

29th July 2019

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## **Cross remembers Concorde**

*'Both invention will go into Concorde engines. The invention of a new type of sealing ring - the specially designed "firsts" - are to be used in the prototype engines of the Anglo-French supersonic Concorde.'*

This was how in 1966 the local newspaper reported the invention of the Cross Centipede Ring; the innovative design featured springs attached to the internal circumference to hold it securely in place and ensure that it achieved an effective seal in the intake area of the Olympus 593 engine. Developed specially to meet challenging dimensional, weight and geometric constraints of the engine, the new ring, 4ft. in diameter, not only worked where a conventional ring would be inadequate but was also lighter and cheaper.

Throughout the 1960s Cross supplied rings, springs and wire thread inserts for the Concorde project, on one occasion dropping all other work to ensure that the delivery of an order for sealing ring packs could be reduced from 10 weeks to 5 days to help ensure that the prototype Concorde took off in time. Manufactured from Haynes 25 alloy, these rings were designed to withstand high temperatures in the middle section of the engine.

Since then, Cross has continued to pioneer the development of significant innovations. For example, the centipede design principle has proved to be a successful solution to many other applications, evolving into what is now known as the Cross Cockle Spring, which is manufactured in diameters up to 2000 mm and widely used in aerospace and power generation turbines.

Cross has also pioneered the introduction of Brush Seals to complement traditional seal designs. Brush Seals contain many thousands of fine wires, forming an effective barrier to flow whilst accommodating turbine shaft excursions, thermal movements and misalignments that can damage and instantly reduce the efficiency of a labyrinth seal. Today, Brush Seals are a proven technology in the aerospace and power generation industries, delivering significant efficiency improvements over traditional seal designs.

In another development, specially designed Cross Retaining Rings are a well proven method of retaining compressor and turbine blades to the rotating drum in modern aircraft engines, combining a speedy assembly technique with reliable blade retention. Holding the blades in place at high speeds and temperatures demands a rugged and lightweight ring design.

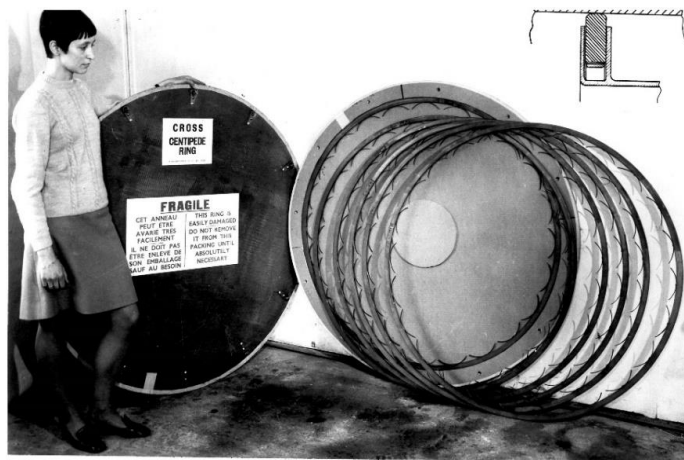
Cross can utilise its proprietary method to transform wire or rod into the required section for engine geometry from alloys such as Waspaloy, Titanium, Inconel 718 and X750. This efficient and environmentally sound process creates negligible waste when compared to traditional machining techniques. It can also offer significant improvements in mechanical properties over rings machined from sheet or forgings, including a very precise circumferential fit and enough spring to hold them in position at operating temperatures up to 800°C.

*Continued....*

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Rings can be dynamically balanced for optimum rotational performance and produced with a range of gap configurations, many of which have been designed by Cross to meet different engine manufacturers' specifications.

END



**CROSS CENTIPEDE RING**

4ft. DIA. IN ALUMINIUM & STAINLESS STEEL USED ON THE CONCORDE

Attached Photo – Ref 2019.105

Caption: A batch of Cross Centipede Rings photographed for the local newspaper prior to despatch to Rolls-Royce.

### Background note for Editors:

Cross Manufacturing Company is a world-class precision engineering company that employs over 600 staff at its three UK factories in Bath and Devizes. Most Cross products are high temperature sealing components which are typically used in gas and steam turbines and engine turbochargers. These are supplied all around the world, with well over three quarters exported directly.

Issued on behalf of:

Cross Manufacturing Company (1938) Ltd

Midford Road, Bath BA2 5RR

Tel: +44 (0) 1225 837000

Fax: +44 (0) 1225 834115

[mail@crossmanufacturing.com](mailto:mail@crossmanufacturing.com)

[www.crossmanufacturing.com](http://www.crossmanufacturing.com)

Contact: Mark Clark [mark.clark@crossmanufacturing.com](mailto:mark.clark@crossmanufacturing.com)