Appendix 1 – Detailed Descriptions of Spinning Processes to Produce Yarn

Ring spinning

Ring spinning is the process of further drawing out roving to the final yarn count needed, inserting twist to the fibres by means of a rotating spindle and winding the yarn on a bobbin. These three stages take place simultaneously and continuously. Ring spinning is a comparatively expensive process because of its slower production speeds and the additional processes (roving and winding) required for producing ring spun yarns. Ring spun yarns produce high quality and are mainly produced in the fine (60 Ne, 10 tex) to medium count (30 Ne, 20 tex) range, with a small amount produced in the coarse count (10 Ne, 60 tex) range. End uses include high quality underwear, shirting, towels.

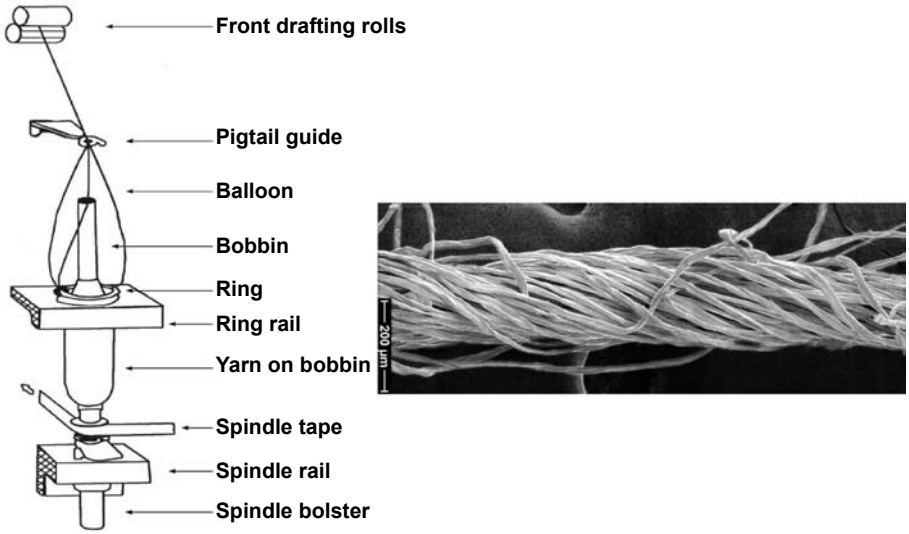

Figure A1: Schematic representation of the ring spinning process (Courtesy of Short Staple Manufacturing- McCreight, Feil, Booterbaugh and Backe, (Carolina Academic Press – 1997)) and resulting yarn (Photo: CSIRO).

Rotor spinning (open –end spinning)

Sliver is fed into the machine and combed and individualized by the opening roller. The fibres are then deposited into the rotor where air current and centrifugal force deposits them along the groove of the rotor where they are evenly distributed. The fibres are twisted together by the spinning action of the rotor, and the yarn is continuously drawn from the centre of the rotor. The resultant yarn is cleared of any defects and wound onto packages.

The production rates of rotor spinning is 6-8 times higher than that of ring spinning and as the machines are fed directly by sliver and yarn is wound onto packages ready for use in fabric formation the yarn is a lot cheaper to produce. Rotor spun yarns are more even, somewhat weaker and have a harsher feel than ring spun yarns. Rotor spun yarns are mainly produced in the medium count (30 Ne, 20 tex) to coarse count (10 Ne, 60 tex) range. End uses include denim, towels, blankets socks, t-shirts, shirts and pants.

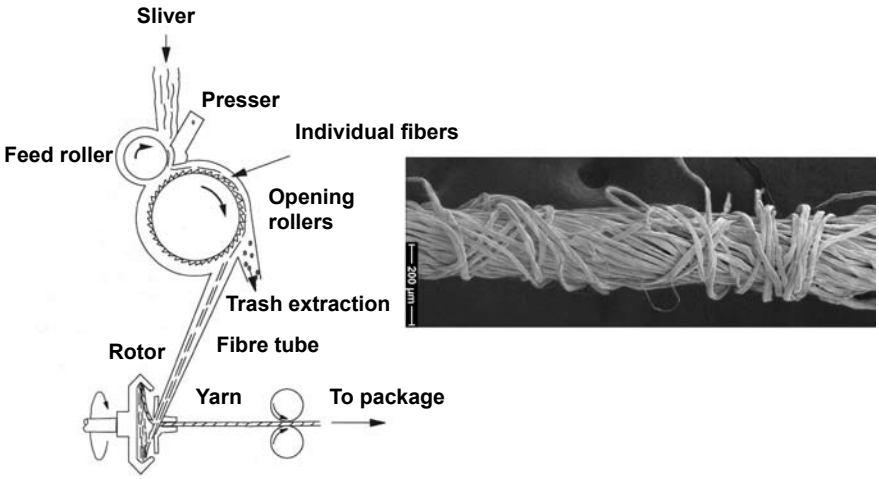

Figure A2: Schematic representation of the rotor spinning process (Courtesy of Short Staple Manufacturing - McCreight, Feil, Booterbaugh and Backe (Carolina Academic Press – 1997)) and resulting yarn (Photo: CSIRO).

Air jet spinning (vortex)

Sliver is fed into the machine and is further drawn out to the final count and twist is inserted by means of a rotating vortex of high pressured air. The resultant yarn is cleared of any defects and wound onto packages ready for use in fabric formation. The production rate of air jet/vortex spinning is 3-5 times higher than rotor spinning and 10-20 times that of ring spinning and, like rotor spinning, air-jet spun yarn is a lot cheaper to produce as it also uses fewer production stages. As is the case with rotor spun yarns, air jet yarns are more even, but weaker and have a harsher feel than ring spun yarns. Air-jet spun yarns are mainly produced in the medium count (30 Ne, 20 tex) range and are mainly polyester/cotton blended yarns. End uses include woven sheeting and knitted lightweight shirting.

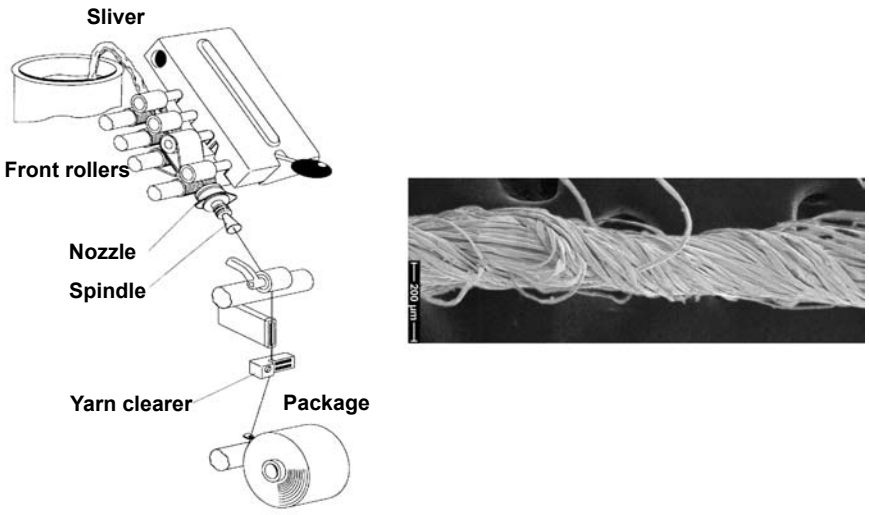

Figure A3: Schematic Representation of the Air-jet spinning Process (Courtesy Murata Machinery, Ltd.) and resulting yarn (Photo: CSIRO)