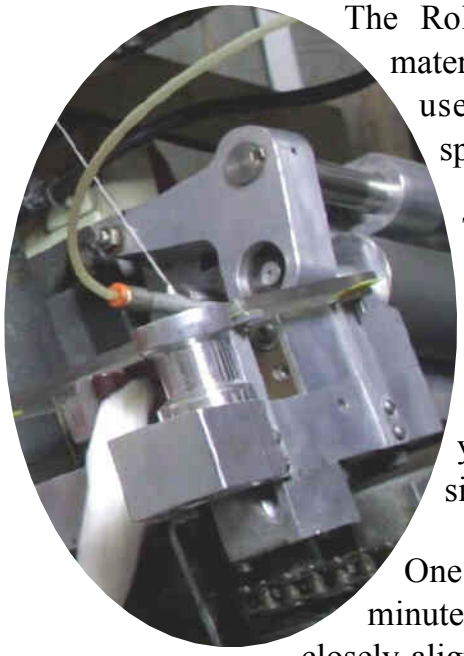
The Unique Technology of Roller-Air

The following is for those who wish to understand a little of how the new technology inside the Roller-Air Spin-Box works. The new technology uses the fundementals of Alan Parker's 1976 invention called friction spinning. The following are about the Mark 12 prototype. However, for intellectual property protection reasons, its features are only divulged in general terms.

First let us look at its spinning principles :-



The Roller-Air technology consists of a raw-material input-fibre opening system already in use on commercially operating rotor spinning machines.

This is linked to a secret and uniquely patentable fibre-transfer system. At its heart is a tube which directs the tiny 'opened' fibres in an air-stream via its uniquely shaped interior to a minute yarn-forming zone called the 'nip' located at one end of two side-by-side cylindrical rollers.

One being a hollowed-out roller with tens of thousands of minute perforations in its cylindrical surface and the other a closely-aligned solid roller. These rotate in the same direction and impart twist to the fibres in the 'nip'.

The crucial technological aspect of Roller-Air spinning is that the Mark 12's unique fibre-transfer system produces yarns with almost 100% horizontal fibre-alignment. The secret is how the requisite yarn-forming number of tiny 'hair-diameter' fibres are made to continually enter 'head-first' into the 'nip', virtually parallel to each other and at a trajectory angle to the 'nip' of less than 8 degrees.

Compressed air is used to create inward-suction through the hollow roller's minute perforations. It is this continuous suction at its perforated surface which enables the same-way rotating rollers to twist the tiny fibres striking the 'nip' into the end of already formed yarn.

A plasma-spray coating system was developed by Union Carbide to stop the US Shuttle's tiles heat-disintegrating on re-entry to the Earth's atmosphere. Similar plasma-spray coating is heat-etched into the surface of the new type of aluminium rollers.

The 'roughened' surface enables the two rollers to impart the requisite mechanised 'finger-twisting' to the millions of tiny fibres per second striking the 'nip'. Various textures of the coating can be used if special twisting characteristics are needed for specific yarn types.

The plasma-spay coating's other function is to prevent the abrasive nature of organic cotton fibres, and the plant's fibrous dust residue, which is expensively-difficult to remove by the various pre-spinning fibre-preparation processes, wearing out the surface of the aluminium rollers.

The fibre-twist insertion characteristics of the Roller-Air technology allows all types of 100% cotton or cotton/polyester blended yarns to be spun at a high efficiency level and commercially acceptable electricity drive-power requirements.

To produce the same yarn delivery speed of around 150 metres per minute as a rotor revolving at a 'wire-producing' 150,000 rpm can achieve, the Roller-Air's 50mm diameter rollers only need to revolve at 3,000 rpm.

But most commercially important is that instead of spinning yarns which feel like 'wire', the Roller-Air technology spins soft-handle yarns which feel pleasant next to the skin.

The massive diameter differential between the 50mm rollers and the diameter of the yarn means that as the rollers impart the mechanised 'finger-twisting', it is the so-formed yarn which revolves at astronomical speed.

Thus the potential to achieve fine quality 100% cotton or cotton/polyester blended yarns at a 'mind-boggling' 1,000 metres per minute, is well within the mechanical capabilities of the new Roller-Air technology.

The major constraint will be the need to upgrade the speed of existing fibre-opening and yarn-package winding systems to cater for such a commercially 'miraculous' fully-automated and thus low-labour yarn production capability, while at the same time using vastly less spinning mill floor-space than exisiting technologies.

Immediately a yarn-end break occurs during spinning, Roller-Air's pneumatic system automatically executes internal self-cleaning. This feature, allied to not needing topower-down, reduces and greatly simplifies what the automatic robotic-piecer needs to do when a yarn-end break occurs on a rotor spin-box.

Thus making for a much simpler robotic system of labour-saving automation than those incorporated on modern rotor-spinning machines.

These being the rotor machine's automation features of a travelling robot to :-

(a) power-down and carry out spin-box cleaning after a break-down in spinning;

(b) mechanically piece yarn-ends together by a knitting/weaving industry acceptable fault-free method of fibre-interlacing;

(c) automatically restart spinning after yarn piecing; and

(d) replace completed yarn packages with empty bobbins and start spinning.