NEEDLE DEFLECTION

Very often technical textiles are constructed from very hard materials. High penetration forces are the rule which often leads to a strong needle deflection.

Results can be:
- Skipped stitches
- Material damage
- Point damage
- Thread splicing and thread breaking
- Needle breakage

To avoid these problems, a new blade design was developed for the Groz-Beckert SAN® 5. The stipulation was high needle stability in combination with an optimum of penetration work.
CROSS SECTION OF THE SCARF

The higher stability of the SAN® 5 in the scarf area becomes visible in this cross section view of the scarf. The lateral scarf chamfer prevents damage to the hook point.

BENDING RESISTANCE

The special design of the entire working area of the Groz-Beckert SAN® 5 needle results in a clearly higher bending resistance in comparison to a standard needle.

A needle deviation of "X" with SAN® 5 needles requires approximately 25% higher force than with standard needles.

THREAD TWIST SHIFTING

The SAN® 5 needle has a specially designed upper point groove. The edges of the eye lie deeper into the direction of the point. All thread-sliding areas are very well-rounded and polished. The needle thread slides protected over this specially shaped area.

Result:

- The “twist shifting” in the thread is clearly reduced when compared to a standard needle.
- The Groz-Beckert SAN® 5 needle produces a visibly more constant seam appearance in comparison to a standard needle.
THE SAN® 6 GEBEDUR®

BLADE PROFILE

The conical blade and the newly designed scarf cross-section give the Groz-Beckert SAN® 6 GEBEDUR® a higher bending resistance of 20 - 40% in comparison to the standard needle.

Scarf and blade profile prevent needle breakage, skip stitches and thread breakage. The looper point is protected.
The guiding of the thread in the eye and scarf area causes a significant improvement of the thread protection and pick-up of the thread by the looper. Even with an extremely poor loop formation the looper has the possibility to pick up the needle thread.

**Needle breakages and skip stitches are removed to a large extent.**

The consequent development of Groz-Beckert leads to the special blade shape and to a further improvement of the needle.

The reduction of the cross section at the eye area was a further step to reduce the penetration force.

**Depending on the needle system, the average penetration force lies up to 30% below a standard needle.**

With the slim and rounded RG-point and the special blade shape the SAN® 6 stands for:

- High seam quality
- Less material damage
- Less skip stitches
THE SAN® 10 – OPTIMAL CHOICE FOR DELICATE FINE KNITWEAR

Guideline: as thick as possible and as thin as necessary.
Using very thin standard needles can solve quality problems at the expense of output.

Checking seams: slight pulling and shearing movements make material damage visible (photo bottom left).

Stitches in the knitting are damage – test is continued with the next size down of needle thickness.

No more material damage visible – correct needle thickness has been found.

TEST SEQUENCE USING MATERIAL DAMAGE AS AN EXAMPLE

Sewing test with needle thickness Nm 75, RG or FFG point

Seam tested for material damage – manually or with machine (e.g. at Groz-Beckert Sewing Technology Centre in accordance with DIN 53882)

Material damage visible

YES

NO

NO

YES

Reduction of needle thickness step by step
Nm 70, 65, 60, (55, 50)

Test of whether needle thickness can be increased further

NO

YES

Needle thickness ideally matched for gentle action on fabric.

Test with SAN® 10 needle

Missed stitches, broken thread, low output

END OF TEST
The needle system DB x K5 was especially developed for the use in modern high performance machines. During research and development the following points had to be considered:

- Reduction of skipped stitches and thread breakage
- Maximum protection of thread and material
- Safe thread loop pick-up
- Best universal point style
- Eliminate looping
- Optimum stitch fill (no gaps)

THE FEATURES AND APPLICATIONS OF THE DB x K5

<table>
<thead>
<tr>
<th>Shank length</th>
<th>Standard</th>
<th>DB x K5 SAN® 1 GEBEDUR®</th>
<th>DB x K5 KK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point style</td>
<td>RG (Standard)</td>
<td>RG (Standard)</td>
<td>RG (Standard)</td>
</tr>
<tr>
<td>Coating</td>
<td>Chrome</td>
<td>Titanium-Nitride</td>
<td>Chrome</td>
</tr>
</tbody>
</table>

VARIATIONS OF THE DB x K5

STABILITY COMPARISON OF THE GROZ-BECKERT STANDARD DB X K5 AND ITS VARIATIONS

Essentially the needle system DB x K5 has the highest stability. The bending resistance of the standard needle is higher than any of the other needle systems used in the embroidery industry.

The Groz-Beckert SAN 1® GEBEDUR®, with its special design and a titanium nitride coating, offers highest stability and maximum resistance against wear.

The blade design of the “KK” version corresponds to the standard DB x K5 needle. However, due to its shorter shank, bending resistance is lower.
STABILITY

The Groz-Beckert SAN® 11 needle with its special blade and scarf geometry has an extreme bending resistance, ensuring the highest possible stability in the whole working part.

The very deep formed scarf makes an extremely tight adjustment of the looper to the needle possible.

The advantages are:

- Less needle deflection
- Less needle breakage
- Less skip stitches
- Less thread breakage
CROSS SECTION AT EYE

When stitching through the material the maximum penetration force is reached in this needle area and increases over-proportionally with needle size. The special design of the Groz-Beckert SAN® 11 needle in this area results in significantly lower penetration forces in comparison with a standard needle.

PENETRATION FORCE

The lower the penetration force the higher the fabric protection. The determined measurements of the penetration forces show significant advantages of the Groz-Beckert SAN® 11. In comparison with the standard needle they are 33% lower in size Nm 80 and 17% in size Nm 120.

The results:
- Better fabric protection
- Less material damage
- Less seam puckering

SEAM QUALITY

Especially in critical applications (material, thread etc.) the advantages of the SAN® 11 needle become visible with highest seam quality.

The results:
- Special fabric protection
- Less material damage
- Less thread breakage
- Less skip stitches
- Less seam puckering
THE USE OF THE RG-POINT

The sensitive, sharp R-point is already damaged by contact with the hardened looper back after a short sewing time. With the light ball point of the RG, especially adapted to the looper back, this needle remains undamaged for a longer amount of working time.

Advantages:
- Less material damage, reduced penetration force
- Less needle deflection (skip stitches, needle breakage)
- Higher process security, with less machine downtime

OPTIMISED NEEDLE POINT

After a two-hour sewing test, under the same conditions, the following was revealed in multiple magnification:

The R-point shows a compressive strain on one side of the tip and sharp edges. The RG-point of Groz-Beckert shows nearly invisible friction marks and is still able to operate without limitation.

USE IN CHAIN STITCH MACHINES:

The titanium nitride coated needle of Groz-Beckert

The titanium nitride coating provides the Groz-Beckert GEBEDUR® needle with high protection from wear and tear as well as damage.

The results are:
- High seam quality
- High productivity
THE ADVANTAGES OF THE SQUARE BLADE NEEDLES (V-NEEDLES)

LOADING CAPACITY

A very distinct advantage in needle stiffness becomes evident in a mechanical experiment.

Such features support the needle function during the sewing process. The resistance against bending forces of a V-needle Nm 65 almost reaches the resistance of a conventional size Nm 80 needle. Therefore, in many cases a V-needle size Nm 65 can be used where up to now a needle size Nm 80 was imperative for stability reason. Or, a V-needle size Nm 80, now has the functional rigidity of a regular size Nm 90 needle. The cross-sectionally thinner V-needles require less space during penetration.

So, they stretch and displace the textile fibres to a lower degree than round blade needles of comparable stability. Blindstitch seams without distortion on thin and critical cloth become possible.

Needle life and the machine performance are enhanced when standard needles are replaced with V-needles of same size.

COMPARISON OF CROSS-SECTIONS

CROSS-SECTION OF BLADE

The development of the Groz-Beckert square blade needle (=V-Needle) has created new possibilities to combine needle stability and gentle fabric handling.

The square needle blade offers a rigidity considerably higher as compared to a conventional round blade of equal cross-sectional area.

LOADING CAPACITY

A very distinct advantage in needle stiffness becomes evident in a mechanical experiment.

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