CETCO's NEEDLE DETECTION SYSTEM FOR BENTOMAT® REINFORCED GCLs

The production of needlepunch-reinforced GCLs requires special procedures to prevent the presence of needle fragments in the finished product. This document describes CETCO's needle detection and removal system, which consists not only of metal detectors and magnets, but also includes special operating procedures to ensure needles are removed from the GCL to the maximum extent practicable.

The Needlepunching Process. Needlepunching is the process by which loosely laid fibers are entangled to form a continuous fabric. A loose layer of fibers is introduced across a needle loom, whose powerful reciprocating motors move a set of needles (often numbering 10,000 or more) mounted on a needle board (Figure 1). Each needle has a barbed shaft which snares fibers on the downstroke and releases them on the upstroke. With thousands of needles moving at hundreds of strokes per minute, the needlepunching process can be used not only for manufacturing geotextiles but also for reinforcing GCLs. Significant forces are applied to the needles during this process. A few needles will inevitably break, and needle fragments must be removed.

CETCO's ISO-compliant quality plan involves a three-part strategy of *prevention, detection* and *removal*. By implementing a variety of procedures relating to the operation of the loom, needle breakage can be largely prevented. These procedures focus on loom operation and maintenance, optimization of bentonite particle size, needle type selection, and many other parameters that have been found with experience to influence the tendency for needles to break.

While CETCO strives to eliminate breakage, it should be realized that the act of needlepunching through bentonite particles places extreme stress on the needles, and some breakage is inevitable. Therefore, a set of powerful magnets is arranged downstream from the loom, across the width of the GCL (Figure 2). Positioned just over the surface of the textiles, the magnets effectively remove needle fragments that break after striking a clay particle. Almost all needle fragments are removed by the magnets, but a few do remain in the product and must be detected and removed.

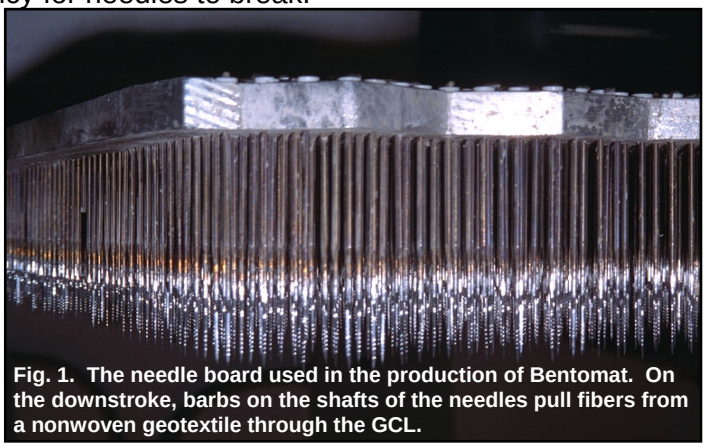

Fig. 1. The needle board used in the production of Bentomat. On the downstroke, barbs on the shafts of the needles pull fibers from a nonwoven geotextile through the GCL.

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CETCO uses a state-of-the-art system of magnetic metal detectors distributed across the width of the GCL. Located after the magnets, the detectors divide the roll into discrete segments. If a needle fragment is detected in one of the segments, a production crewperson stops the material in-line and checks for needle fragment(s). Rolling of the material then resumes and it passes a second metal detector. If metal is still detected, a tag is placed on the outside edge of the roll. Flagged rolls are set aside for a secondary detection and removal process, where a "re-roll station" is used to unroll the GCL to the spot where the tag was placed. This section of the roll is scanned with a hand-held detector and visually inspected until the needle fragment is found. Protruding needle fragments are removed, and the rolls is then wound and packaged.

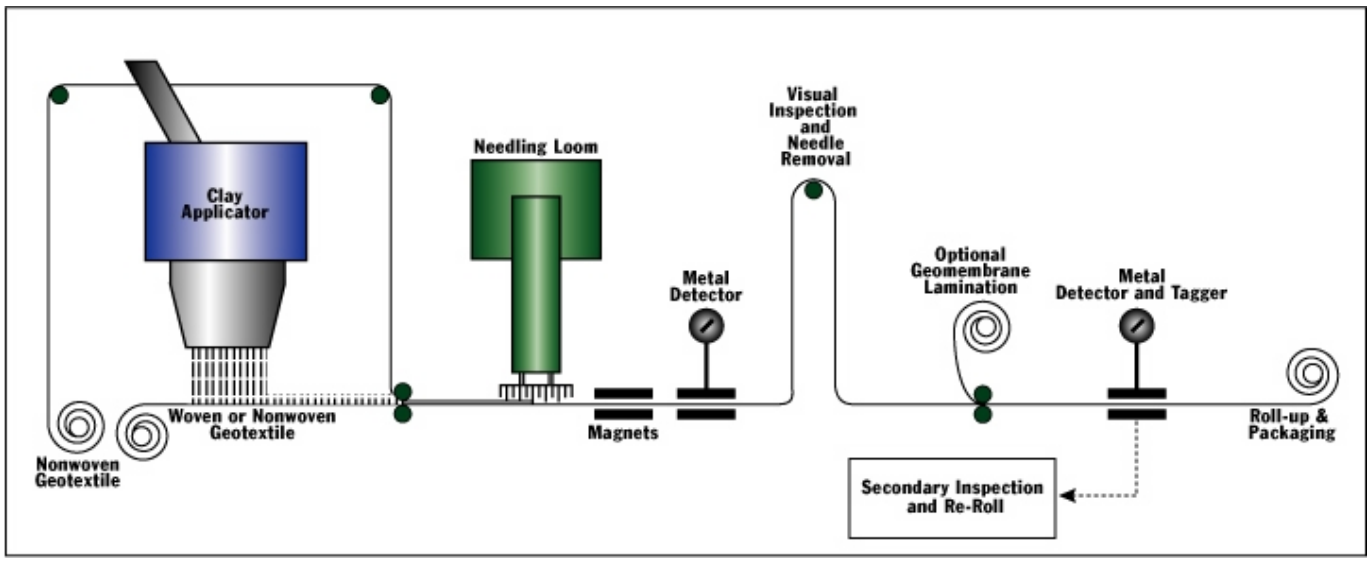

Figure 2. The Bentomat production process involves the use of magnets and metal detectors to ensure needle fragments are removed.

While it is impossible to guarantee that every roll of Bentomat will be needle-free, CETCO's needle prevention, detection and removal system results in the best possible quality reinforced GCL product available.

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