A trackway for a personal rapid transport systems which comprises track members formed of preformed grid-like structures. The preformed grid-like structures may be formed of fiber reinforced plastic or the like.
TRACKWAY FOR PERSONAL RAPID
TRANSPORT SYSTEMS

[0001] The present invention relates to a trackway for a personal rapid transport system.

[0002] With ever increasing traffic volumes and increased vehicle performance increasing the speed at which vehicles travel, there is a continuing need to improve the running surfaces over which these vehicles travel. Many aspects have been considered for such improvements, for example improved friction between the running surface and the wheels of the vehicles, improved drainage to reduce the effect of water, snow and ice collected on the running surface and noise reduction etc. Many solutions have been proposed to solve these problems which, invariably, are expensive and cumbersome to install and maintain.

[0003] Much has been invested in improving the running surfaces of the trackways for personal rapid transport systems. In general, a personal rapid transport (PRT) system comprises a dedicated trackway on which individual vehicles travel between stations. Each vehicle contains only one passenger or group of passengers, and the vehicle travels continuously between the starting point and the destination without stopping at any intermediate stations. PRT systems thus provide a compromise between a conventional mass transport system such as buses, trains and metro systems, and individual passenger cars.

[0004] Typical PRT systems use a rail system to provide guidance for the vehicles. This may be a monorail or dual rail, and points similar to standard railway points are used to direct the vehicles at junctions. An example of such a system is disclosed in U.S. Pat. No. 5,778,796.

[0005] An example of an alternative PRT system is disclosed in U.S. Pat. No. 4,061,089. In this system each vehicle is supported by air bearings in such a way that an air gap is maintained between the vehicle and the trackway. Vehicle propulsion is provided by a linear synchronous motor, the primary circuit of which is embedded in the trackway to activate a pair of induction motors located on the vehicle.

[0006] A further known PRT system is disclosed in UK Patent No. 2384223. In this system a trackway is provided in preformed sections. The running surface of the trackway is formed of reinforced concrete. However, it is found that it would be desirable to reduce noise as vehicles run over concrete running surfaces, particularly when the surface is wet, to improve friction and reduce ice and snow collecting on the running surface, restricting operation of the system during such weather conditions.

[0007] U.S. 2004/0089189 and U.S. Pat. No. 5,566,620 disclose transportation systems having a trackway comprising rails which support the vehicles. The region of the trackway between the rails is provided with a walkway having an open-work structure.

[0008] According to the present invention, there is provided a trackway for a personal rapid transport system, the trackway comprising a track having a running surface along which, in use, run wheels of vehicles of the system, characterized in that the running surface comprises a preformed grid-like structure.

[0009] The grid-like structure may be flexible to enable it to conform to the movement of the vehicle so that flexing of the structure enables snow and ice to be shed from the surface. As the grid-like structure is supported at a height above ground, any water, snow and ice can fall off the running surface to the ground without the need for additional drainage. The grid-like structure may comprise a plurality of intersecting grid members which may be separate intersecting members or be whole in the form of grooves and ridges. Embodiments of suitable grid-like structures may improve friction between the surface and the vehicle wheels by up to approximately 30% whilst minimising wear of vehicle tyres. The grid members may extend obliquely to the direction of travel of vehicle wheels travelling over the running surface. This can significantly reduce the noise of travel of the vehicle over the running surface. The intersecting grid members may define holes passing between adjacent grid members through the track. The holes may have a pitch within the range of 20-60 mm, and the pitch may vary along the length of the running surface. The pitch size enables easy manufacture and more snow and ice can easily fall off the surface through the holes. Variation in the pitch may reduce noise, and varies any noise, making it less of a nuisance. The holes also provide a structure which allows light to pass through making the structure more environmentally attractive.

[0010] The track may comprise a plurality of preformed sections longitudinally interconnected to form a continuous running surface. The track sections may be interconnected, or adjoin another, at an oblique angle. This oblique angle may be varied randomly between successive sections. This allows the tyre loading to be transferred smoothly between sections. It prevents the tyres hitting the down stream section with impact, thus preventing damage to the running surface, further reducing noise and tyre wear.

[0011] The track may be one of a pair of elongate, parallel tracks of each track section, each track section also comprising a plurality of cross-members which support the tracks.

[0012] The grid-like structure of the running surface provides a strong structure and consequently may be simply formed of fibre reinforced plastics material or the like, thus making the structure easy to manufacture, less expensive and flexible.

[0013] The tracks may have substantially flat upper surfaces acting as the running surfaces. The running surfaces may comprise a top surface coating of an anti-skid material to improve friction between the tyres of the vehicles and the surface.

[0014] The grid-like structures provide increased friction with the vehicle tyres whilst minimising wear. In snow and ice conditions, the snow and ice has poor adhesion to the running surface and the snow and ice shed from the grid surface. Further the grid-like running surface is quieter when vehicles run over its surface even when the surface is wet.

[0015] In an embodiment in accordance with the present invention each section of the trackway comprises a pair of parallel side beams interconnected by said cross members, the tracks extending parallel to the side beams. The load on the tracks is transferred to the cross members and into the side beams.

[0016] In an embodiment, the cross members are connected to the side beams at the lower regions of the side beams, so that the side beams form side walls which extend upwardly from the cross members, possibly to a level above the running surfaces.
For a more complete understanding of the present invention, reference is now made to the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a plan view of part of a trackway for a personal rapid transport system; and

FIG. 2 is a cross section view taken along the axis A-A of the trackway of FIG. 1.

The trackway according to an embodiment of the present invention will be described in more detail with reference to FIGS. 1 and 2. The trackway comprises a series of track sections 100 which are laid end-to-end to form a continuous trackway for passage of vehicles. Each section 100 comprises a plurality of spaced-apart parallel identical cross members 101, each comprising a hollow, thin walled rectangular cross section beam with rounded corners, extending laterally across the width of the trackway. The cross members 101 extend between a pair of side beams 103, 105. The side beams 103, 105 are identical thin walled rectangular cross-section members which extend along the sides of the track section 100. The vertically extending innermost side wall 107, 109 of each side beam 103, 105 is welded to the cross members 101 at the base of the side walls 103, 105. Accordingly, the side beams 103, 105 extend vertically above the cross members 101. In the embodiment shown, the vertical dimensions of the cross members 101 and the side beams 103, 105 are 100 mm and 450 mm respectively. The cross members 101 are located at equidistant intervals of approximately 2 m along the length of the trackway.

First and second elongate tracks 111, 113 are secured to the upper surfaces of a first pair of elongate support members 115, 117 and a second pair of elongate support members 119, 121, respectively. The support members 115, 117, 119, 121 extend along the length of the respective track 111, 113. The support members are identical thin walled rectangular cross section beams. The support members 115, 117, 119, 121 are welded to the upper surfaces of the cross members 101 perpendicular to the cross members 101. The tracks 111, 113 are secured to the support members 115, 117, 119, 121 either by edge clamping or retaining bolts (not shown).

A cable tray 123 with a lid 125 for housing the cable for the trackway is situated between the tracks 111, 113. The cable tray and lid 123, 125 extend along the length of the trackway parallel to the facing longitudinal edges of the first and second tracks 111, 113. The cable tray 123 sits between a pair of supports 127, 129. The cable tray supports 127, 129 are welded to the upper surface of the cross members 101.

The upper surfaces of the first and second track members 111, 113 are substantially flat and provide first and second running surfaces 131, 133 respectively, along which run wheels of vehicles of the personal rapid transport system.

Although the embodiment is described with reference to a pair of running surfaces, it can be appreciated that a single running surface may be provided on a single track which is the full width of the vehicle.

The trackway section 100 may be supported in an elevated position as disclosed, for example, in UK Patent No. 2384223.

The first and second tracks 111, 113 comprise preformed grid-like structures. The track may, for example, be made from a fibre-reinforced plastics material (FRP). Alternatively the grid may be formed of any other, suitable material. If FRP is used, material is moulded in an open mould using a fibre deposition head that feeds continuous fibre rovings that are passed through a pre-wetting bath of resin. The top surfaces of the tracks are coated with an anti-skid material which may comprise a variety of materials, for example, shot-blast grit, silica sand or calcinated bauxite embedded in a resin.

The grid-like members forming the tracks are secured to their respective support members 115, 117, 119, 121 in longitudinally adjoining sections, each section being approximately 6 m in length. The sections of the first and second tracks 111, 113 adjoin adjacent sections at an oblique angle, for example 45°. The sections may be bonded together with a suitable adhesive or, alternatively clamped at the underside surface of the track members by a C-clamp with a captive nut (not shown). The oblique angles of the joints between successive sections may vary along the trackway, possibly randomly. The tracks are then bonded to the supporting structure for additional stability. Each track member 111, 113 comprise a framed section of a plurality intersecting grid members. The grid members intersect each other at 90° and extend from the frame at an oblique angle such that the grid members leave between them a plurality of square holes which may have a pitch in the range of 20-60 mm. In one embodiment the pitch of the holes is 38 mm, created by forming the grid with grid members that are 25 mm deep by 5 mm thick, with the perpendicular distance between grid member centrelines being 38 mm. The grid members are at an oblique angle to the direction of travel of the vehicle. The oblique angles may be randomly variable between the sections of track members.

In an alternative embodiment, the grid-like structures may be formed of intersecting ridges or grooves in the running surface.

In operation, a vehicle is guided over the running surfaces 131, 133 of the trackway such that tyres on each side of the vehicle run over the running surfaces of the first and second tracks 111, 113, respectively. The tyres are centred on the running surfaces 131, 133 of the first and second tracks 111, 113. The grid-like structures of the running surfaces provide increased friction between the tyres and running surface whilst minimising wear to the tyres, preventing shipping or skidding of the vehicles even in wet conditions whilst reducing noise. Friction is further improved if an anti-skid coating is provided on the running surface.

The support members 115, 117, 119, 121 elevate the grid structures of the first and second tracks 111, 113 such that ice and snow will not collect on the running surface such that the running surface is kept clear. Consequently, the PRT system can operate in severe weather conditions.

Because the tracks 111, 113 are flexible, they will flex slightly as vehicles pass along them. This flexing will serve to dislodge any compacted snow or ice that may have accumulated, allowing the snow or ice to fall to the ground below.

15. (canceled)

16. A trackway for a personal rapid transport system, the trackway comprising a track having a preformed grid-like structure which comprises a running surface along which, in use, run wheels of vehicles of the system, wherein the track is flexible and is formed from a fibre-reinforced plastics material.
17. A trackway according to claim 16, wherein the grid-like structure comprises a plurality of intersecting grid members providing the running surface.

18. A trackway according to claim 17, wherein the grid members extend obliquely to the direction of travel of a vehicle wheel travelling along the running surface.

19. A trackway according to claim 17, wherein holes through the grid-like structure are provided between the intersecting grid members.

20. A trackway according to claim 19, wherein the pitch of the holes varies in the lengthwise direction of the running surface.

21. A trackway according to claim 16, wherein the running surface has a top surface coating of an anti-skid material.

22. A trackway according to claim 16, wherein the track comprises a plurality of preformed sections longitudinally interconnected to form a continuous running surface.

23. A trackway according to claim 22, wherein the track is one of a pair of elongate, parallel tracks of a track section, the track section also comprising a plurality of cross members which support the tracks.

24. A trackway according to claim 23, wherein the track section further comprises a pair of parallel side beams interconnected by the cross members and extending parallel to the tracks.

25. A trackway according to claim 23, wherein the tracks are elevated above the top surfaces of the cross members.

26. A trackway according to claim 16, wherein the running surface is substantially flat.

27. A trackway according to claim 16, wherein the track is supported above ground level.

28. A personal rapid transport system, comprising:
   wheeled vehicles,
   a track having a preformed grid-like structure including a track running surface for engaging one or more wheels of the wheeled vehicles, wherein the track is flexible and formed from fiber-reinforced plastic.

* * * * *