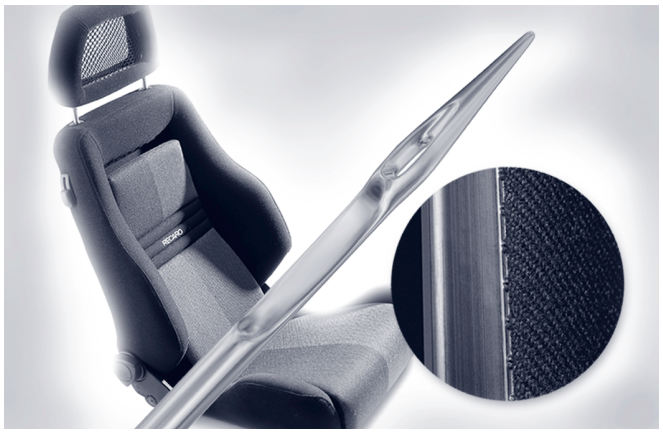
SEWING FOCUS

TECHNICAL SEWING INFORMATION

SERVICEHOUSE



Seats for Motor Vehicles, Ships, Aircrafts and Trains

Checklist for Sewing Vehicle Seatings

Sewing Parameters:	SCHMETZ Tip:
Needle size	NM SIZE 80 – 140 12 – 22 Also as SERV 7 version, depending on the material thickness.
Needle point	In seat production, both round points and cutting points are used. For laminated cover fabrics, depending on the material structure and number of layers, normal round or ball points are recommended.
Sewing thread	Almost exclusive use is made of 100 % polyamide or 100 % polyester continuous filament sewing threads as needle threads. Less commonly, core spun threads are used.
Machine	Normally, industrial high-speed sewing machines are used with stitch type 301 (double lockstitch) and stitch type 401 (double chain stitch). Multi-needle automated machinery with stitch type 401 (double chain stitch) is used as well for quilting of laminated fabrics.
Other factors:	
Thread tension	The necessary thread tension depends on the fabric, the sewing thread as well as on the sewing machine. The thread tension should be as low as possible and should allow optimal loop formation.
Stitch type	Double lockstitch (stitch types 301, 304) and double chainstitch (stitch types 401, 404) according to DIN 61400.
Stitch density	The higher the stitch density, the better the seam strength. However: 3 – 4 stitches/cm (max. 5). For reinforcement seams, reduce stitch density to 2-3 stitches/cm.

SCHMETZ

NEEDLES SINCE 1851

Quick Reference for Typical Sewing Problems in Vehicle Seatings Manufacturing

Symptoms	Effect	Cause
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
		Adhesion of melted residues, clogging of the needle eye and needle groove
Material damage		
Fabric damage	Reduced tensile strength of the material	Needle size too big and/or wrong point style
Mesh damage	Sub-standard, defective seam appearance	Unsuitable finish
Stitch holes with melted residue of fabric threads	Reduced seam strength	Excessive sewing speed
		Defective/worn out needles
		Damaged sewing accessories, such as throat plate, feed, etc.

Solution

NM SIZE	Point style	Thread	Machine
			
Use the SCHMETZ SERV 7 needle Adjust needle size to the material and amount of layers e.g. for 2 layers NM 80 – 90 in SCHMETZ SERV 7 version and for 4 layers NM 90 – 100 in SCHMETZ SERV 7 version		Use core-spun threads as bobbin/looper threads Optimize thread tension	Optimize the hook/looper setting Adjust the sewing accessories, such as throat plate, feed etc. depending on material thickness and sewing thread/needle Examine the thread guiding elements
Use the SCHMETZ SERV 7 needle Needle size as stated under ‘Skip stitches/Thread breakage’	R Normal round point SES Light ball point **CAUTION:** After every change of shifts or short intervals according to the needle stress we recommend to change the needle	Choose the right sewing thread size according to the needle size and the fabric Ticket No. 20 = NM 110 – 120 Ticket No. 30 = NM 90 – 100 Ticket No. 40 = NM 80 – 90	Adjust the sewing accessories, such as throat plate, feed etc. depending on material thickness and sewing thread/needle Check and adjust the material transport

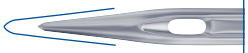
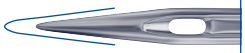
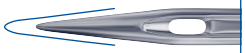
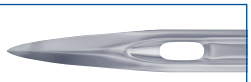
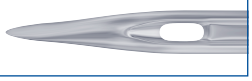
Quick Reference for Typical Sewing Problems in Vehicle Seatings Manufacturing

Symptoms	Effect	Cause
Thermal damage		
	Individual layers of material are sticking together Melted particles cling to the fabric Needle thread breaks Needle eye is clogged Needle groove is clogged	Excessive needle temperature due to friction especially when sewing densely woven fabrics Excessive sewing speed Needle smeared or needle eye clogged with melted residue Melting of the thread surface and as a result mechanical breakage of the weakened thread
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
			
BLUKOLD needle with Teflon coating. This needle coating prevents or greatly reduces the adhesion of melted residues **CAUTION:** The use of the BLUKOLD needle does not reduce the needle temperature which is caused by excessive sewing speeds.	R Normal round point SES Light ball point are available in BLUKOLD	Select a well finished sewing thread Alternatively use an extra thread lubricant (exp. silicone oil)	Reduce sewing speed Use needle cooling through compressed air
Use the SCHMETZ SERV 7 needle Needle size as stated under ‘Skip stitches/Thread breakage’	R Normal round point SES Light ball point	Check thread flow Optimize thread tension Choose the right sewing thread size according to the needle size and the fabric	Check and adjust the material transport Examine the thread guiding elements

Selection of Point Style and Needle Size

Material	Number of layers	Needle size NM / SIZE	Point style
Woven fabrics and foam backing	2 4	80 – 90 / 12 – 14 100 – 110 / 16 – 18	R normal round point 
Knitted fabrics and foam backing	2 4	80 – 90 / 12 – 14 100 – 110 / 16 – 18	SES light ball point 
Velour and foam backing	2 4	80 – 90 / 12 – 14 100 – 110 / 16 – 18	SES light ball point 
Material combinations of woven or knitted fabrics with plastic, cardboard, artificial leather, webbing strips	2 4 6	90 – 100 / 14 – 16 110 – 120 / 18 – 19 130 – 140 / 21 – 22	SD1 round point with small triangular tip 
Leather and foam backing	2 4	90 – 100 / 14 – 16 110 – 140 / 18 – 22	DH half triangular point  D triangular point depending on thickness of leather  LR reverse twist point for decorative seams 

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

Contents

1. Manufacturing of vehicle seatings

During production of vehicle seatings technical safety and functional aspects such as flame resistance, shear and abrasion resistance, colour fastness and elongation of the textile structure are the prime considerations. The seat is an element of the vehicle interior and a technical safety product, where the influences of fashion are only of secondary importance. Different requirements in product development and manufacture call for 'just in time' production involving a high degree of logistic planning.

Finished products of consistent quality are 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.
If the part played by the needle is not considered at the work preparation stage, visible and non-reparable material damage will occur during subsequent production. Regrettably, it is often realized far too late in production that the wrong needle has been used. With the correct selection of needle and point style critical errors of this kind can be prevented.

1.1 Typical sewing problems

Seat covers are most commonly sewn from foam-backed woven or knitted fabrics. The foam backing differs in its firmness and height (1 mm – 10 mm) and this together with the material finish has an impact on its subsequent sewability.

These fabrics are described as composites because seat upholstery materials usually consist of three layers: fabric forming the outer surface of the product – foam – knitted fabric on the inside of the product.

Typical sewing problems affecting seat production are primarily:

- Thermal damage
- Fabric damage
- Skip stitches

Topstitching of closing seams with a 2-needle postbed machine (768-FA-273-RAP-HP).
Source: Dürkopp-Adler AG

1.2 Quality seams with the right sewing parameters

In seatings, the outer surface of the product conforms not only to technical safety standards but also to the fashion trends followed by designers, and is offered in a great variety of colours, material structures and designs.

This broad spectrum of variations results in varied sewability from one material to another, and necessitates individual and precise adaptation of all sewing parameters such as machine, sewing speed, sewing needle and sewing thread.

Dark coloured materials, for example, generally show increased fabric damage, even with optimal needle and thread sizes. An additional factor to consider when optimizing sewability is the height of the foam backing.

The higher the foam, the lower the sewing speed should be set.

Due to the low melting point of the foam (approximately 170 – 235°C) high sewing speeds generate thermal damage – i.e. material sticking around the stitch hole, melted residues on the needle and even complete clogging of the needle eye resulting in skip stitches and thread breakage.

Needle

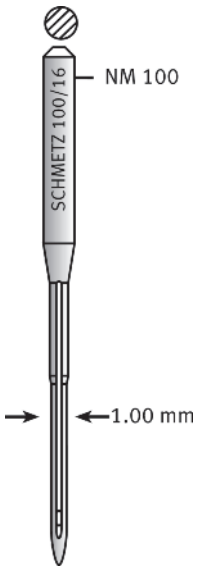
2. Selection of the right needle

Determination of the correct needle size and point style for the material to be sewn is among the most important decisions and responsibilities of the quality assurance.
If the influence of the needle and point style on seam quality is not taken into account during the preparation phase of the work, there can be no guarantee of damage-free sewing.
The choice of needle is always guided by the material quality, the number of layers and material combinations.

2.1 Needle size

When it penetrates the fabric, the needle expands the fabric threads.

If the physical tolerance limits are exceeded in respect of the elongation of the fabric threads, material damage will be the result and the threads of the fabric will ‘burst’, i.e. be damaged.



Joining sidewalls to seat plate
(767-KFA-373-RAP-HP).

Source: Dürkopp-Adler AG

Depending on the thickness and finish of the material as well as on sufficient inherent elasticity in the fabric threads, no damage is to be expected if a suitable needle size is used.
An overview of the recommended needle sizes can be found in the table on page 6.

2.2 Point style

In seat production, both SCHMETZ round points and cutting points are used.

To sew the laminated cover fabrics, depending on the material structure and number of layers, round or ball points are recommended.

R normal round point 

SES light ball point 

SUK medium ball point 

Material combinations call for needles which can pass through the material layers, regardless of their thickness and firmness, with the same ease as through a ‘normal’ 2-layer closing seam. Little exertion of force and no deflection of the needle are the requirements.
This is best achieved by a cutting action of the needle tip.

The typical materials in seat production are woven, plastic or cardboard strips for seam reinforcement and to provide fixing elements for later fitting in combination with laminated seat material.
In this case it is essential to tune the needle selection to two or more material characteristics and qualities which are extremely diverse.

On one hand, on seat covers with foam backings the woven or knitted fabric threads should be pushed aside by an optimal round point needle without damage. On the other hand, the closed material structure of the plastic strips calls for a needle with a cutting point for easier penetration of the material.

Accordingly, a compromise has to be found for the selection of a cutting point. In material combinations, the choice is determined by the material that is most difficult to sew. For softer plastic material, the “SD1” point (round point with small triangular tip) can be used.

Owing to the 10 % cutting effect of the “SD1” point, very little or no damage is to be expected to the underside of the cover material. If the plastic or cardboard is of extremely solid quality then a needle with a stronger cutting action is required. In this case the “DH” point (half triangular point) should be used.

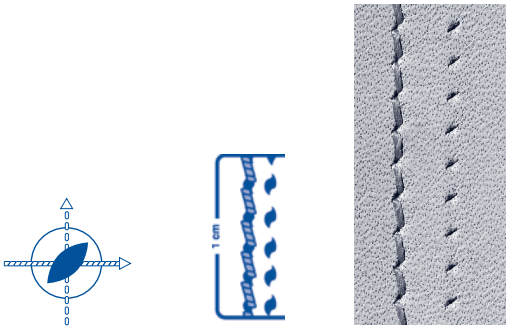
Caution:
As the cutting effect is increased with needle points like the “DH” point damage to the sewing thread or material is to be anticipated during backtacking at the beginning and end of the seams.

SD1 round point with small triangular tip

DH half triangular point

D triangular point

For decorative seams on seats we recommend to use the “LR” point. This cutting point is generating a seam where the stitches are positioned slightly diagonal to the left, a so called decorative stitch. The cutting incision of the “LR” point is made in an angle of 45 degrees to the sewing direction. In this way a seam is made where the sewing thread is guided from incision to incision forming the slightly diagonal stitch pattern on the surface.



LR reverse twist point

2.3 SERV 7 needle construction

Vastly differing sewing requirements and material thicknesses demand a needle which produces seams of the desired quality without problems in spite of different material combinations.

Especially in seat production, needles are faced with a range of sewing processes which impose extreme requirements on them, e.g. highest wear resistance and low needle deflection.

Besides material damage, skip stitches are a sewing problem which frequently arises. Skip stitches occur during stitch formation when the needle thread loop is not caught by the hook or looper, interrupting the interlocking or interlooping of the upper and lower thread. Skip stitches considerably impair the course and strength of the seam, and thus the quality of the finished product.

SERV 7 is a special needle to prevent skip stitches and needle breakage. This needle type comes in various point styles – for the particular requirements of different materials. The distinctive features of 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 SERV 7 needle is particularly valuable for sewing multiple layers of fabric and solid materials.

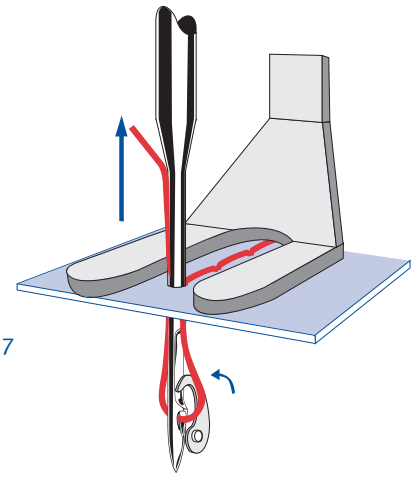
The SERV 7 blade reinforcement makes the needle especially stable and far less likely to ‘bend’. Needle breakages are thus minimized and the centric penetration produces a better seam appearance.

2.4 Changing of the needle

Regular needle changing should be a stated requirement in the performance specification of every quality control system. Depending on the number of material layers, material thickness and combination, different sewing processes call for a change of needle at the start of every shift or, under particularly high needle stress, every two hours.

SCHMETZ Tip:

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



SCHMETZ SERV 7

Sewing thread

3. Selection of sewing threads and stitch parameters

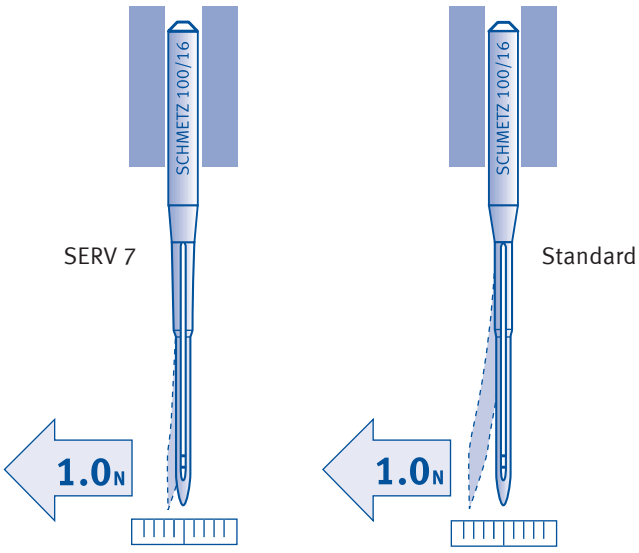
Typical sewing goods used in seat manufacture are foam backed woven or knitted fabrics and material combinations with plastic and cardboard strips. For quality assurance, the requirement for seam strength is of equal importance to the requirement for straight and damage-free seam results. In the fitting of the sewn covers, and certainly in subsequent use, the seams are exposed to great strains.

The material and the quality of the sewing thread substantially determine the final seam quality.

In seat manufacture, almost exclusive use is made of 100 % polyamide or 100 % polyester continuous filament sewing threads as needle threads. Less commonly, core spun threads are used, but only for the bobbin thread because the 'rough' surface structure helps to prevent skip stitches. Additionally, sewing threads of polyester or polyamide have high values for tenacity and tensile strength, which have a positive effect on the durability of the seam.

SCHMETZ Tip:

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



3.1 Composition and size of the sewing thread

Continuous filament

Yarn Type	Polyamide 6.6 (Nylon)				Polyester			
	Thread Size		Needle Size		Thread Size		Needle Size	
	No*	tex*	NM	SIZE	No*	tex*	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
					24/25	125/120	110–130	18–21
	30	100	100–140	16–22	30	100	110–120	18–19
					35/36	86/83	100–110	16–18
Medium	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 Size		Needle Size		Thread Size		Needle Size	
	No*	tex*	NM	SIZE	No*	tex*	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

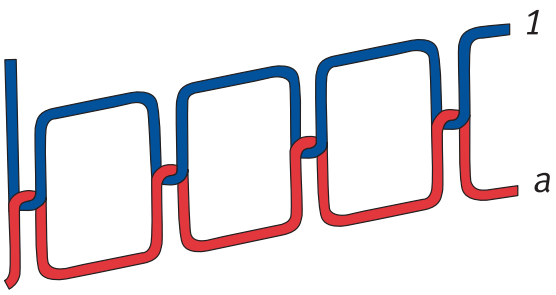
* No = Label number

* tex = Unit of size 1 g / 1,000 m
(e.g. 17 tex = 1,000 m yarn weigh 17 g)

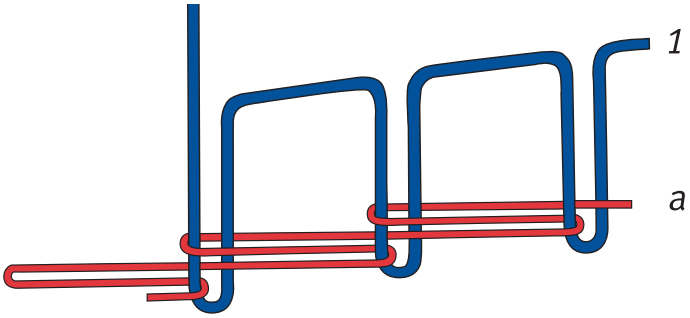
3.2 Stitch type

Stitch type 301 – double lockstitch

For fitting and fixing seams (e.g. attachment of plastic rails) the normal stitch used is double lockstitch



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



Due to the higher seam elasticity produced by the typical stitch formation on the underside, double chain stitch is predominantly used for stitching upholstered seat elements including under-sewing of fixing strips. These seams are exposed to high stress in later use, particularly through elongation.

Information on sewing thread innovations specifically for this area of application can be obtained from your sewing thread manufacturer.

SCHMETZ Tip:

SCHMETZ SERVICE**HOUSE** is pleased to assist with any questions on optimizing stitch type, stitch density, needle and sewing thread!

3.3 Stitch density

The stitch density should be coordinated to the specific material quality, number of layers and the desired seam strength and seam elasticity. At the same time the strength of the sewing thread is a further criterion in determining the optimum stitch density.

For closing seams on the laminated upholstery pieces, the normal setting is three to four (max. five) stitches/cm.

For reinforcement seams involving plastic strips and cardboard strips or other materials with a relatively solid texture, the stitch density should be reduced to two to three stitches/cm because even with the best possible material feed, a high stitch density (i.e. more stitches/cm) may otherwise result in perforation.

3.4 Thread tension

The necessary thread tension depends on the material, sewing thread and 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 it will give rise to unwanted seam puckering. Hence the thread tension should be set as low as possible.

Machine

4. Sewing machines for vehicle seating production

In seat production, the machines most commonly used are heavy duty 1- or 2-needle machines with special feeds and additional accessories for the specific sewing operation. Multi-needle automated machinery with stitch type 401 (double chain stitch) is used as well for quilting of laminated fabrics.

Flatbed Sewing Machine — Closing and attaching seams
Decorative and securing seams

Long-Arm Sewing Machine — Closing and attaching seams
Decorative and securing seams for particularly wide pieces

Postbed Sewing Machine — For decorative and securing seams on small sections and curved patterns

Free-Arm Sewing Machine — For decorative and securing seams on small sections and curved patterns

Multi-Needle Automated Machinery
(without illustration) — For quilting and decorative seams stitching of large-scale pieces and extra long seams

4.1 Feed

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

Bottom feed and differential alternating presser foot top feed
For smooth sewing of heavy materials with uniformly long stitches even when oversewing thick transverse seams; also for ruffling the upper layer of fabric

Compound feed with alternating presser foot top feed
For sewing heavy or feed-critical materials without displacement with uniformly long stitches, even when oversewing thick transverse seams

Compound feed with alternating presser foot top feed with roller top feed
For smooth sewing of material causing particular feed difficulties (e.g. coated fabrics)

4.2 Throat plate/Throat plate aperture size

Every sewing machine is fitted with specific sewing accessories for the particular use or the sewing operation for which it is intended.

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

Care should be taken that the aperture of the throat plate is not too large for the needle size used, otherwise there is a danger of the material being pulled into the throat plate aperture.

The consequence of this is serious material damage and skip stitches. On the other hand, the needle and thread must be able to pass freely through the aperture.

4.3 Sewing speed

As a rule, high sewing speeds are not used in seat production.
The foam used as backing on the underside of the material permits only low revolution sewing machine operation in the region of 1,500 – max. 3,500 stitches/minute. But expanded plastic strips made from polyurethane PU or other plastic materials are similar, in that they can only be sewn without damage at a reduced sewing speed.

If these sewing speeds are exceeded, thermal damage occurs in the form of melted residues on the needle and material layers sticking together.
The physical properties (melting point of approx. 170 – 235° C) of expanded plastic materials dictate the sewing speed.

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** SERVICE**HOUSE** 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** SERVICE**HOUSE** 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 seatings? 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 SERVICE**HOUSE** experts and take advantage of our offer.

We will be pleased to send you information on:

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