



Working With silk

Rie Natalenko

Silk is a simple protein fibre made by silkworms - yet it is so much more.

The first country to manufacture and use silk was China. According to Kadolph, Langford, Hollen, and Saddler (1993) in their book *Textiles*, China was the only country producing silk for approximately 3,000 years before manufacturing spread to other Asian countries. Japan is currently manufacturing more silk than any other country in the world.

Silk can be dyed easily, either yarn-dyed or piece-dyed. Yarn-dyed silk is degummed, dyed and twisted before use (e.g. taffetas, some satins, jacquard weaves). For piece-dyed fabric, the fabric is woven and then degummed and dyed (e.g. crepes, twills). Piece-dyeing was uncommon before 1815. Usually, the raw silk skeins were soaked in tanks of dye. Piece-dyeing was introduced in Lyons in France, and became an industry in 1849.

Silk can be printed by rollers, first recorded in 1785 in Scotland. Roller printing of silk is not common. More common is screen-printing, an ancient form of printing which was industrialised in France in the mid 1800s.

All silk fabrics have to be 'finished', a

process which gives silk its shimmer, suppleness and 'hand'. Treatments include both physical and chemical, and are designed to set the dye, increase the shine, crease-proof, water-proof, flame-proof, and so on.

Silk is usually woven. The traditional loom has now been largely replaced by a weaving machine. These machines transport the weft thread by rapier or air jet rather than a shuttle. This means a higher weaving speed and fewer workers. It is also possible to weave very wide fabric on machine looms. Some fabrics, however, are still produced on traditional looms (such as reproductions of traditional jacquards), and the looms in Lyons still use the perforated cards which were perfected in 1804.

Silk can also be knitted. Knitting gives silk hosiery elasticity, and the range of silk knitted fabrics is very large today. A big advantage is resistance to creasing - ideal for use in travelling clothes.

Today, silk can be purchased for knitting and weaving in many forms. For example, you can purchase recycled sari silk yarn which can be used, not only for knitting and weaving, but also in felting projects and other creative pursuits.

Throwster's yarn, made from



Silk hankies.
*Photo: Treetops
Colour Harmonies.*
Far Left:
Throwster's
waste silk.
*Photo: Treetops
Colour Harmonies.*
Right: Silk sari
twist. *Photo: The
Thread Studio.*



throwster's waste, is also available for use in crafting, as is recycled sari silk ribbon.

Silk caps and silk hankies (*mawata*) are made by stretching the cocoon over a cone or a wooden board. They can be stretched into three-dimensional shapes and can be separated into layers. Silk caps and hankies are excellent for spinning because of the lustre and continuous fibre. They make a very strong yarn, dye beautifully, and can be used in weaving and felting, needlefelting, papermaking and other fibre arts. As well, they are also used as the padding inside winter kimonos!

Silk tops (sliver, roving) have been stretched to align the fibres in one direction. These can be used for spinning and weaving, and can be laid out with wool tops for felting. They are also used in papermaking and various textile arts. Silk by itself (without the addition of wool) is not a suitable felting material. Silk is also used as the basis of nuno felted projects. Beautiful Silks has an excellent chart of which silks to use and the various effects at: www.beautifulsilks.com/pages/products/fabricfornuno.html

Silk is very versatile. Through researching this article, I have found it far more versatile than I could possibly have imagined. I knew,

of course, about the use of silk in fashion and fabric, so let's start there.

In Parisian Haute Couture, silk was always the fabric of choice—the prestige fabric of the fashion industry. It has become more and more accessible during the last century and is now available to anyone who wants to wear it. It is still not cheap, but is far more so today than it ever was.

Silk has been used traditionally in lingerie because of its softness against the skin and the range of colours possible. Interestingly, nobody has ever reported an allergy to silk. It is the ideal fabric to have next to the skin, both for men and women - ideal for pyjamas and underwear.

Scarves made from silk are popular for both women and men, and silk is often used in laces and the frothy fabrics ideal for evening wear and wedding dresses. It is still the fabric of choice for men's ties as well.

Silk is used for *passementerie*, the term applied to all the techniques connected with ribbons, braids, pompoms, tassels and other decorative articles. Silk *passementerie* is a speciality of the Saint Étienne region in France.

In furnishing and upholstery, silk has been used for centuries, and is still used today.



Silk is made into sewing thread which is fine and strong, and is the preferred thread for quality garments. It is also flexible and won't leave holes, so it makes an excellent choice for basting thread. When sewing silk or wool, it is ideal. You will find a number of blogs in the internet posting about silk threads and their use.

Now for some of the more unusual and surprising uses of silk. I have mentioned silk as the padding for kimonos, but it is also used in all sorts of insulation, such as for space craft. It has been used for parachutes and parachute cords, the padding in pillows and doonas, climbing ropes and airbags, and to strengthen bicycle tyres and car tyres.

However, there are some amazing new uses of silk which are being developed. At Utah State University, Tufts University and Oxford University, silk is being used for some very exciting applications. It turns out that silk can be made into bulletproof vests, and body armour which is stronger than kevlar and more flexible than nylon. It can be processed into microprisms and make reflective tape and holograms and optical fibres.

Because it is implantable in the human body without causing any immune response and it actually gets reintegrated into the body (biodegradable and biocompatible), it is being used for artificial tendons, ligaments, veins and bones, and artificial skin and bandages which speed the healing process following an injury. It is being developed as surgical sutures because it is thinner and stronger than current materials, and being made into microneedles thinner than a human hair. Enzymes, antibodies and vaccines can be added to a liquid silk solution which then hardens and can then be introduced into the human body, or carried and stored in your wallet, for example.

Because it is biodegradable, silk can be made into cups and other food packaging which can be thrown away without guilt (or, since it is edible, it can be made into edible packaging that you can cook with the food).

Silk can be formed into nuts and bolts that work under water, and can be used in sensors, or even silk LED tattoos. The list seems to go on and on!

There is a fantastic TED talk by professor Fiorenzo Omenetto at: http://www.ted.com/talks/fiorenzo_omenetto_silk_the_ancient_material_of_the_future which is worth watching, and which explains many of these developments.

Spider silk and silkworm silk are being called the fibres of the future. They are being studied for uses in computing, building, telecommunications, lasers, many medical applications, packaging - the possibilities of silk-based technologies are endless!

Who knew that silk was such an amazing fibre?

The research for this article has been fascinating, and was made easier thanks to Sylvia at Silksational (www.silksational.com.au) and Marion at Beautiful Silks (www.beautifulsilks.com) who sent me samples of different silk and silk products to examine and to play with. Thank you also to Carol at Silk Wholesalers (www.silkwholesalers.com.au) for sharing her expertise. Further information may be found on their websites.

Various silk products as mentioned in this article are available from Silksational, Beautiful Silks, Silk Wholesalers, The Thread Studio, Ecoyarns, BB Yarn Supplies, Colour Streams, Kraftkolour, Waratah Fibres, Treetops Colour Harmonies, Pitt Trading, Feltfine Yarns, The Stitching Circle, Fibres & Threads, Glenora, Lara Downs, and other wonderful Australian suppliers.



Far Left: Salt effect silk painted scarf

Above: Silk ribbon embroidery on felt.

Photos: *Colour Streams.*

Right: Mixed silk hankies.

Photo: *Treetops Colour Harmonies.*

Far Right: Silk Tops.

Photo: *The Thread Studio*

Below: Silk cap.

Photo: *The Thread Studio.*

