

- determining the width and length of the segments and whole section,
- creating the porosity and degree of the surface covering of side walls of the segments by selecting 'fully covered' or openwork stitches of knitted fabrics with the configuration and size of openings already determined,
- creating different structural parameters of the parallel walls of the segments,
- producing a tube-shaped knitted fabric connecting the segments, in which pins can be inserted in order to fix the cellular geonet to the ground,
- marking with colours the weft threads of the polypropylene bands of the geonet type ('coloured code').

Determining the strength parameters of geonets by:

- selecting reports of the threading of needle bars (complete or incomplete),
- selecting suitable stitches, especially the weft ones with straight segments of threads, which limit the elasticity and increase the strength and rigidity of a knitted fabric,
- selecting threads of suitable strength, elasticity modulus, linear density, structure and kind of raw material.

The use of modern, highly efficient flat warp-knitting machines with two needle bars enables to:

- manufacture products in the majority formed on a knitting machine, which require only connecting the adjacent segments (into one),
- produce one section of a standard cellular geonet of the following dimensions: 8000 × 2500, or to produce simultaneously 2, 3 or 4 smaller ones over the operating width of the warp knitting machine,
- on a machine equipped with a laminating device, to cover the geonet produced with poliurethane material or bituminous mass in order to protect the product from corrosion,
- search for other applications, such as three dimensional geonets for reinforcement of concrete constructions,
- technology with the use of a flat warp knitting machine with two bars is significantly more efficient and energy-saving than the alternative weaving technology.

The 3D knitted cellular geonet is an innovative product protected by a patent (application).

Summary and conclusions:

1. The problem of new, innovative 3D knitted structures of cellular geonets used in road construction engineering is a current and extremely important issue in the context of the present critical state of Polish roads and realisation of the national road and motorway construction program.
2. The new technologies and constructions of 3D knitted cellular geonets presented are an alternative and more beneficial solution than those obtained from polyethylene bands. The new conception of 3D knitted geotextile nets is characterised by the possibility of programming the structural parameters and three dimensional geometry of the geonet. It also enables to determine the strength of the geonet, depending on its application, and to produce geonets using highly efficient technologies.
3. 3D knitted geonets are innovative structures, hence the new technology of their production is protected by a patent application. The invention is a product of scientific research conducted at two national universities: Technical University of Lodz and University of Bielsko-Biala. The invention has a practical aspect from the point of view of applications of these kinds of nets in the road construction industry in Poland and also from that of the real possibilities of their production in Polish textile enterprises.

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