

SEKISUI FFU Synthetic Railway Sleepers



Pre-Assembly at Voestalpine BWG

Sekisui Chemical Co., Ltd., established in 1947, is a widely diversified Japanese corporation with over 200 companies operating in 20 countries. Sekisui provides a broad range of products, from high performance plastics and environmental solutions to synthetic lumber for railroads and factory-produced module housing.

ESLON Neo Lumber FFU, a synthetic wood developed for use as railway sleepers in 1978 has since then been widely applied in Japan's railroad infrastructure, from the high speed Shinkansen to regional trains and urban metro systems. So far, more than 870 km of track have been laid with FFU, main areas of application are turnouts, open steel girder structures and tunnels. The idea behind this was to devise a synthetic material featuring the same properties as natural wood, plus an extended life-span and weathering resistivity. Therefore, FFU is a perfect symbiosis between wood and plastic, combining the advantages of both materials.

Esilon FFU Neo Lumber for railroad application is produced by compressing single strands of glass fibre with polyurethane foam using a high pressure extraction press. The manufacturing process is initiated by mixing the base materials polyole and isocyanide with several additives. After compounding and extrusion, the raw mixture is reinforced with long glass fibres. Foaming and curing are the final



Installation of Turnout at Bayer Leverkusen Plant

manufacturing stages before the finished product is cut to a standard length of 12 metres for further processing. The continuous extrusion method allows the production of sleepers in any length, the only restriction being transportation capacities. Sekisui synthetic wood railroad and bridge sleepers can be fabricated to millimetre accuracy according to customer specifications. A priceless advantage for track precision accuracy.



Rail Fastening System Analog to Wood

Scrap fibres or shavings can easily be recycled. As opposed to natural wood, FFU does not need to be impregnated with environmentally harmful chemicals, while still resistant against chemical contamination and lubricants. Due to its closed cell structure, FFU does not absorb water, making it a homogenous, high-grade technical material. After installation, FFU remains inherently stable, i.e. even under extreme strain, the material sits solidly on the steel beams without any distortions. The bottom side



Easy Manual Adjustment

of the FFU sleeper interlocks with the ballast track just like natural wood. Practical experience shows that effective load deflection and tight bonding between sleeper bolts and synthetic wood, along with weathering resistivity and a closed cell structure are the key factors for lower maintenance costs and a positive cost-benefit analysis in the long run. In addition, FFU waste can be re-fabricated into railway sleepers not subjected to heavy traffic or loads.

FFU can easily be drilled with commercial tools, as processing requires the same procedure as natural wood. Easy to repair, misplaced boreholes can easily be fixed by inserting an FFU dowel and re-drilling the hole in the correct position after a short waiting period. It is also possible to custom-fabricate individual FFU sleepers based on client blueprints, offering an unlimited number of design possibilities including cut-outs, notches, and tapering. Various sleeper widths and lengths are available according to customer requirements.

The year 2004 marked the European premiere for Eslon FFU Neo Lumber. Wiener Linien urban metro

systems opted for the application of FFU as sleepers on an open steel girder bridge in Vienna. So far, FFU has been used on several other Wiener Linien bridge projects. Since 2005, Austrian Federal Railways ÖBB uses FFU 'polyurethane wood' in diverse railroad infrastructure projects. Recently, the Bayer AG subsidiary Currenta Leverkusen installed a FFU turnout 74 meters long in order to connect the production



Final Installation of Turnout

site to the Deutsche Bahn railroad net. The turnout was manufactured by Voestalpine BWG.



The durability of Eslon FFU Neo Lumber is much higher than that of natural wood. The initial investment for installation in the track superstructure is slightly larger when FFU is used, but is in turn quickly offset by lower life cycle costs and technical superiority. Environmentally responsible rail operating companies generally make their purchasing decisions in favour of synthetic wood.

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