

# SEWING FOCUS

TECHNICAL SEWING INFORMATION

SERVICEHOUSE



## Interior for Motor Vehicles, Ships, Aircrafts and Trains

### Checklist for Sewing Vehicle Interior

Sewing Parameters: SCHMETZ Tip:

Needle size	NM	SIZE
	100 – 140	16 – 22
	Depending on the thickness of the material to be sewn also available as SCHMETZ SERV 7 version.	

**Needle point** In the production of vehicle interior both round points and cutting points are used. For sewing of woven textiles normal round points or ball points should be deployed depending on the material structure and the number of layers. For sewing leather, round points and cutting points are used.

**Sewing thread** Almost exclusive use is made of 100 % polyester or 100 % polyamide continuous multi filament thread as needle and hook/looper thread. Seldom core spun threads are used.

**Machine** Normally, industrial high-speed sewing machines are used with stitch type 301 (double lockstitch), 401 (double chain stitch) and 503 (2-thread overedge chain stitch)

**Other factors:**

**Thread tension** The necessary thread tension depends on the fabric, the sewing thread and the sewing machine. The thread tension should be as low as possible to allow an optimal loop formation.

**Stitch type** Double lockstitch (stitch type 301) according to DIN 61400,  
double chain stitch (stitch type 401) according to DIN 61400,  
2-thread overedge chain stitch (stitch type 503) according to DIN 61400.

**Stitch density** The higher the stitch density, the better the seam strength.  
Usually about 3 – 4 stitches/cm (max. 5).

## Quick Reference for Typical Sewing Problems in Manufacturing of Vehicle Interior

Symptoms	Effect	Cause
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### Skip stitches/Thread breakage

No interlacing/interlooping of needle thread and bobbin/looper thread	Reduced seam strength, especially with double chain stitch	Incorrect thread tension
Needle thread breaks	Sub-standard, defective seam appearance	Incorrect needle system
Ravelling of the needle thread	Thread breakage after skip stitch	Needle incorrectly fitted
		Needle deflection due to extremely thick layers of material at cross seams
		Incorrect thread guidance
		Jamming of the sewing thread between needle and fabric
		Mechanical damage to needle, throat plate, feed etc.

### Fabric damage

Material damage	Reduced tensile strength of the material	Oversized needle and/or wrong point style
Stitch holes with melted residue of fabric threads	Sub-standard, defective seam appearance	Unsuitable finish
	Reduced seam strength	Excessive sewing speed
		Defective/worn out needles
		Damaged sewing accessories, such as throat plate, feed etc.
		Wrong sized aperture of the throat plate

### Uneven seam appearance

Stitch sequence is irregular, resulting in a zig-zagging seam	Reduced seam strength	Incorrect balance of thread tension
		Incorrect thread guidance
		Incorrect point style

Solution			
NM SIZE	Point style	Thread	Machine
			
<p>Use the SCHMETZ SERV 7 needle</p> <p>Adjust needle size to the material and amount of layers; e.g. for 2 layers NM 100 – 120 in SERV 7 version and for 4 layers NM 120 – 140 in SERV 7 version</p>	<p>Use needles with twisted point groove</p>	<p>Use core-spun threads as bobbin/looper threads</p> <p>Optimize thread tension</p>	<p>Optimize the hook/looper setting</p> <p>Adjust the sewing accessories, such as throat plate, feed etc. depending on material thickness and sewing thread/needle</p> <p>Examine the thread guiding elements</p> <p>Change worn out or defective sewing accessories regularly, such as thread guiding elements, hook/looper, throat plate etc.</p>
<p>Use the SCHMETZ SERV 7 needle</p> <p>Needle size as stated under ‘Skip stitches/Thread breakage’</p>	<p>R Normal round point</p> <p>SES Light ball point</p> <p>SUK Medium ball point</p> <p><b>CAUTION:</b> It is advisable to change the needle after every shift or after a shorter interval depending on the stress</p>	<p>Choose the right sewing thread size according to the needle size and the fabric</p>	<p>Adjust the sewing accessories, such as throat plate, feed etc. depending on material thickness and sewing thread/needle</p> <p>Check and adjust the material transport</p>
<p>Use the SCHMETZ SERV 7 needle</p> <p>Needle size as stated under ‘Skip stitches/Thread breakage’</p>	<p>R Normal round point</p> <p>SES Light ball point</p> <p>SUK Medium ball point</p>	<p>Check thread flow</p> <p>Optimize thread tension</p>	<p>Check and adjust the material transport</p> <p>Examine the thread guiding elements</p>

## Selection of Point Style and Needle Size

Material	Number of layers	Needle size NM / SIZE	Point style
Fabric with/without foam backing	2	100 – 110 / 16 – 18	R normal round point
	4	110 – 120 / 18 – 19	SES light ball point SUK medium ball point
Knitted fabric with/without foam backing	2	100 – 110 / 16 – 18	SES light ball point
	4	110 – 120 / 18 – 19	SUK medium ball point
Imitation leather with/without foam backing	2	100 – 120 / 16 – 19	SD1 round point with a small triangular tip
	4	120 – 140 / 19 – 22	R normal round point
Leather with/without foam backing	2	100 – 120 / 16 – 19	SD1 round point with a small triangular tip
	4	120 – 140 / 19 – 22	LL twist point
			LR reverse twist point
			PCL narrow wedge point, left twist point groove
			PCR narrow wedge point, right twist point groove
			R normal round point

**CAUTION:** Imitation leather is more sensitive to marking than leather. Careful when using a cutting point with strong cutting effect.

General recommendation: Use of the SERV 7 needle version with the appropriate point style



## Contents

1. Manufacturing of vehicle interior
  - 1.1 Typical sewing problems
  - 1.2 Quality seams with the right sewing parameters
2. Selection of the right needle
  - 2.1 Needle size
  - 2.2 Point style
  - 2.3 SERV 7 needle construction
  - 2.4 Changing of the needle
3. Selection of sewing threads and stitch parameters
  - 3.1 Composition and size of the sewing thread
  - 3.2 Stitch type
  - 3.3 Stitch density
  - 3.4 Thread tension
4. Sewing machines for the manufacturing of vehicle interior
  - 4.1 Feed
  - 4.2 Throat plate/Throat plate aperture size
  - 4.3 Sewing speed
5. Our advice
6. SERVICEHOUSE –  
An overview of our services

## 1. Manufacturing of vehicle interior

Mobility and the demand of the consumer for safe and comfortable travelling is growing each year. For this reason more and more components out of textile materials are used in motor vehicles, trains, airplanes and ships.

During the production of interior, safety and functional aspects like flame resistance, shear and abrasion resistance, colour-fastness and elongation of the fabrics are the main objectives. The many different products in the field of interior not only have to fulfil safety aspects but also the demands and influences of fashion.

The consistent quality of the finished products is the decisive criterion in achieving optimum market positioning and enduring success. Quality assurance operated from the first phase of production is a tool for setting the required standard of final quality. Ensuring quality always has been and always will be a must in every production step.

If the part played by the needle is not considered at the stage of work preparation sewing disturbances, faulty seams and non-reparable material damage will occur during subsequent production. Regrettably often it is realized far too late in the production process that the wrong needle has been deployed. Choosing the right needle and point style can prevent such critical errors.

### 1.1 Typical sewing problems

Textile products in the field of interior are usually sewn out of woven fabrics, knitted fabrics and leather. These components usually have a foam backing. These backings differ in material height (1 – 10 mm) and strength. Together with the finish they later have a direct influence on the sewability.

Typical sewing problems occurring during interior manufacturing are:

- Skip stitches/Thread breakage
- Fabric damage
- Faulty seam appearance (visual and functional)

## 1.2 Quality seams with the right sewing parameters

All sewing parameters influencing the production have to be coordinated with each other. Quality seams demand durability and tensile strength as well as fashionable aspects (for example quilted seams which are offered in different designs).

This broad spectrum of variations demand an exact adaptation of all sewing parameters like material to be sewn, sewing thread, needle, sewing machine and sewing speed.

### Needle

## 2. Selection of the right needle

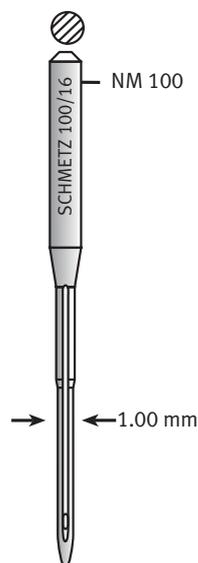
In the adjustment of all sewing parameters the needle has a very important function. The determination of the right needle size and point style for the material to be sewn is among one of the most important decisions in order to achieve a fault free seam and a high quality seam appearance.

The selection of the right needle is dependant on the structure of the material, the number of layers and the material combinations.

### 2.1 Needle size

Before choosing the point style one should determine the needle size. The needle size is dependant on the material to be sewn, the number of layers and the sewing thread.

The needle expands the fabric threads during penetration of the fabric. The use of a too large needle diameter can exceed the physical tolerance limits in respect to the elongation of the fabric threads. This causes the fabric threads to “burst” with material damage as the result.



Depending on the thickness and finish of the material and given sufficient inherent elasticity in the fabric threads, no damage is to be expected if a suitable needle size is used.

An overview of the suggested needle sizes can be found in the table on page 4.

### 2.2 Point style

In the manufacturing of interior both SCHMETZ round points as well as SCHMETZ cutting points are used.

Depending on the material structure and the number of layers round or ball points should be used for sewing cover fabrics and laminated cover fabrics as they push the fabric threads away carefully during penetration of the needle.

R normal round point



SES light ball point



SUK medium ball point



The normal round point “R” is the standard point style. With its pointed conical shape it pierces the weave yarns which creates a very straight seam.

The light ball point “SES” displaces fabric threads, directly piercing the gaps in between and avoiding damage to the material.

The medium ball point “SUK” is even more rounded than the “SES” light ball point and guarantees a damage free displacement of the fabric threads.

The ball points “SES” and “SUK” originate from the use in the field of knitwear. Experiences in the area of woven fabrics – especially with laminated fabrics – show that very good seam results can be achieved with their help.

Depending on the material structure and the number of layers round or small cutting points should be used for sewing imitation leather and laminated imitation leather.

R normal round point



SD1 round point with a small triangular tip



The round point with a very small, triangular cross section “SD1” cuts approximately 10% of the stitch hole with the remaining 90% being displaced by the conical portion of the round point. In comparison to a normal round point “R” a needle with a “SD1” point is less deflected and makes a nice, small incision into the material.

Usually imitation leather is more sensitive to marking than leather. This property can influence the durability and strength of a seam negatively when using a cutting point with strong cutting effect; possibly the material can rip open.

For sewing imitation leather and laminated imitation leather cutting points, in some cases round points are deployed. This is dependant on the number of layers and the quality of the leather.

LR reverse twist point



LL twist point



P narrow wedge point



PCL narrow wedge point, left twist point groove



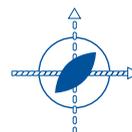
PCR narrow wedge point, right twist point groove



R normal round point



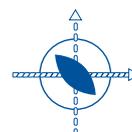
The reverse twist point “LR” is a cutting point creating a seam inclined slightly towards the left – a so called decorative seam. The incision is made at a 45° angle to the direction of the seam; thus creating a seam where the sewing thread is lying slightly inclined to the left between the incisions on the surface. Originally this seam appearance originates from the footwear manufacture and is used as a decorative seam when closing leather seams.



LR reverse twist point



An “LL” cutting point does not really make a decorative seam, instead a slightly recessed, straight seam is created. At a 135° angle to the direction of the seam the incisions are exactly opposite to those of the cutting point “LR”. “LL”-needles with a right twist point groove (CR) are also available. Usually an “LL” point is used for a two-needle decorative seam. Here the needle should have a “CR”-point groove (right twist point groove) in order to prevent the thread getting stuck and in order to achieve a better seam appearance of the left seam.



LL twist point



LLCR twist point

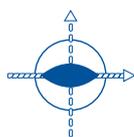


The narrow wedge point “P” is a cutting point with a lens-shaped incision made at the right angle towards the seam direction. Seams which are exposed to high stresses require a very compact stitch sequence. These demands are fulfilled by needles cutting into the material crosswise towards the seam direction and thus leaving enough space between the single stitches. By this the danger of perforating the material through touching stitch holes is ruled out.

Due to the short distances between the stitch holes the very fine, pearl like seams are very decorative when used as top seam.

For this purpose, the most successful choice will always be a “P”-point needle and its innovative versions “PCL” and “PCR”.

The special feature of the needles “PCL” and “PCR” is the point groove below the eye twisting to left (PCL) or to the right (PCR) side. This gives the thread more room and protects it being squeezed over the edges of the groove and eye or against the cutting edge. Whether to use a “PCL” or a “PCR” is determined by the direction from which the hook takes the thread. With needles which are threaded from left to right a “PCL” must always be used.



**P** narrow wedge point



**PCL** narrow wedge point with left twist point groove



**PCR** narrow wedge point with right twist point groove. Special use as left needle with 2-needle lockstitch machine



### 2.3 SERV 7 needle construction

Differing sewing requirements and different numbers of material layers demand a needle which produces seams of the desired quality without problems.

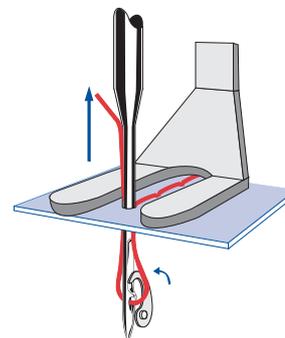
Skip stitches impair the sequence and the strength of the seam and by that the quality of the finished product immensely.

SCHMETZ SERV 7 is a special needle to prevent skip stitches and needle breakages. This needle type comes in various point styles – for the particular requirements of different materials. The distinctive features of SCHMETZ SERV 7 needles are their specially shaped hump scarf and their extra blade reinforcement. The hump scarf extends the loop so that the hook or looper can catch it easily. This greatly reduces skip stitches. The special stability of the SCHMETZ SERV 7 needle is particularly valuable for sewing dense fabrics and multiple layers of fabric.

**SCHMETZ Tip:**

**Benefit 1: SERV 7 hump scarf produces optimum loop formation and prevents skip stitches.**

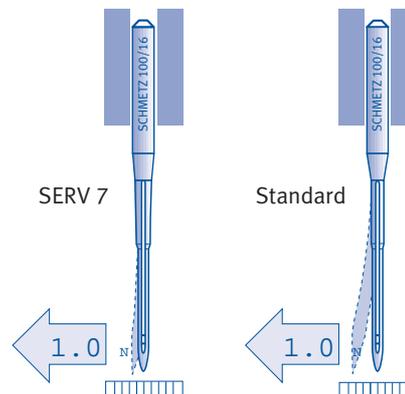
SCHMETZ SERV 7



The SCHMETZ SERV 7 blade reinforcement makes the needle especially stable and far less likely to “bend”. Needle breakages are thus minimized and the centric penetration produces a better seam appearance. The low deflection of the needle also prevents skip stitches.

**SCHMETZ Tip:**

**Benefit 2: SERV 7 needle has higher stability increasing needle life.**



## 2.4 Changing of the needle

Minor damage to the needle point and the wear and tear of different sewing operations impair the quality of the end product. Depending on the number of fabric layers, material thickness and combinations a change of the needle is necessary at the beginning of every shift or at least once per working day. Experiences show that keeping these times makes it possible to sew with a constant quality.

### SCHMETZ Tip:

Testing methods like the nail test give hints about the condition of the needle. The needle point is pulled over the fingernail and damages are felt (fingernail is scratched).

## Sewing thread

### 3. Selection of sewing threads and stitch parameters

Typical materials used in interior manufacture are foam backed woven fabrics, imitation leather, leather and fabric combinations. For the quality assurance the requirement for seam strength is of equal importance to the requirement for straight and damage free seam results. The final seam quality is substantially determined by the material and the quality of the sewing thread.

In the interior manufacture almost exclusive use is made of 100 % polyester or 100 % polyamide continuous multifilament yarn as sewing thread. Seldom core spun threads are used. Sewing threads made of polyester have a high stability. The properties of sewing threads made of polyamide are high abrasion resistance and high tensile strength.

### 3.1 Composition and size of the sewing thread

Continuous filament								
Yarn Type	Polyamide 6.6 (Nylon)				Polyester			
	Thread No*	Size tex*	Needle NM	Size	Thread No*	Size tex*	Needle NM	Size
Coarse	13	231	160-200	23-25	13	231	130-160	21-23
					14	214	130-140	21-22
	15	200	160-180	23-24	15	200	120-140	19-22
					18	167	120-130	19-21
	20	150	120-160	19-23	20	150	110-130	18-21
Medium	30	100	100-140	16-22	24/25	125/120	110-130	18-21
					30	100	110-120	18-19
					35/36	86/83	100-110	16-18
	40	75	90-120	14-19	40	75	90-100	14-16
					50	60	80-90	12-14
	60/70	50/43	80-100	12-16	60/70	50/43	70-80	10-12
	80	38	70-90	10-14	80	38	65-80	9-12
	90	33	65-90	9-14	90	33	60-80	8-12

Core Spun								
Yarn Type	Polyester/Cotton				Polyester/Polyester			
	Thread No*	Size tex*	Needle NM	Size	Thread No*	Size tex*	Needle NM	Size
Coarse	15	200	140-160	22-23				
	20	150	130-160	21-23	20	150	120-140	19-22
	24	125	130-160	21-23	25	120	110-130	18-21
	25	120	130-160	21-23				
	28	107	130-160	21-23				
	30	100	120-140	19-22	30	100	110-130	18-21
	35/36	86/83	110-130	18-21	35/36	86/83	110-120	18-19
Medium	40	75	100-120	16-19	40	75	90-100	14-18
	50	60	100-120	16-19	50	60	90-100	14-16
	60	50	100-110	16-18	60/70	50	90-100	14-16
	75	40	90-100	14-16	80	40	70-90	10-14
	80/90	38/33	80-90	12-14	90	38/33	65-80	9-12

\* No = Label number

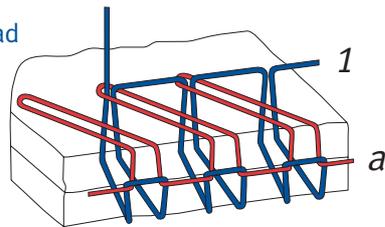
\* tex = Unit of size 1 g / 1,000 m

(e.g. 17 tex = 1,000 m yarn weigh 17 g)

### 3.2 Stitch type

As a rule two stitch types form the construction of the production of interior. One is the stitch type 301 (double lockstitch), the other one is the stitch type 401 (double chain stitch). For covering the edges the stitch type 503 (2-thread overedge chain stitch) is also deployed.

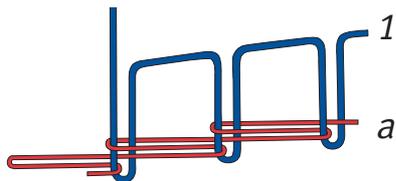
Stitch type 503 – 2-thread overedge chain stitch (edge covering)



Due to the higher seam elasticity with lower strength the double chain stitch is used for preparation sewing tasks or safety relevant seams for example in the area of the outlet for the airbag. This can be the case in the area of the side coverings (for example of doors).

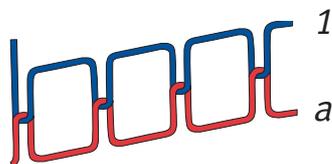
Here “midget seams” are sewn where the airbag can burst out of the seat and the door covering in case of an emergency. The term “midget seam” or “Stummelnaht” in German was created by DaimlerChrysler determining a double chain stitch seam with exactly defined sewing parameters and the lowest possible amount of seam allowance.

Stitch type 401 – double chain stitch (2-thread chain stitch)



Decorative, closing and attaching seams are done with the stitch type 301 (double lockstitch). Here the properties of the stitch type like stability and tensile strength are needed.

Stitch type 301 – double lockstitch



### 3.3 Stitch density

The stitch density is dependant on the material, the number of layers and the desired the seam strength. A further criteria for the determination of optimal stitch density is the thread size.

In the area of decorative seams the stitch density/length is combined with visual parameters of the sewing thread and

– with a two needle quilting – the needle spacing. These three factors have to form a visual harmonizing appearance to create a decorative seam. Depending on the application the stitch density varies between 2 to 4 (max. 5) stitches/cm. Experiences show that closing seams have a stitch density of about 4 stitches/cm. When sewing decorative seams the stitch density is reduced to 2 to 2.5 stitches/cm.

### 3.4 Thread tension

The necessary thread tension depends on the material, the sewing thread and the sewing machine.

A sewing thread is expected to exhibit a certain amount of elongation or inherent elasticity, but the amount of retraction following elongation must not be too high or unwanted seam puckering can occur. Hence the thread tension should be set as low as possible. Here thread tension measuring devices typical for this branch of industry are helpful.

## Machine

### 4. Sewing machines for the manufacturing of vehicle interior

Heavy 1- or 2-needle-machines with special feeds and additional accessories for the specific sewing operations are mostly used in interior manufacturing.



#### Flatbed Sewing Machine

Closing and attaching seams, quilting/decorative seams for example door coverings



#### Postbed Sewing Machine

For decorative and securing seams on small sections and curved patterns, 3-D-Seams, for example “midget seam” with band for airbag seams in the area of door coverings



**Free-Arm Sewing Machine** For decorative and securing seams on small sections and curved patterns, 3-D-Seams for example in the area of head rests  
In comparison to the other two machines this type is seldom used

## 4.1 Feed

To ensure uniform material feed there are various forms of machine accessories and feeds.

For example:



Compound feed with alternating presser foot top feed  
For sewing heavy or feed-critical materials with uniformly long stitches, even when sewing across thick transverse seams  
For decorative seams, for example on head rests, mountings



Drop feed and roller feed  
For closing seams and “midget seams” with tight radius and little spacing between needle and outer edge demanding a better view on the material to be sewn



Roller drop feed and roller top feed  
For closing seams and “midget seams” with tight radius and little spacing between needle and outer edge demanding a better view on the material to be sewn

## 4.2 Throat plate/Throat plate aperture size

All sewing machines and sewing automates are fitted with specific sewing accessories for the particular use or the sewing operation for which they are intended. These

include the type of feed on the machine and the throat plate aperture which are adjusted to the needle sizes available for use.

It should be taken care that the size of the throat plate aperture is not too large for the chosen needle size. Otherwise there is a danger of the material being pulled into the aperture of the throat plate. This results in serious material damage and skip stitches. On the other hand needle and thread must be able to pass through the aperture freely.

Needle size in NM	Throat plate aperture size in mm
100 – 120	2.2 x 2.7
120 – 140	2.2 x 2.7
140 – 160	2.7 x 3.2

## 4.3 Sewing speed

As a rule high sewing speeds are not usually reached in interior manufacture. In principle about 1,200 stitches/min are deployed. Only in exceptions sewing speeds of over 3,000 stitches/min are reached when sewing large formats and straight seams.

## 5. Our advice

You can achieve damage-free quality seams if all the sewing parameters are precisely coordinated with one another.

Material, needle, thread and machine are the key variables. The **SCHMETZ SERVICEHOUSE** offers various service packages:

From recommending the ideal needle for your fabrics to sending out sample needles and providing assistance with special sewing requirements. In addition the **SCHMETZ SERVICEHOUSE** offers competent on-site advice on your production line and training courses for your employees.

**Challenge us –  
let us show you our competence!**

## Form to copy and fax: + 49 (0) 24 06 / 85-186

Do you have further questions about sewing vehicle interior?  
Would you like support in solving your individual sewing problem?  
Would you like recommendations on needle selection and sewability of your fabrics in advance of production?  
Challenge the SERVICEHOUSE experts and take advantage of our offer.

We will be pleased to send you information on:

### Our range of service:

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##### SAMPLE NEEDLES

Sample needles, tips and information

##### DOCUMENTED SEWING REPORTS

Sewing reports tailored to match your sewing goods as well as solutions for your complex sewing demands

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Express consulting by phone, fax or e-mail

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Company name
Attention
Position
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#### INFORMATION

##### SEWING FOCUS

Sewing information for special industries and applications

##### PRODUCT FOCUS

Product information for special industries and applications

##### GUIDE TO SEWING TECHNIQUES

Manual for sewing industry

#### TRAINING/SYMPOSIUM

##### TRAINING-ON-SITE

Industry specific training including the latest information on needles, threads, machines and applications

##### SYMPOSIUM

Interdisciplinary knowledge sharing and exchange of expertise for skilled sewing industry staff

