Carbon Fibre

Fact Sheet

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What is it?

- Consists of 90% polyacrylonitrile (PAN) and 10% petroleum pitch (*How is it made?*, n.d.)
- Made of carbon crystals aligned in a long axis (DeMerchant, n.d.)
- Consists of very thin strands of the element carbon (Johnson, 2017)
- Only 5-10 micrometres in diameter (Johnson, 2017), human hair: 50 micrometres

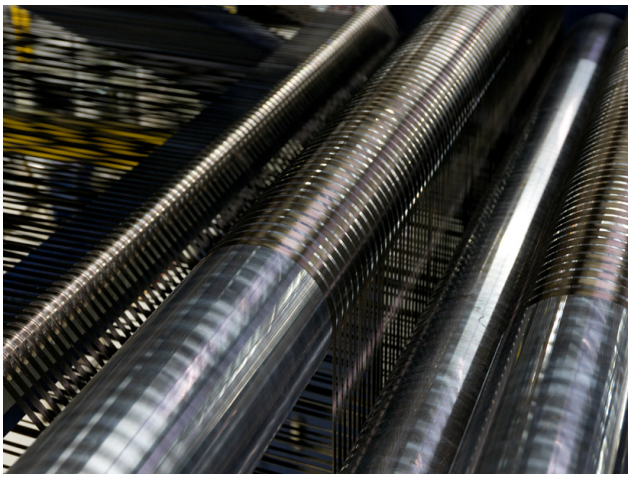

Figure 1: The production of carbon fibre

How is it made?

1. Spinning: polyacrylonitrile and other ingredients are spun into fibres, washed and stretched
2. Stabilizing: heating up to 200-300°C to let the fibres pick up oxygen molecules
3. Carbonizing: heating up to 1000-3000°C under oxygen seclusion to get rid of non-carbon atoms
4. Treating the surface: oxidize surface slightly to reach better bounding properties
5. Coating: protect the fibres from damage with a thin film of polyester, nylon or urethane etc.
6. Winding: fibres are wound onto bobbins (cylinders) and twisted into yarns of various sizes

Applications

- Cars
  - Electrically powered cars like BMWi3 (English, 2016)
  - Racing cars (Formula 1, Formula E, Indy Cars etc.)
  - Bicycles (mountain bikes, racing cycles)
- Sports equipment
  - Tennis rackets
  - Rawing boats
  - Arches
- Aeronautics
- Musical instruments
  - Violins (*Carbon fiber stringed instruments*, n.d.) and bows
  - Guitars
  - Drums

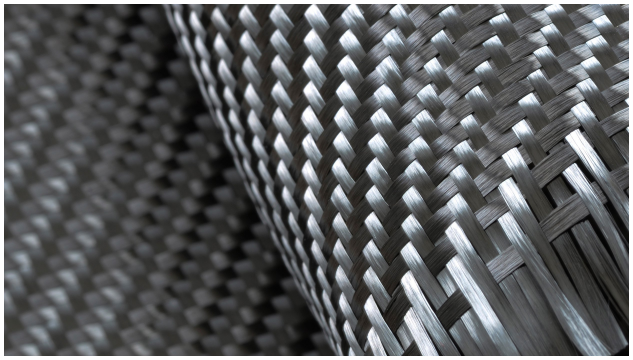

Figure 2: The structure of carbon fibre

Figure 3: A wheel rim made of carbon fibre

Properties

- High strength to weight ratio
- Rigid
- Corrosion resistant
- Electrical conductive
- Twice as stiff and five times as strong as steel (Johnson, 2017)
- Tolerant to high temperatures
- Low thermal expansion
- Biologically inert

Advantages

- Low weight
- Good tensile strength
- Inflammable
- Not poisonous
- Fatigue resistant

Disadvantages

- Brittle
- Expensive
- Energy-intensive production
- Hard to dispose of (Harris, 2017)
- Speciel equipment required for processing
- Sharp edged when refracted (dangerous)

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List of Figures