How are the patented state of the art RacingBrake Carbon Ceramic (CFRC) Brake Discs made?

Racingbrake uses a Surface Transforms material which is an advanced Carbon Fibre Reinforced Ceramic (CFRC) which is produced by Surface Transforms' proprietary processes, transforming Carbon-Carbon into our Carbon-Silicon Carbide (CSiC) ceramic.

Whilst the carbon-ceramic discs you find on production road cars conventionally use discontinuous (chopped) carbon fibre, ST interweaves continuous carbon fibre to form a 3D multi-directional matrix, producing a stronger and more durable product with 3x the heat conductivity of standard production components; this keeps the brake system temperature down and the brake performance consistent.

Surface Transforms has developed unique patented next-generation Carbon-Ceramic Technology that provides the ultimate braking performance for road and track.

Here are just seven reasons why you need this technology on your vehicle –

- Weight savings of up to 70% compared to iron brakes (typically 20kg of unsprung weight)
- Improved NVH (less noise, vibration and harshness)
- Improved handling and driveability
- Improved performance (in both wet and dry conditions)
- Reduced brake wear – giving increased life
- Corrosion Free
- Outstanding performance, even from cold

THE PROCESS:-

Surface Transforms uses a unique patented process to produce its carbon-ceramic material, whilst we can't tell you all our secrets we can give you an overview of how the discs are made –

Stage 1 - Carbon Fibre Preform a unique 3D structure of carbon-fibre is weaved together from multiple layers of carbon-fibre cloth to form the base carbon material (pre-form).

Stage 2 – Carbonisation - The carbon pre-forms are heated to a temperature of (1,000-3,000° C) in a furnace filled with a gas mixture that does not contain oxygen. The lack of oxygen prevents the carbon from burning in the very high temperatures.

As the pre-forms are heated, they begin to lose their non-carbon atoms, plus a few carbon atoms, in the form of various gases including water vapour, ammonia, carbon monoxide, carbon dioxide, hydrogen, nitrogen, and others. As the non-carbon atoms are expelled, the remaining carbon atoms form tightly bonded carbon crystals that are aligned more or less parallel to the long axis of the fibres.

Stage 3 – Chemical Vapour Infiltration (CVIST) Surface Transforms have developed their own process CVIST based on the Chemical Vapour Infiltration method of Ceramic Matrix Composites fabrication.

This is a process in which reactant gases diffuse into the porous preform and form a deposition. Deposited material is a result of chemical reaction occurring on the fibres surface. The deposition fills the space between the fibres, forming composite material in which matrix is the deposited material and dispersed phase is the fibres of the preform.

Stage 4 – Heat Treatment Following CVI, the parts are placed in a furnace and taken through a further cycle at very high temperature.

Stage 5 – Green-State Machining At this stage, the parts are solid blanks of close to the finished dimensions but not yet as hard as the final part. Most of the machining of the component features is done at this stage, as machining after the next stages is expensive and time consuming due to the high hardness of the material.

Stage 6 – Melt Infiltration (MIST) An ST-developed process of melt infiltration deposits the Silicon Carbide into the Carbon pre-form to produce the final composite material – CsiC.

Stage 7 – Final Machining - A final machining process is required to achieve the specific tolerances required for brake components.

Stage 8 – Anti-oxidant coating before parts are completed, an anti-oxidant coating is added to reduce oxidation and increase the life of the part.

Stage 9 – Inspection a CMM (co-ordinate measuring machine) inspection of each part along with DTV (disc thickness variation) measurements is performed to ensure all parts meet the strict tolerances required by our customers.