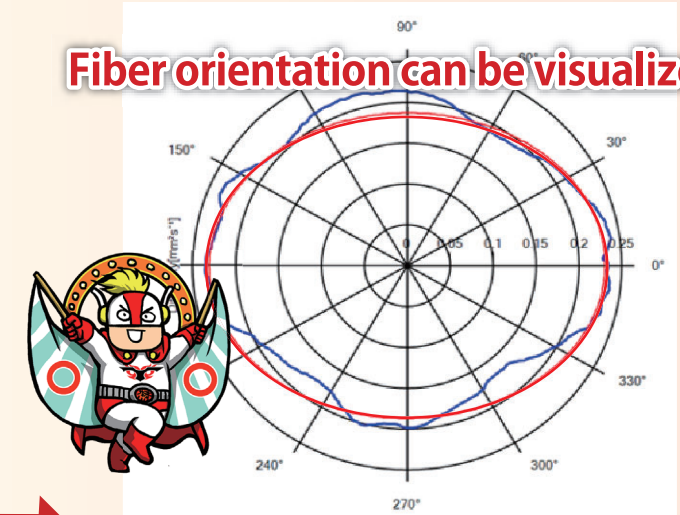


Places where resin collision is expected

In the colliding part of the resin, what direction is the fiber oriented ?

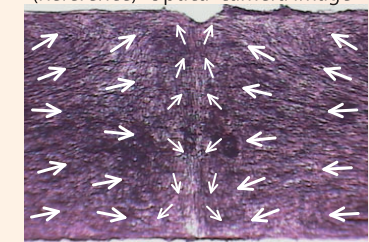


Fiber orientation can be visualized.



Quantification

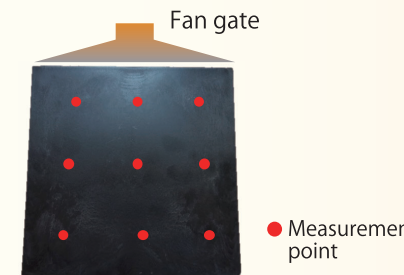
(Reference) Optical camera image



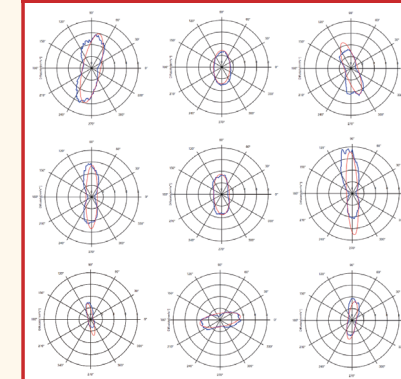
The arrow in the above figure shows a fiber orientation image

Application example of CFRTTP ②

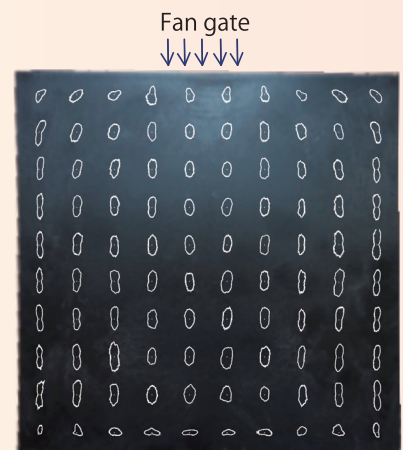
Distribution of fiber orientation of CFRTTP sample at the time of flow state of resin in injection molding



Fiber orientation within the sample



Measure in details



Features of orientation identification technology

Non destructive / quick / quantitative (orientation, thermal diffusivity)

What can it be done?

You can see the fiber orientation of CFRTTP structural parts!

Anticipated applications

**For development sites and quality control of electric vehicles
For the development site of resin manufacturers**