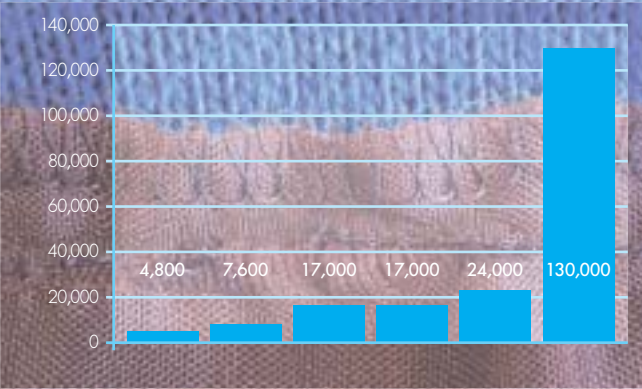
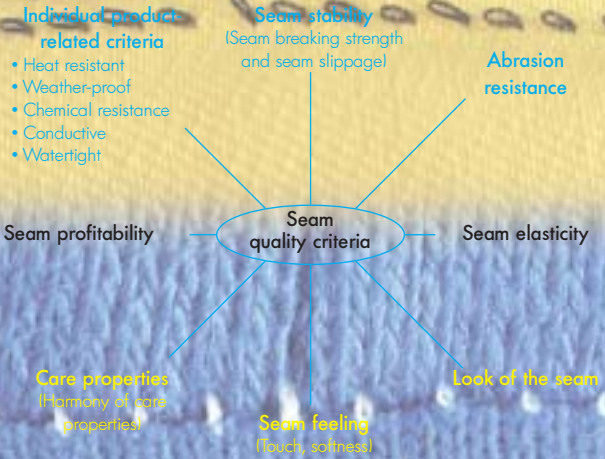


No quality product without quality seams



No quality product without quality seams

Quality is popular. Many speak of quality. Producers, retailers, and customers – all of them demand quality. And in the sewing industry, product quality always means seam quality. There is no product quality without seam quality. This applies for all applications and all the areas of the sewing industry.

Clothing

Only few modern comforts have such a direct influence on our well-being as our clothes do, which we wear directly on our skin. No other technology virtually touches us in this way. And the art of producing clothes is one of the oldest technologies developed by the human race. Even the people of the iceage protected their bodies from the cold with fur and nettings of plant fibres. This protective function of



clothing has been the same ever since. But protection from cold, heat, and the weather are only some of the modern demands. There is also the human desire for beauty. For thousands of years, clothes have had a decorating function, too.

Now as then, we think of fashion and beauty and of function when we think of clothes. Seams can have a great influence on both. Seams are the connecting element, they make clothes from fabrics. They are often decoration and have the most various functions. Seams are tear proof, elastic, soft, watertight, weather-proof, easy-care, ... depending on the given requirements. And they are always decisive for the product quality.

Home textiles

Almost all home textiles have seam connections. Awnings, mattresses, quilts, upholstery, curtains, bed spreads – they all need seams to give



them their desired form. First priority for seams on home textiles is their holding and fixing function. Seams on awnings connect individual fabric webs to make one big awning for protection from the sun. Seams on mattresses connect a piece of fabric with the desired fleece lining to make a soft bed. Upholstery seams form individual fabric pieces into three-dimensional covers. If the seams are visible on the outside of the finished model, they have an additional decorating function. Ornamental seams on upholstery or decorative top-stitchings on quilts are good examples here.

In the area of home textiles, seam and product quality are linked closely. A broken seam on a sofa, a rippled seam on curtains, or a weather-related torn seam on an awning ruin a product's quality as a whole. Reworking or repairing such problems is often very time-consuming and often very expensive, too. This is another motivation for producing quality.

Technical textiles

Whether they are used in construction, in the industry, or in protective clothing – technical textiles are always hi-tech, innovative, and special products. Especially remarkable are their specific physical, chemical, and sewing technological characteristics. In the development of these products, the main focus is on their function. So, the requirements on their seams are special, too. Sometimes, even lives can depend on these seams. For example, if a seam on a parachute or an airbag does not meet the requirements, life is in danger.



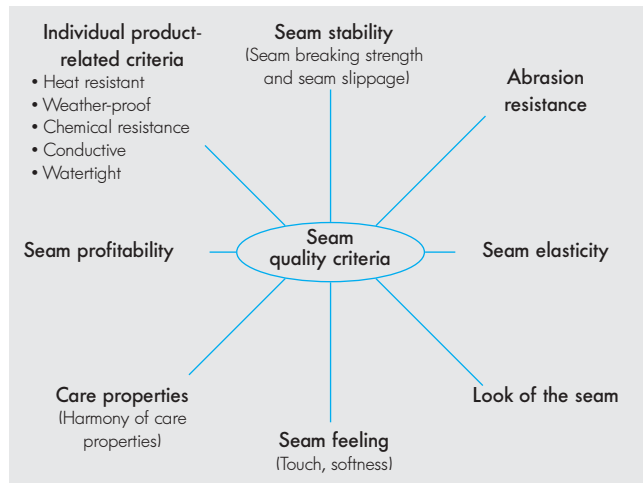
Seams are one of the essential connections in technical textiles. They make very flexible and safe connections for producing complex two or three-dimensional products. Embroideries are often seen on technical textiles, too, for example in the production of fibre composites for light-weight structures in the aircraft industry. Whether sewn or embroidered, the sewing thread inserted into the textile material, must maintain or provide the function and partly even the demanding requirement profile of the entire product.

The importance of a seam's quality for the quality of the finished product is undoubted, and yet, the definition of seam quality is often hard to describe or determine. What is seam quality? Are there any standards? How can seam quality be measured? AMANN, as an experienced sewing thread and seam specialist, knows the answers.

Seam quality criteria

Quality means performance, conditions, and properties. If you want to assess a seam under these aspects, you need a detailed requirement profile. Yet, different seams make different requirements. Airbag seams, jeans seams, or upholstery seams – they all ask for different properties of the seam connections and thus have their individual requirement profiles.

However, there are indicators that are true for almost all seams. Their evaluation is the basis for assessing their quality. At AMANN, they are the basic knowledge of sewing. Every seam analysis begins with the checking of these properties. In addition, there are individual quality criteria. They must be worked out depending on the application and function. Image 1 shows the most important standard indicators and gives examples for individual quality criteria.



Seam quality criteria

Seam stability

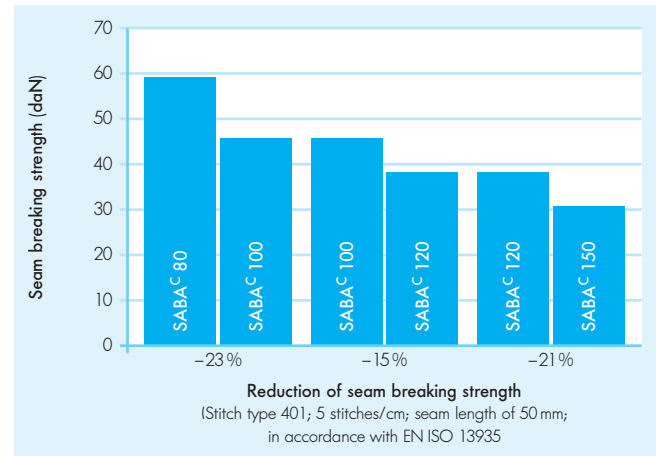
For assessing the seam stability, it is important to check the cross-resistance (EN ISO 13935) and the seam slippage (EN ISO 13936). Seam breaking strength describes the resistance of seams to tensile stress on the seam, in crosswise direction. If a seam's breaking strength is insufficient, the seams will tear during the later use. A well-known example from practice here are broken back seams on trousers. The seam slippage relates to the tendency of the warp and weft threads in a fabric to shift in crosswise direction to a seam under tensile forces. This is a fabric-related issue. A low seam shifting resistance leads to open seams, and possibly even broken seams. Many fashion fabrics show this problem.



Unfavourable seam slippage of a women's wear fabric

An unfavourable seam slippage can be improved only marginally by changing the sewing conditions, for example through additional topstitching seams at the relevant seams, or the use of lap seams. Partly, it helps to use an additional non-woven interlining to reinforce the fabric in the area of the seam – an emergency solution, which is very time and cost consuming. The used sewing thread, however, does not have any influence on the seam slippage, despite various statements to the contrary. Basically, it is up to the fabric producer to improve the seam slippage.

The seam's breaking strength is determined by the fabric, the sewing thread, and the sewing parameters. The basic level of a seam's stability is firstly determined by the fabric's tensile strength (in warp, weft, and diagonal direction). Apart from that, the used sewing thread is the primary factor for the possible seam breaking strength of a seam – its raw material, strength, and construction. Cotton or polyester, fibre thread or multifilament construction, coarse or fine counts – the possible stability of the different threads varies extremely. For a first evaluation of the sewing thread requirements the product data sheets can be helpful. Here you will find information on their raw materials, construction, count, and all the other important data. The following figure shows the influence of the thread size. The clear difference in stability, even to the next smaller or bigger size, emphasises the need for a thorough selection of the size. AMANN will be glad to provide competent advice.



Comparison of seam breaking strength of different thread strengths

When choosing the sewing parameters, the stitch density, stitch type, and the thread balance in the seam have a great influence on the seam's breaking strength. Increasing the stitch density by only one stitch/cm, for example, leads to a 25–30% increase of seam breaking strength. When comparing the most important stitch types for joining seams, the lockstitch and the double chainstitch, the double chainstitch is to be favoured under the aspect of seam breaking strength.

Seam abrasion resistance

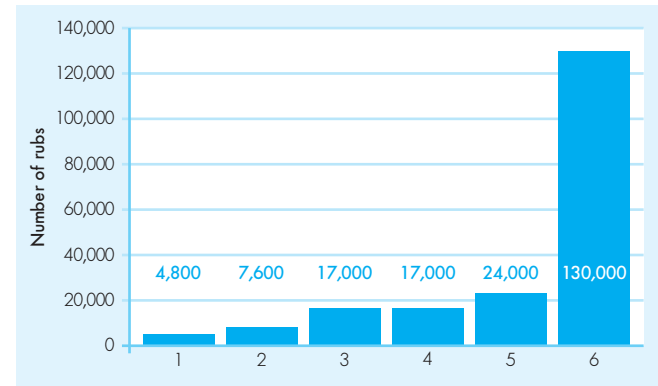
The seam abrasion resistance characterises the thread's resistance to abrasion stress in the seam. It is one of the most important criterions for assessing a threads behaviour in use. AMANN has developed its own test method for testing the seam abrasion resistance. It is based on the well-known abrasion test for textile surfaces with the Martindale tester (see Focus 1, pages 164 ff.)

Seams are often exposed to great abrasion stress in use: buttonholes, exposed ornamental seams, seams on stone-washed jeans, cover seams on biking pants – just to name a few examples – are under great stress. Quite frequently, they show signs of wear after short use periods only, with a frayed seam pattern or totally worn and torn seams.

The seam's abrasion resistance is determined by the fabric, the seam construction, and the sewing thread. The characteristic of the fabric is decisive for how flat or prominent a seam is, thus having more and more exposure to the abrasion stress. Fleecy and voluminous fabrics protect the sewing thread from rubbing, hard and glossy fabrics expose the seams more and thus increase the abrasion stress. Accordingly, the seam construction (seam and stitch type) influence the abrasion resistance. For example, lap seams for joining two material plies cause a more intense abrasion stress for the needle thread than inside positioned safety stitch seams. Thus, the bobbin thread in a double chainstitch is exposed to abrasion stress much stronger than in a lockstitch.

However, the seam's abrasion resistance is primarily determined by the sewing thread, and in this regard, mainly by the raw material, which determines its general resistance to abrasion. The following figure shows the big differences in a seam's abrasion resistance depending on the raw material. The sewing thread construction and

its strength do have some influence, too, but it is much lower than that of the raw material. Corespun threads feature a better abrasion resistance than fibre threads, for example. Multifilament threads are the best. Coarser threads tend to be more resistant to abrasion than finer threads. But this is tricky, too, because coarser threads are more prominent, thus increasing the abrasion stress, which can even reverse the expected result. Then, the abrasion resistance of a finer thread is better again.



Comparison of seam abrasion resistance of different sewing threads of the same size (Modified Martindale test):

- 1 Cotton thread
- 2 Polyester cut staple thread
- 3 Cotton polyester corespun thread
- 4 Polyester corespun thread
- 5 Polyester multifilament thread
- 6 Polyamide multifilament thread

Seam elasticity

Seam elasticity means the elasticity and the behaviour of a seam under tensile stress in lengthwise direction. It is primarily determined by the thread reserve in the seam. Another option for elastic seams is the use of SABAFLEX, AMANN's highly elastic sewing thread. Today, elastic seams are important for so many applications that a complete chapter of this booklet was dedicated to this topic. Under the title "Stretch it – the need for elastic seams" we have listed all the influencing factors and important sewing recommendations for elastic materials, starting on page 65.

Look of the seam

The look of a seam can be assessed by everybody any time; there is no need for expensive test methods or special expert knowledge. Every customer knows very well if he or she likes the seam. This rather subjective evaluation makes the look of a seam a very special quality criterion.

A good look of a seam depends on many factors. Often, one notices how the visual perception can be impaired only if one dislikes something. And there are many causes for this:

Seam pucker

A clearly rippled appearance, on one or both sides of a seam is desired rather seldom. Seam pucker is one of the most frequently occurring problems in the production of clothes. It can occur directly after sewing, during ironing or pressing, or shortly thereafter, along the seam or in specific sections of the seam. In practice, they are usually evaluated visually. Partly, a photo measure is used to facilitate evaluation.



Seam pucker

Seam marks

Marks in the area of the seams visible on the outside of a garment are a well-known production problem with fine fabrics. They are caused by seam allowances or sewing threads that leave marks through the ironing of the seams or the pressing of joining and over-edges seams.

Unfortunate matching of sewing thread and fabric

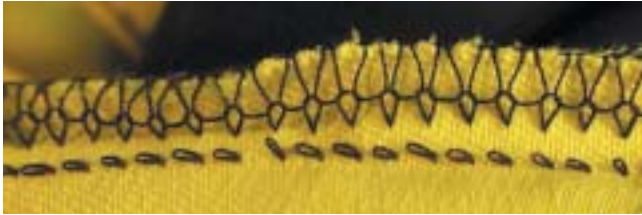
Well-known in practice here is the unfortunate matching of the sewing thread colour. But also a thread's construction and strength often does not emphasise a fabric's or model's character. For outside seams see chapter 3.8 "Ornamental seams – unrestricted creativity in design?", page 145, for advice on how to choose the right sewing thread.

Unfavourable thread look

An open, coarse fibre pattern gives a scruffy impression and is usually disliked. Through rubbing stress, sewing threads can be worn to threads. Individual fibres will then stick out from the thread and cause the scruffy look.

Unfavourable stitch looping and incorrect thread balance

This makes an uneasy seam pattern, which is not acceptable, at least not for the visible seams. A well-known example here is the incorrect stitch-forming with the lockstitch. With this stitch, the looping of the needle and bobbin thread should take place in the centre of the material plies, in practice the picture is often different.



Incorrect thread balance

Diverging seams

Diverging or loose seams are a sign for production errors, and you don't have to be an expert to know that. This occurs mostly on joining seam that are exposed to intense stress during use, for example the back seams on trousers. Diverging seams show where the stitches are formed between the edges of the seam. Under tensile stress, in crosswise direction to the seam, the sewing threads are visible, looking like a ladder. Possible causes are an insufficient thread formation, a low thread tension or a low stitch density.



Diverging seams

Seam touch

Many garments are worn directly on the skin, many seams are touched by our hands every day; so a seam's touch cannot be left out as a criterion for the seam quality. It includes all of the touch-feel perceptions and this is what is interesting regarding seams. In practice, this quality indicator is just called "touch". There are objective measuring methods for evaluating textile surfaces, but not for seams. For this, evaluation takes place subjectively, that means by hand or by wearing the garments. The softness of the seams is an issue currently discussed by all the manufacturers of underwear and tight-fitting garments. In sportswear, flat seams and a favourable touch are of extreme importance. A good example are biking pants. Here, prominent seams and a scratchy coarse quality are unacceptable.



A seam's touch depends on the fabric, the seam construction and the sewing thread. The fabric determines how well the seam is bedded in the material. The seam construction determines the form of the seam. And in case of cover seams and overedge stitches, it defines the width of the seam. With all stitch types it influences the height of the seam, together with the sewing thread. Its influence becomes clear when comparing lockstitches with double chainstitches. The double chainstitch features a significantly more prominent seam through its bobbin thread chain.

The greatest influence on a seam's touch has the sewing thread, and this is also the factor that can be changed most easily. Strength, construction, and raw material of the sewing thread play a role here. By varying these three parameters, one can create the most different touch feelings. Fine polyester bulk yarns make a different seam feeling than coarse polyamide multifilament threads. Spun cotton threads create a different touch than braided polyester threads. Most often, the change of only one parameter leads to a clearly different touch feeling.

In case of covering chain stitches, the cover and bobbin threads are extremely important for a good touch feeling, because these are in crosswise direction to the seam, and their share of the seam surface is the greatest one. For this reason, bulk yarns are used, if they can fulfill the requirements of a garment's later use. They make soft seams due to their voluminous and soft character. Practical tests have shown that the needle thread has a remarkable influence on the seam's touch, too, because of the loops showing on the underside of the material. If the seams need to be extremely soft, one should therefore think about the needle thread to be used as well. AMANN will be glad to provide advice.

Like no other criterion, the touch of a seam can be evaluated by manual tests of different seam samples only. The touch of a seam can hardly be assessed by checking the thread on the spool. And no technical data sheet will help when evaluating a thread's touch

quality. For the production of tight-fitting garments, we therefore recommend sewing tests prior to the start of production. Often, commonly used sewing thread concepts must be adjusted for soft seams.

Care

Determining the quality requirements on a sewing thread's care properties is easy:

The sewing thread must correspond to the care requirements of the fabric. Outer fabric and sewing thread must match.

This demand for harmonic care properties is usually fulfilled by all of AMANN's quality sewing threads – for all fabrics, regarding the washing, bleaching, ironing, dry-cleaning, or tumble-drying. Often the fabric's care durability is much lower than that of the sewing thread.

There are only little restrictions, mainly regarding ironing. Also for contrast colours or for extreme care conditions, for example for hospital textiles or workwear, the seam's care durability must be tested individually. In Focus 1, one chapter was specifically dedicated to care. Beside detailed explanations regarding the perfect matching of fabric and sewing thread, it includes the care instructions for all AMANN products.

Seam profitability

On the question of whether the seam profitability is a quality criterion, there have been many arguments. Without doubt, however, the seam profitability is of great significance for the producers. It is an important criterion when designing and deciding on the seam. For production, it is extremely important that quality seams can be realised economically. So, in this respect, the seam profitability is a quality indicator for AMANN. By choosing the right processing

parameters and the right sewing thread, the seam profitability can be influenced – an important aspect for AMANN consultants.

Profitability in seam processing depends on the following calculatory factors:

- Individual sewing thread costs (Quantity and price)
- Labour costs + non-wage labour costs
- Operating supplies, for example sewing machine needles
- Costs of workplace (Investment costs)
- Energy costs per workplace (Power, compressed air, etc.)

It is out of the question that the labour and non-wage labour costs have the greatest influence on the seam profitability. At the same time, these costs leave the greatest room for adjustment. This is one of the reasons, why the clothing producers wander more and more eastwards, always heading for the countries with the lowest labour costs.

The total sewing thread costs are primarily determined by the thread consumption and the individual sewing thread costs. The costs incurred by the sewing thread in addition to the mere production costs, must be taken into consideration. For example through the fact that threads breaks can occur when using low quality threads, for example through knots, unevenness, etc., which necessarily leads to machine and automate downtimes, and thus to higher production costs and a lower productivity. With AMANN's quality sewing threads, these costs can be reduced to a minimum.

For a precise calculation of the thread requirements and the individual sewing thread costs, AMANN offers its NBE program, the software for professional sewing thread calculation. By using this software consequently, it is possible to clearly improve the seam profitability. For detailed information please see the AMANN brochure "Determining your sewing thread requirements", which can be downloaded at www.amann.com.

Individual product-related quality criteria

In addition to the standard quality criterions, there are numerous product-related requirements. This applies especially for the production of technical textiles. When function is decisive, requirements on sewing threads are most different. Here are some examples of this great variety:

- Heat resistant seams for heat protection clothing
- Weather-proof seams for outdoor textiles
- Chemicals-resistant seams for chemical protection clothing
- Conductive seams for conductive textiles
- Waterproof seams for rainproof clothing
- Non-silicone sewing threads for special applications in the production of filters
- Absorbable seams for surgical applications

The more detailed the application profile, the better the chance for perfect seam quality. If the desired function is known, one can start realising it. In this regard, help is often needed. Knowledge of sewing technology, sewing recommendations and tips for the different applications can help to satisfactorily fulfil the requirements. You will find all this here in FOCUS 2.