# FibreCUT

## *3D cutting solution*

FibreCUT is our versatile, precision cutting system designed for the net-edge trimming of composite preforms.

It uses ultrasonic cutting technology to make high quality cuts on various composite materials such as prepreg and dry fibre.

Ready to deploy via gantry or robot, this system is ideal for trimming complex 3D geometries of any size, large and small. FibreCUT offers a high processing rate along with improved quality and repeatability to ensure the preform is accurately sized and ready for moulding with minimal waste.
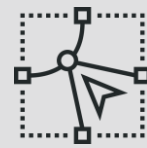
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### CLEAN CUTS
Minimises quality defects such as frayed fibres, tows lifting, or clusters of loose fibres.
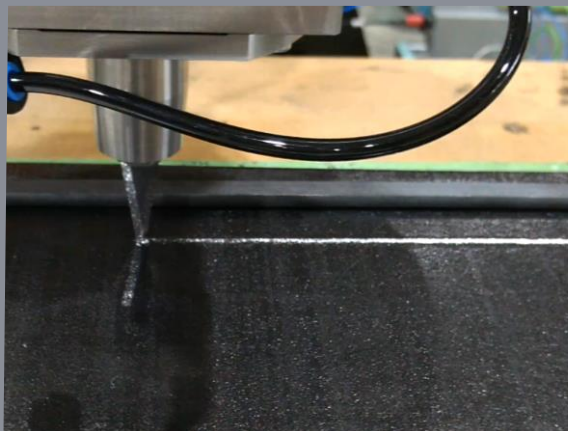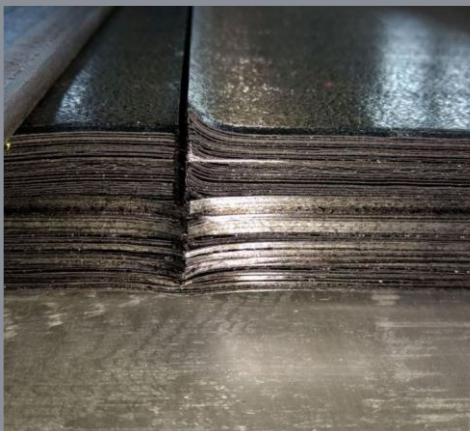
### CUSTOMISABLE
Various blade sizes and profiles and multiple programs offering different cutting parameters for different materials.

### ACCURATE EDGE PROFILES
Cut curves with radii as tight as 30mm with ±0.2mm path following capability.

## Example of Performance

### Prepreg material
Typical values for a 38mm blade at 20kHz. Max depth of 35mm would be achieved as multiple cuts at 5mm.

| Depth of Cut (mm) | Speed of Cut (mm/s) |
|---|---|
| 5 | 15 |
| 10 | 15 |
| 15 | 10 |
| 20 | 10 |
| 25 | 10 |
| 30 | 10 |
| 35 (max) | 10 |

### Dry fibre Material
Typical values for a 70mm blade:
- up to 200mm/s cutting speed
- up to 70mm cutting depth in a single pass

### Example auxiliary systems
- Infrared temperature measurement
- Automated broken blade detection
- Force torque monitoring
- Particulate extraction
- Blade cleaning
- Blade alignment station

## Extraction System

Composite trimming can create dangerous debris and dust particles which can be challenging to contain over large parts or in an open cell.

In a high production scenario, we recommend using an extraction cowl connected to an ATEX rated extraction system.

Many solutions are possible and are dependant on production volume. General systems are equipped with a 55-litre capacity, ATEX rated vacuum unit, with a HEPA H13 filter.

The particulate container can be emptied by manually unclipping the shroud to dispose of the waste or for larger capacity units, removal can be aided with our easy empty system.

## Force Torque Monitoring

Force torque monitoring of the blade enables the system to constantly assess and determine whether a blade has worn and is no longer providing optimal cuts by measuring the corresponding drag.

The force torque sensor is mounted between the gantry/robot tool flange and the sonotrode housing. This allows the sensor to experience the force and torque from the weight of the sonotrode housing at its centre of mass, but as the knife angle changes, the weight of the sonotrode will cause different force and torque readings. Loop Technology can provide a statically calibrated model that will eliminate this error to provide a true value at the knife source.

Additionally, it can recognise if a blade has broken during a cut if it measures either jump in force or no force at all.

## Automated Blade Cleaning

For certain materials and cutting periods, the ultrasonic cutting blades will become contaminated overtime, reducing the blade life and cut quality. To minimise this, an automated blade cleaning system can be easily integrated into your process, and reduce your system downtime.
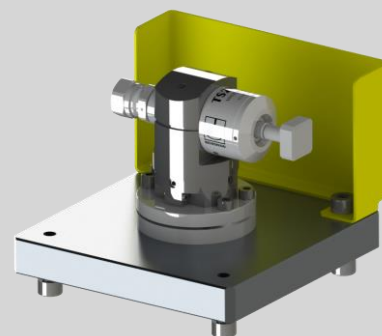
## Blade Monitoring for Breakages and Position

A Renishaw TS27R tool setting probe can be used for verification of the ultrasonic cutting blade position and condition. Before and after each process, the blade is analysed with the Blade Monitoring System. This ensures the blade is in optimal condition for providing the best quality cut.

If the system finds an error, such as a broken or worn blade, the robot can either exchange the end effector for another ultrasonic knife from a tool stand, if available, or can position itself accordingly to allow an operator to safely perform the required maintenance.

An alignment jig can be used to ensure than the replacement blade is correctly aligned within the chuck.

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