Patent claims

1. A method of manufacture of geotechnical profiles, characterized in that thermoplastic material, preferably hard and high-impact, PVC and/or PET and/or PE and/or ABS and/or PP, is plasticized in an extruder, after which it is pressed through an cross die unit to form a primary shape of the letter Z, S, U, Π, T, Ω, or a hollow profile containing at least one lock, ant internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) in the form of flat bars, arched elements, angled elements, ribbed profiles or sections of any geometry are entered to it in the entire volume, and at least in selected cross-section areas of the geotechnical profile (1, 3, 5, 7, 9, 11, 13, 15) whereas these profiles are created from continuous and/or chopped fiber produced simultaneously or as part of a separate production process.
2. The method according to claim 1, characterized in that internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) can be produced by calendering continuous fiber beams, mats and fabrics coated with impregnate compatible with a thermoplastic polymer matrix surrounding the internal reinforcing profiles and/or by calibrating continuous fibers, mats and fabrics made of hybrid fibers containing, apart from the basic fibers, fibers made of thermoplastic materials.
3. The method according to claim 2, characterized in that plastisol and/or hydrogel is the impregnate compatible with the thermoplastic polymer matrix.
4. The method according to claim 2 or 3, characterized in that the process of calendering or calibrating internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) is conducted at temperatures allowing for thermal fusion of the impregnate or adhesion promotor compatible with the thermoplastic polymer matrix or with the thermoplastic hybrid fibers.
5. The method according to claim 2 or 3 or 4, characterized in that the process of melting the impregnate or the fibers is conducted with the use of elements generating pressure in the form of heated slide

elements – calibrators, or with the use of horizontal and vertical, single-roller, two-roller or multi-roller calendering units.

6. The method according to claim 5, characterized in that the process of melting the impregnate or the fibers is conducted with heated calenders at 50 – 350 °C.
7. The method according to claim 2 or 3 or 4 or 5 or 6, characterized in that the fiber entered to the structure of the geotechnical profile (1, 3, 5, 7, 9, 11, 13, 15) is selected from among: glass, basalt, aramid, polyamide, steel or natural, plant or animal fibers.
8. The method according to claim 1, characterized in that the fiber entered to the structure of the geotechnical profile (1, 3, 5, 7, 9, 11, 13, 15) is produced applying the pultrusion method, coating continuous fibers with selected plastic, i.e. PVC and/or PET and/or PE and/or ABS and/or PP.
9. The method according to claim 2 or 3 or 4 or 5 or 6 or 7 or 8, characterized in that the internal reinforcing profiles are entirely surrounded with non-reinforced thermoplastic polymer matrix and/or thermoplastic polymer matrix reinforced with dispersed reinforcement.
10. The method according to claim 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9, characterized in that the minimum thickness of the thermoplastic polymer matrix is 0.1 mm.
11. A reinforced geotechnical profile, particularly a sheet piling profiles and a mobile flood prevention devices characterized in that it is manufactured out of thermoplastic material, in which reinforcement (2, 4, 6, 8, 10, 12, 14, 16) in the form of reinforcing fibers are entered locally or at least in selected cross-section areas, and then stabilized and maintained in position by a layer/coat made of PVC and/or PET and/or PE and/or ABS and/or PP, which is permanently and inseparably connected to the reinforcement fibers and wherein the reinforced geotechnical profile has a primary shape of the letter Z, S, U, Π, T, Ω, or is a hollow profile and contains at least one lock.

12. The geotechnical profile according to claim 11, characterized in that the thermoplastic material was selected from among: hard and high-impact PVC and/or PET and/or PE and/or ABS and/or PP.

13. The geotechnical profile according to claim 12, characterized in that the thermoplastic material can be reinforced with dispersed reinforcement made of chopped fiber.
14. The geotechnical profile according to claim 12, characterized in that the internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) contain from 30-90% of the weight of the reinforcing fibers and impregnate compatible with the thermoplastic polymer matrix or thermoplastic hybrid fibers in a quantity constituting 10-70% of the overall weight of the reinforcing profile (2, 4, 6, 8, 10, 12, 14, 16).
15. The geotechnical profile according to claim 14, characterized in that it contains 70% of the weight of the reinforcing fibers and thermoplastic hybrid fibers in an amount constituting 12-16% of the weight of the geotechnical profile (1, 3, 5, 7, 9, 11, 13, 15).
16. The geotechnical profile according to claim 15, characterized in that the hybrid fibers are glass fiber hybrid fibers with the fibers of thermoplastic PET, PE, PVC or PP fibers.
17. The geotechnical profile according to claim 14 or 15 or 16, characterized in that the reinforcing fibers are selected from among: glass, basalt, aramid, polyamide, steel or natural, plant or animal fibers.
18. The geotechnical profile according to claim 12 or 13 or 14 or 15 or 16 or 17, characterized in that the percentage amount of reinforcing fibers is 5-50% by weight.
19. The geotechnical profile according to claim 18, characterized in that the percentage amount of reinforcing fibers is 12-16% in relation to the overall weight of the geotechnical profile (1, 3, 5, 7, 9, 11, 13, 15).
20. The geotechnical profile according to claim 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19, characterized in that the internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) are placed inside the walls of the geotechnical profiles situated the farthest from the bending axis of the geotechnical profile (1, 3, 5, 7, 9, 11, 13, 15).

21. The geotechnical profile according to claim 20, characterized in that the internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) are installed in one, two or multiple layers and are completely surrounded with the polymer matrix.
22. The geotechnical profile according to claim 21, characterized in that the internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) are flat bars and/or ribbed profiles and/or arched profiles and/or angled elements of any geometry in a single- and/or two-layer arrangement, preferably of varying lengths.
23. The geotechnical profile according to claim 22, characterized in that the internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) can be continuous.
24. The geotechnical profile according to claim 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23, characterized in that the minimum thickness of the thermoplastic polymer matrix in the cross-section containing internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) is 0.1mm.
25. The geotechnical profile according to claim 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24, characterized in that in the process of co-extrusion, all external surfaces of the geotechnical profile (1, 3, 5, 7, 9, 11, 13, 15) are coated with a layer of thermoplastic material of at least 0.5 mm in total thickness using a second extruder.
26. The geotechnical profile according to claim 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25, characterized in that the coarseness (tex) of the reinforcing fibers used is contained within 600 – 5000 tex.
27. The geotechnical profile according to claim 26, characterized in that the coarseness (tex) of the reinforcing fibers used is contained within 1 000 – 3 000 tex.
28. The geotechnical profile according to claim 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27,

characterized in that the thickness of the internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) entered to the geotechnical profile (1, 3, 5, 7, 9, 11, 13, 15) is 0.5 – 6 mm.

29. The geotechnical profile according to claim 28, characterized in that the thickness of the internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) entered to the geotechnical profile (1, 3, 5, 7, 9, 11, 13, 15) is 1.5-2.5 mm.
30. The geotechnical profile according to claim 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29, characterized in that the width of internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) in the form of flat bars, entered to the geotechnical profile (1, 3, 5, 7, 9, 11, 13, 15) is 5- 100 mm, whereas particular profiles can differ in width.
31. The geotechnical profile according to claim 30, characterized in that the width of internal reinforcing profiles (2, 4, 6, 8, 10, 12, 14, 16) in the form of flat bars, entered to the geotechnical profiles (1, 3, 5, 7, 9, 11, 13, 15) is 10-50 mm, whereas particular profiles can differ in width.
32. The geotechnical profile according to claim 31, characterized in that the geotechnical profile is a sheet piling which has two locks with mutually complementary shapes.
33. The geotechnical profile according to claim 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32, characterized in that the geotechnical profile is a mobile flood prevention dam, which comprises at least two geotechnical profiles 15 with external reinforcing profiles (16),

including a single- or multi-chamber, hollow flood prevention dam wall and a load-bearing profile (pillar),

preferably a double T-section with proper rigidity, sufficient for founding it in the soil and guaranteeing water-tight installation of the flood prevention dam wall panels.

34. The geotechnical profile according to claim 33, characterized in that external surfaces of profiles of mobile profiles (15) include seals (17) applied using the co-extrusion method or applying any other method, guaranteeing the water-tightness of the profiles under the pressure of water.