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## TECHNICAL INFORMATION

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Initial sampling/testing of programme =  
Shima Seiki 122 S (10 gauge) Knitting single system.

Final samples/full size knitted bodies =  
Shima Seiki SWG First ® 184L  
(7 gauge - knitted split gauge/1/2 gauge, single bed)  
Knitting single system  
[www.shimaseiki.co.jp](http://www.shimaseiki.co.jp)

Yarn =  
Zegna Baruffa Cashwool NM. 2/30  
100% Extrafine Wool (Virgin Wool)  
(Knitting with 2 ends)  
[www.baruffa.com](http://www.baruffa.com)

**“HEAD, SHOULDERS, KNEES AND TOES, KNEES AND TOES . . . . .”**

The bodies are knitted feet first ending with the top of the head. They are made using seamless knitting technology, falling from the machine fully knitted. The only finishing necessary is to remove the waste yarn from the toes (sock ends), fingertips (mitten ends) and thumbs and to sew in the ends of yarn at the toes, fingertips, thumbs and top of head.

The concept of the knitted body simply dropping from the machine is achievable.

### HEAD, FACE AND SHOULDERS

TO ACHIEVE A FINISHED, SMOOTH SHAPED TOP OF HEAD SO THAT THE KNITTING SIMPLY DROPS FROM THE MACHINE WITH NO NEED FOR FINISHING APART FROM AN END OF YARN TO SEW IN.

Originally trying to shape top of head without having noticeable fully fashioning marks. It was not possible to get the amount of shaping needed through this method. Cut down shaping from 8 shaping lines to 4 fully fashioned shaping areas. Smooth shaping and minimal finish now possible.

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TO GIVE THE KNITTED BODIES MORE TEXTURE, EMPHASIS THE KNITTED QUALITY OF THE WORK AND ACHIEVE SHAPING FOR THE NECK AND SHOULDERS.

Addition of 2 x 2 rib in this area to pull in the fabric.

TO ACHIEVE DETAIL IN FACE WHILST MAINTAINING KNITTED FABRIC QUALITY

This is a very notable technical development. To achieve such detail and three-dimensional shaping you would normally use a high twist yarn or elastomeric, and knit very tightly. This was not possible, as I wanted the pieces to be very obviously knitted. I also wanted to use wool to further emphasis the knitted quality of the work. I wanted the knitted stitch to show so we had to knit relatively loosely and split gauge (on every other needle) to get a larger stitch.

**This technical development would be very useful in developing a better fit for medical and other protective facial masks especially when using technical yarns such as Lyocell, which are not stretchy, and where elastomeric cannot be used because it impedes the function of the yarn or mask.** Lyocell is made from cellulose fibre. When wet it turns to jelly. When knitted into a facial mask it can be used in the protection and treatment of burns.

The detail and three-dimensional shaping was achieved in the following two areas.

### **Three-dimensional chin**

This development builds on the past experience of knitting medical masks. **A truly three-dimensional chin is developed by the use of partial knitting (flashage), as used in the knitting of sock heels, and the incorporation of interlock (birdseye) in the under part of the chin.** The top and bottom part of chin are of equal size but the use of interlock (birdseye) in the lower part of the chin makes the fabric denser and firmer. This enables the looser top part of the chin to stick out further. The interlock stitch is not visible; it simply gives more structure to the knitted fabric.

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The fabric is knitted split gauge/1/2 gauge (knitting on every other needle) single bed

ie needles 1, 3, 5, 7, 9, 11 etc knit all rows (courses). The lower part of the chin is knitted split gauge/1/2 gauge, single bed, interlock (birdseye)

ie needles 1, 5, 9 etc knit row 1 (course 1)

needles 3, 7, 11 etc knit row 2 (course 2)

needles 1, 5, 9 etc knit row 3 (course 3)

### Three-dimensional nose

To achieve a truly three-dimensional nose the nose area is knitted full needle (on all needles) interlock (birdseye), whereas the rest of the face is knitted split gauge (on every other needle).

**To achieve the shaping more rows are knitted on the nose than on the face. This is done through the use of a holding technique. For the top of the nose 3 rows are knitted in the nose area (full needle birdseye) to 1 row on the face (split gauge). For the widest part of the nose up to 7 rows are knitted in the nose area (full needle birdseye) to 1 row on the face (split gauge). This process pushes the capabilities of the machine to its limits. Every possible feature of the machine is employed to keep the stitches on the needles;** Stitch Pressers (for holding down the fabric), Loop Pressers (for holding down the individual loops), Contra-sinker (distributing the yarn tension more evenly), Takedown Rollers (main rollers and sub rollers) and Pulldown Device.

To prevent holes appearing where the nose meets the face the stitches either side of the nose are transferred back into the face (split gauge) area.

## HANDS AND FEET

### Shaping of toe ends (socks) and hands (mittens)

Original samples were knitted with traditional sock toes. Using partial knitting (flashage) with the sock line appearing on the top of the foot. A new toe shaping was developed, with a right and left foot, starting from a narrow base of stitches and increasing either side. A good edge was achieved by the development of the Drawstring Edge.

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The hand/mitten end shaping was also improved through the use of the Drawstring Edge.

Wrist and ankle shaping was achieved through the addition of 2 x 2 rib in these areas.

### **Drawstring edge (when knitting split gauge)**

This is a very notable technical development giving a very neat finish on toes, mitten ends and thumbs when knitting split gauge/1/2 gauge (on every other needle).

**When knitting in split gauge the press off start does not give a neat edge, as it does when used on full needle knitting. To get the edge neat and tight when knitting split gauge you would usually use a high twist yarn, or put elastomeric in the first row (set up row). This development enables you to get a very neat finish and improve shaping when using any yarn.**

The drawstring edge is achieved by the addition of 1 row knitted on the back bed needles only before the usual set up row (press off start), where 1 row is knitted on all needles.

Knit as follows:

After knitting waste yarn change to main yarn.

Knit 1 row (course) back bed needles only.

Knit 1 row (course) both beds/double bed

Continue in tubular (circular) knitting

When finished knitting remove the waste yarn and pull the first row, knitted on back bed needles only, tight.

### **ARMS AND LEGS**

TO START KNITTING FROM A NARROW POINT, FROM THE TOE END

Need long waste yarn to get beyond Takedown Rollers.

Waste yarn on hands (mitten ends and thumbs) needs to be exactly the right length to hit sub rollers before starting to knit hands in main yarn.



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## TECHNICAL INFORMATION & DEVELOPMENT



**1**  
The bodies are knitted feet first ending with the top of the head. They fall from the machine fully knitted.



**2**  
The knitting process starts at the toe ends. Long waste yarn is needed to get beyond the Takedown Rollers. It is necessary to remove the grey waste yarn from the toes (sock ends) when the knitting comes off the machine.



**3**  
The waste yarn on the hands (mitten ends and thumbs) needs to be right length to hit the sub rollers before starting to knit the hands in main yarn. It is necessary to remove the grey waste yarn when the knitting comes off the machine.



**4**  
First full-size sample. Trying to shape top of head without having noticeable fully fashioning marks. It was not possible to get the amount of shaping needed through this method.



**5**  
Final sample. Smooth shaping and minimal finish possible with the addition of 2 x 2 rib to give more texture and achieve shaping for neck and shoulders.



**6**  
First full-size sample. Trying to achieve three-dimensional detail in face whilst maintaining knitted fabric quality.



**7**  
Final sample. Achieving three-dimensional detail in face whilst maintaining knitted fabric quality through use of partial knitting (flashage) and interlock (birdseye).



**8**  
Sole of foot. Toe shaping was developed, with a right and left foot. A good edge was achieved by the development of the Drawstring Edge, ankle shaping achieved through the addition of 2 x 2 rib.



**9**  
The hand/mitten end shaping was achieved through the use of the Drawstring Edge. Wrist shaping was achieved through the addition of 2 x 2 rib.