

FFU[®] Synthetic Wood | Railway Technology



Working
guidelines

List of contents

Introduction	4
General	4
Material specification	4
Basic principles	4
Mechanical working	5
Drilling	5
Bore hole diameters for sleeper screws	5
Sawing	6
Chiselling	6
Milling	7
Grinding	8
Repairing bore holes	8
Repair method with synthetic resin only	8
Repair method with a synthetic wood plug plus synthetic resin	9
Handling synthetic resin	10
Precautions when handling synthetic resin	10
Fire Prevention	11

Introduction

General

These working guidelines for FFU synthetic wood | railway technology serve to improve occupational safety when working on the project, and to optimise competent working by the experienced specialist.

All statutory regulations that are applicable to carrying out the work must be observed, especially those relating to the working of materials such as glass fibres.

All persons involved in handling FFU synthetic wood must read these working guidelines carefully before start to work, and observe them during working.

Material specification

Basic principles

FFU synthetic wood is made up of endless long glass fibre strands, which are soaked with a special polyurethane system and then cured at an elevated temperature.

The synthetic wood can be machined or worked using the same methods and tools as those used for railway sleepers of natural wood.

Compared to natural wood, the following in particular must be heeded when machining FFU synthetic wood:

- FFU synthetic wood has greater hardness and strength than natural wood.
- The specific weight of FFU 74 synthetic wood is approx. 740kg/m³.
- **To prevent the glass fibres in FFU synthetic wood from melting and tools becoming stuck, it is advisable to reduce the RPM as well as the feed rate of equipment adequately.**
- In the course of their work with FFU synthetic wood, **the workforce must take precautions against dust and fine particles. Wearing protective clothing (overalls, gloves, breathing masks, safety goggles etc.)** must ensure that **dust and fine particles are kept away from the body and respiratory passages**. All other persons must be a safe distance away or wear protective gear while work is in progress.
- FFU synthetic wood is a closed pore material. **Water and/or low temperatures can lead to a surface of the material posing a slip hazard**. Adequate safety precautions must be taken.
- It is only allowed to bring the load into the sleeper perpendicular to the laminate area and at no time parallel to that.

Slim tie:

Using FF slim tie with a height of 12 cm and an axle load up to 22,5 tonnes a hard synthetic plate with 2 mm height (like Lupolen) must be used under the ripped baseplate.

Mechanical working

Drilling

Depth of bore hole:

The bore hole for the screw in the FFU synthetic wood sleeper should **be at least 10 mm deeper** than the final penetration depth of the sleeper screw. We recommend the use of a drill stopper to maintain the correct bore hole depth. The very high proportion of glass fibre can result in rapid wear of machining tools.

Drill: must be suitable for metal materials or of WIDIA quality

Vacuum cleaner: Drillings are to be vacuumed out while the hole is being drilled.
 Once the hole is finished, it has to be cleaned.

Minimum distance of drill holes:

- From the beginning or the end of the sleeper it must be always bigger than 100 mm
 - From one drill hole to another one – it must be always bigger than 100 mm
 - From the edge of the sleeper – it must be always bigger than 50 mm
- Furthermore minimum distance regulations for wooden sleepers must be followed



Bore hole diameters for sleeper screws:

The table below shows examples of optimum bore hole diameters in FFU synthetic wood

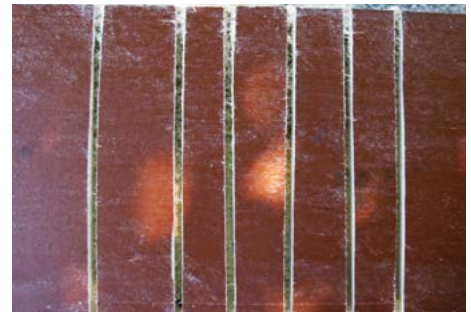
Screw dimension	Bore hole dimension	Notes
ø 22,2 x 144 mm	ø 18 mm depth 110 mm	as a rule
	ø 19 mm depth 120 mm	in FFU edge area
SS76 article number #3054176		
ø 24 x 160 mm	ø 19 (20) mm depth 130 mm	for bridge sleepers
	ø 20 mm depth 135 mm	in FFU edge area

Sawing

A significant proportion of FFU synthetic wood is glass fibres. This means that when sawing or generally machining FFU synthetic wood, care must be taken to **ensure the fibres do not melt**, otherwise tools may become stuck.

Sawing, like drilling, should proceed **at a suitable RPM and lower tool feed rate** than for natural wood. Too high a temperature at the saw blade may result in it **sticking, due to melted glass fibres**.

We recommend the use of Widia circular saw blades with fine teeth for working glass fibre materials.



Chiselling

The recess required, e.g. for the support area of a bridge girder, can be, among others, chiselled out. Saw cuts to the desired depth are made at the ends of the intended recess in the FFU synthetic wood.

The area to be chiselled out between these two cuts is then cut into strips of 2 to 5 cm wide.



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The strips can now be chiselled out with a suitable caulking tool.



Finished recess
E.g. support area of a bridge longitudinal girder



Milling

For milling FFU synthetic wood a machine that has a sealed bag to collect the milled material has to be used. The milling tool itself must be an extra hard milling disc for working hard material.



As with drilling and sawing, the milling speed must also be controlled so that the glass fibres do not melt at any time. Otherwise, the milling tool **may become totally stuck** and be rendered useless.

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Grinding

The grinding machine must have a sealed collecting bag for the shavings. The abrasive paper must be suitable for working hard material. Temperature related melting of the glass fibre must be avoided.



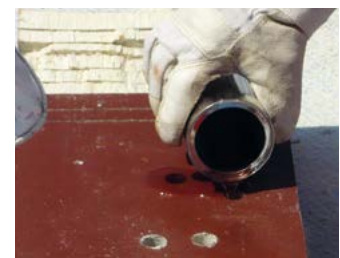
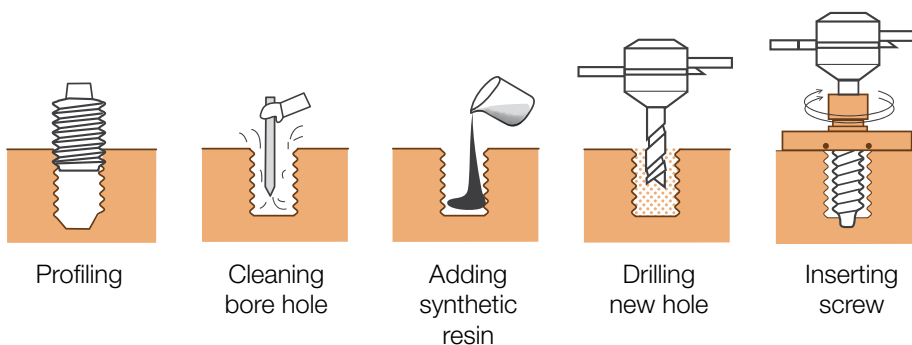
Repairing bore holes

Repair method with synthetic resin only

Old and new bore hole at the same spot or overlapping

If only synthetic resin is used for repair, as shown in the work steps below, the repaired bore hole can be worked at the earliest **after a curing time of 30 minutes, similar to FFU synthetic wood.**

a) Bore hole not badly damaged

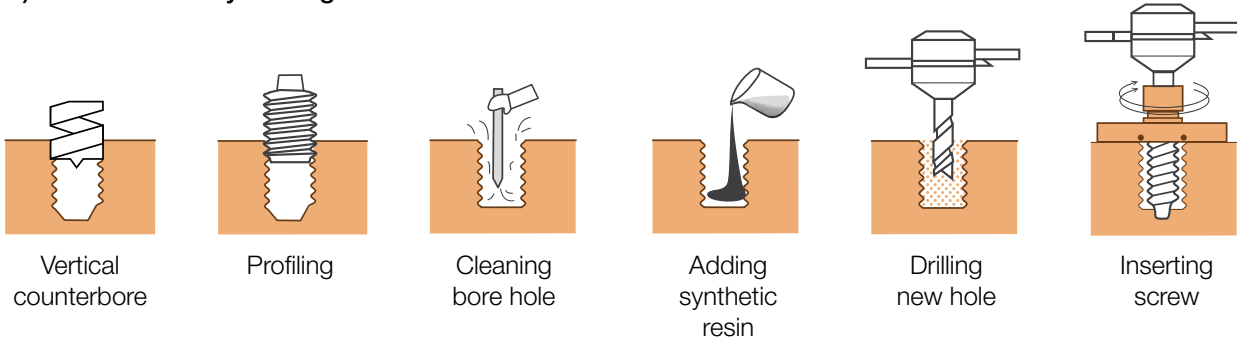


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b) Bore hole badly damaged

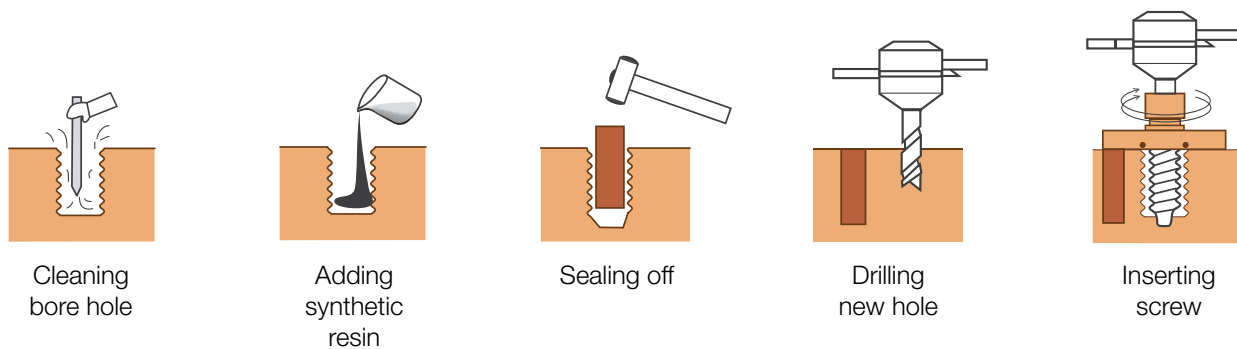


Repair method with a synthetic wood plug plus synthetic resin

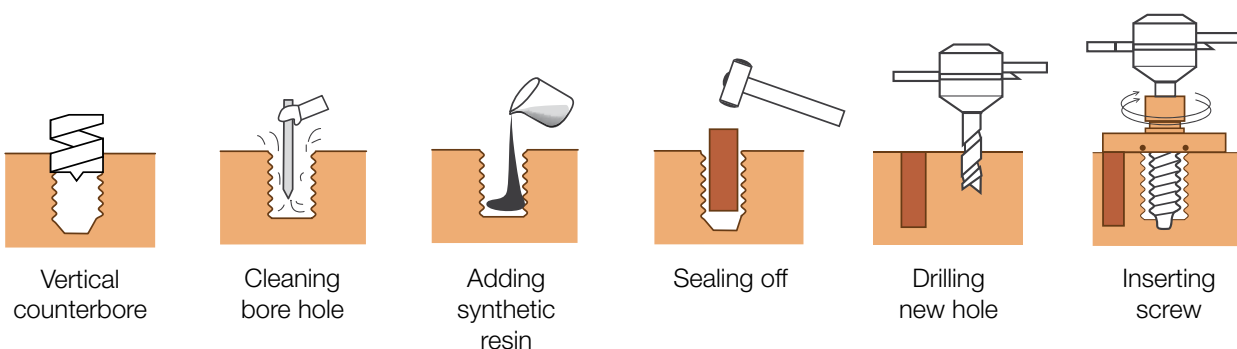
Old and new bore hole is not at the same spot or overlapping

If a synthetic wood plug plus synthetic resin is used for repair, as shown below in the work steps, then, as with FFU synthetic wood, the repaired hole can be worked at the earliest **after a curing time of 4 hours**.

a) Bore hole not badly damaged



b) Bore hole badly damaged



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Handling synthetic resin

Synthetic resin is suitable for making repairs to FFU synthetic wood, e.g. in the eventuality of bore holes not made at the correct spot, damaged bore holes, damage that has arisen and remedying old damaged spots.

In isolated cases, repair work to FFU synthetic wood using synthetic resin can be carried out under boundary conditions with **low** humidity.

Due to the **very short shelf life** of synthetic resin, the two component materials are supplied only **to special order!**

Preparation required

- Synthetic resin (base + hardener)
- Plastic measuring cup - clean
- Stirring sticks - clean
- Cleaning cloth



Pour base (300 g)
Hardener (6 g)

Mixing

Pour base (white 300g) into a suitable clean mixing vessel.

Add the hardener and stir straight away.

This mix can be used once only.

Precautions when handling synthetic resin

- Keep the synthetic resin and its components safely out of reach of children.
- Keep the synthetic resin and its components safely away from fire.
- Handling or working synthetic resin or its components **near naked flames or heat** is forbidden.
- Immediate medical assistance must be sought if synthetic resin or its components are swallowed by mistake.
- Safety goggles must be worn when working with synthetic resin or its components.
- Should synthetic resin or its components get into the eyes, **flush out with clean water immediately** and seek medical assistance straight away.
- Rubber gloves must be worn when working with synthetic resin or its components.
- Immediate medical assistance must be sought if the skin exhibits a rash or other changes.
- Protective clothing badly soiled with synthetic resin or its components must be cleaned with a cloth.
- The synthetic resin mix produced must be used up in a single work operation (one use only).
- Please order the synthetic resin components only in the quantities needed since they can only be stored for approx. one month.

Fire Prevention

Inspections:

Spontaneous combustion pursuant to ISO 871: 530°C

Fire classification pursuant to ISO 11925-2, ISO 9239-1 and DIN EN 13501-1: B1 flame retardant, self-extinguishing

Fumes pursuant to ISO 5659-02 and DIN 5510-2: FED 0.5

Welds:

If the sleeper ignites during welding, the welding materials must be removed from the sleeper and/or the sleeper bay. The sleeper can subsequently be covered with sand.

Heating, neutralising the rail:

The flash point is 450°C. If the sleeper should ignite during the heating or neutralising of the rails, the sleeper will self-extinguish as soon as the energy source is removed.

Actions to be taken in the event of a fire:

If materials such as welds should ignite on the sleeper, as much of the material as possible must be removed before extinguishing operations begin. Then, traditional extinguishing agents: sand, CO₂ or water may be used.

