

## Description

### Image



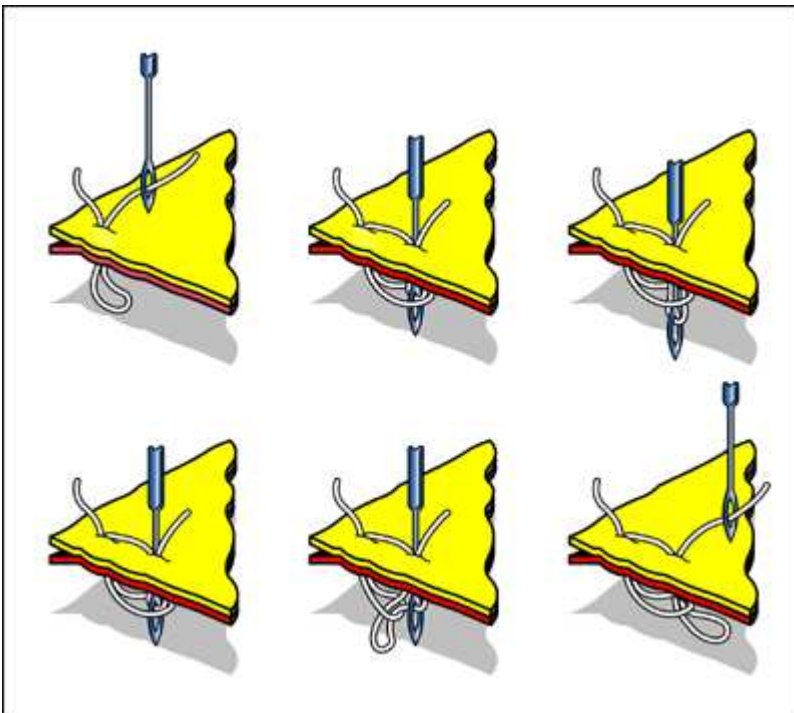
### Image caption

(1) Sewing Machine Serendipity - Brother Model 210 © Kelly Hogaboom at Flickr (CC BY-SA 2.0) (2) Photo sewing, Thumbhole Cuff Tutorial © Kelly Hogaboom at Flickr (CC BY-SA 2.0) (3) Jeans, Jean-ius Class On Crafts © Kelly Hogaboom at Flickr (CC BY-SA 2.0)

### The process

SEWING has been practiced for at least 5000 years - indeed, there is evidence that it is much older still. In sewing, a series of stitches are applied, using one or more continuous threads of fibers, to join two or more thicknesses of material. There are many types of stitching, broadly described as 'lock stitch' in which loops of one thread pass through the material and are locked on the other side by a second thread; or 'chain stitch' in which a single thread zigzags through the material. Sewing machines automate the process. The figure shows a chain stitch of a single lap joint.

### Process schematic



### Figure caption

The figure shows a chain stitch of a single lap

### Material compatibility

Composites	✓
Metals - ferrous	✓
Metals - non-ferrous	✓
Natural materials	✓
Polymers - thermoplastics	✓

### Function compatibility

Electrically conductive	✗
Thermally conductive	✗
Watertight/airtight	✗
Demountable	✓

### Joint geometry compatibility

Lap	✓
Sleeve	✓
Scarf	✓
Tee	✓

### Load compatibility

Tension	✓
Compression	✓
Shear	✓
Bending	✓

### Economic compatibility

Relative tooling cost	low
Relative equipment cost	low
Labor intensity	medium

### Physical and quality attributes

Range of section thickness	0.02 - 5 mm
Unequal thicknesses	✓
Processing temperature	16.9 - 36.9 °C

### Process characteristics

Discrete	✓
Continuous	✓

### Supporting information

#### Design guidelines

Sewing is an exceptionally flexible process, both in the range of materials it can join and in the shapes to which it can be applied. It provides not only mechanical fastening, but also decoration, often of a very elaborate kind.

**Technical notes**

Dissimilar materials can be joined. The threads used for conventional sewing are the natural fibers cotton, silk and flax, the cellulose derivative (rayon or viscose), and drawn polymer fibers made from polyethylene, polyester, polyamide (nylons) or aramids (Nomex, Kevlar). It is also possible to sew with metal threads. The joining thread or fiber must be sufficiently strong and flexible to tolerate the tensions and curvatures involved in making a stitch. All fabrics, paper, cardboard, leather, and polymer films can be sewn. Sewing can also be used to join fabric and film to metal, glass or composite if eye-holes for the threads are molded or cut into these. There are many possible joint configurations, some involving simple through-stitching of a single lap or zigzag stitching across a simple butt, others requiring folding to give locked-lap and butt configurations.

**Typical uses**

Sewing is the principal joining process used by the clothing industry. It is important in tent and sail making, shoe construction, and book-binding. It can be used to join polymer sheet to make wallets, pockets, cases and travel gear.

**The economics**

Hand or small electric sewing machines are inexpensive; large automated machines can be expensive. Sewing is fast, cheap, and very flexible, both in the materials it can join, and in the joint configurations.

**The environment**

The thimble was devised to protect the finger from puncture when sewing. This minor risk aside, sewing offers no threat to health or safety, and is environmentally benign.

**Links**

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MaterialUniverse

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Reference

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