



# ZSX

Twin-Sleeper

Technology  
Features  
Application  
Advantages

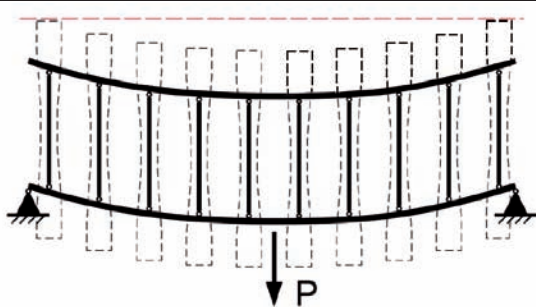
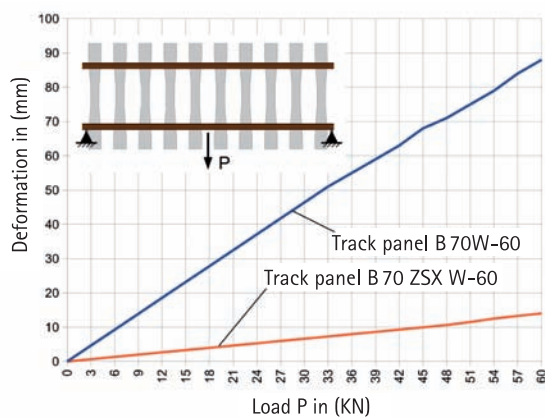
# Twin-Sleeper

## Know-How

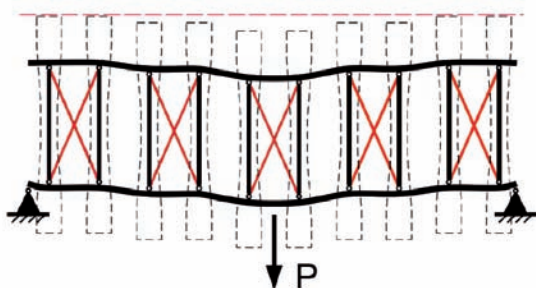
ZSX sleepers increase lateral track stability extraordinary.

ZSX sleepers rigidly connect two rails and convert a ballasted track into a truss close to the stiffness of slab tracks. The track panel bending test shows the improved load capacity. A load transverse to the track axis is bending the track panel significantly less. The lateral bending stiffness is increased six-fold!

In track, this results in a higher resistance against track deformation also in summertime the risk of track deformation in cause of high rail temperature is greatly reduced.



In regular ballasted track only the rail stiffness and the rail fastening restrict lateral bending forces.



Rail bending in one Twin sleeper is impossible, lateral forces can only bend the rails between two Twin sleepers. This increases the lateral bending stiffness.

Quelle: Plica

## Progress...

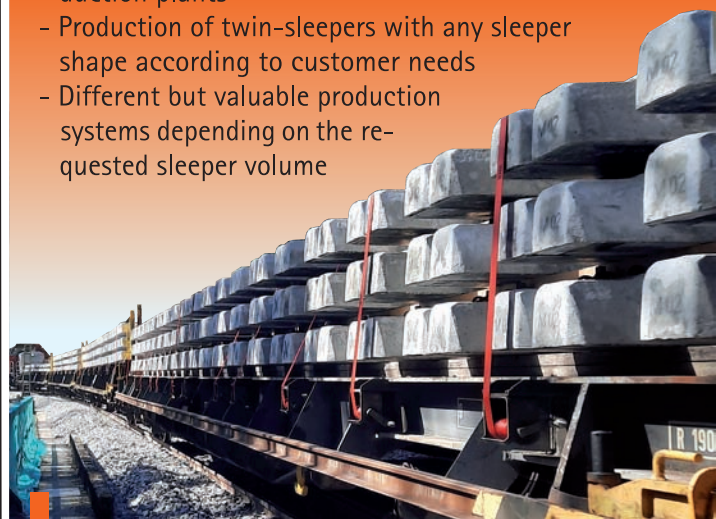
means to combine R&D with proven experience: ZSX sleepers keep the advantages of ballasted track.

- Economical and ecological production of ZSX superstructure through state of the art installation processes
- Sleepers laying by using modern track renewal trains, track panel cranes or railroad excavators
- No transition construction needed between regular and ZSX superstructure
- No need for sleeper anchors in narrow curves
- Quick and easy releveling, relifting and realigning with conventional tamping machines
- Easy rerouting in case of an increase of driving speed
- Quick and easy exchange of faulty or damaged superstructure components

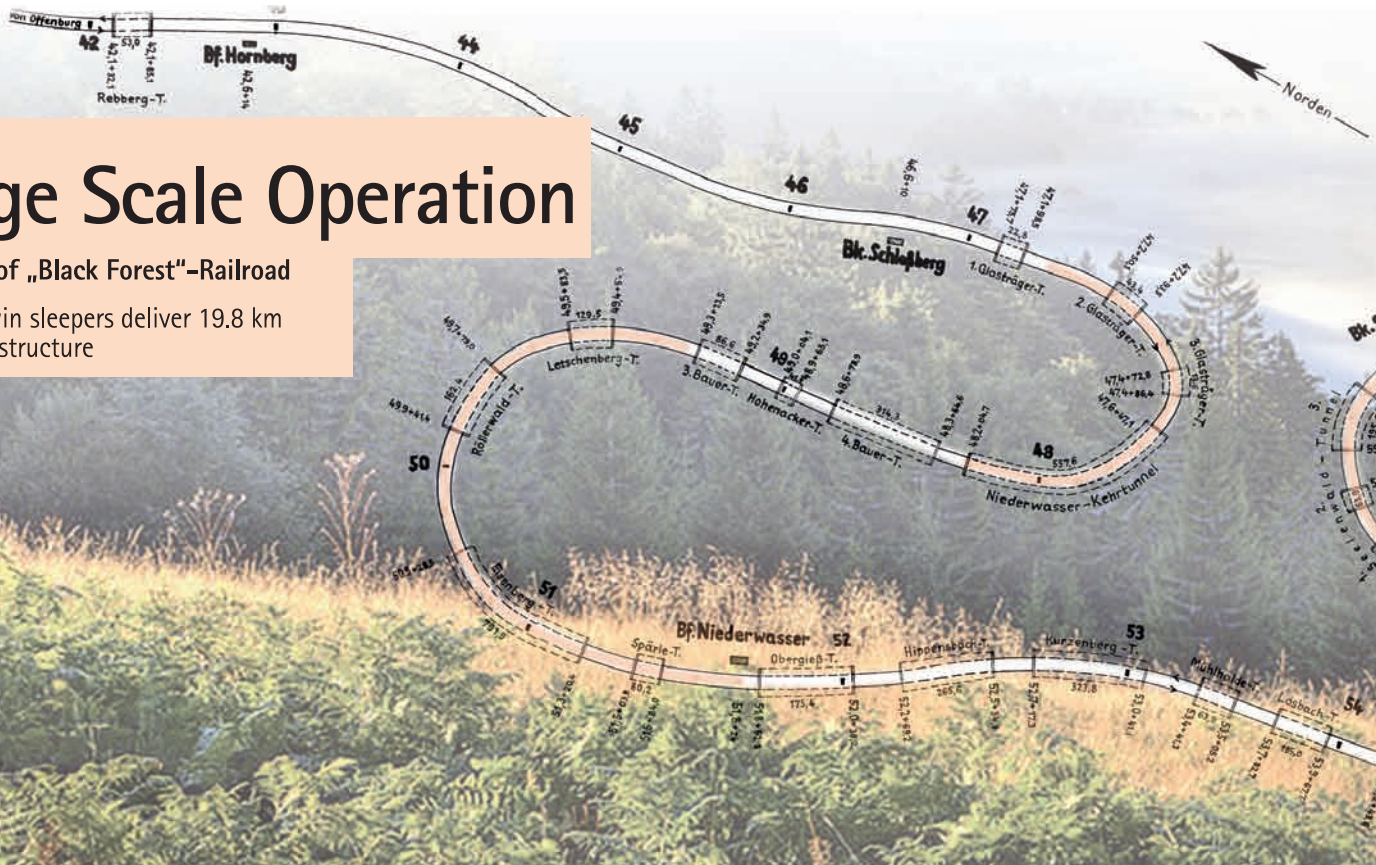
## Production

Economical and ecological production of the ZSX twin-sleepers

- State of the art production facilities in existing production plants
- Production of twin-sleepers with any sleeper shape according to customer needs
- Different but valuable production systems depending on the requested sleeper volume



Dispatch with regular sleeper rail cars



# Large Scale Operation

Renewal of „Black Forest“-Railroad  
 16,500 twin sleepers deliver 19.8 km  
 ZSX superstructure

# Installation Process

through a valuable track renewal system

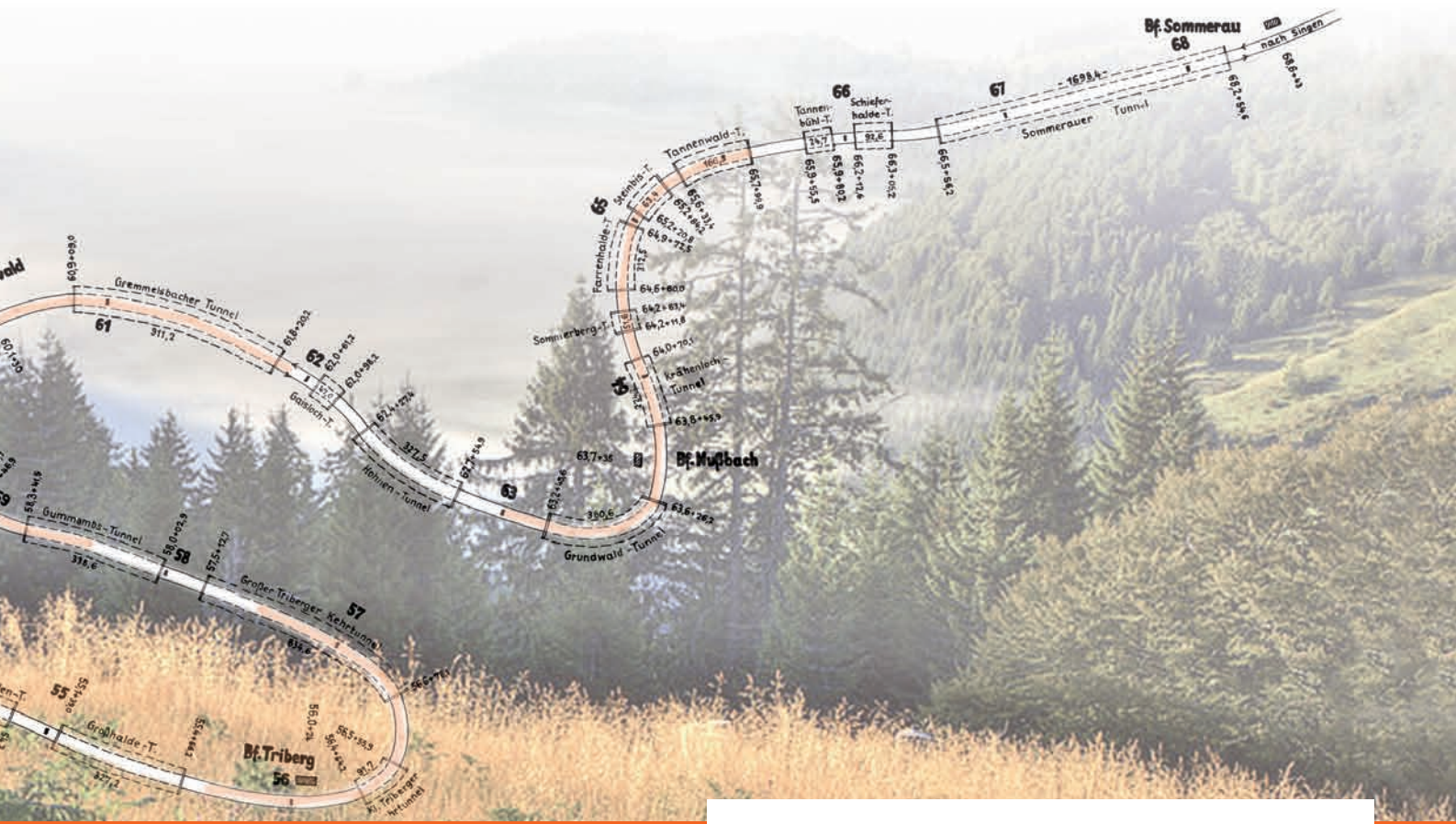
- Large scale renewal with a TRT using a laying unit with two sleepers at a time
- Installation of track panels
- For smaller projects - installation of ZSX sleepers with railroad excavators
- Delivery of ZSX sleepers by train or truck



Laying ZSX with SUZ 500 UVR (double installation unit)



Threading of rails without moving up the sleepers



## Application

ZSX superstructure improves track stability and reduces maintenance costs

- In curves with small radii
- In tracks with frequent changes between curves and straight lines as well as in transitions to bridges or tunnels
- In downhill sections with frequent braking
- In lines with application of the linear eddy-current brake



Laying of ZSX twin-sleepers by railroad excavator



Fixing of rails (screwing)

# Delivering Solutions



## Technical Features

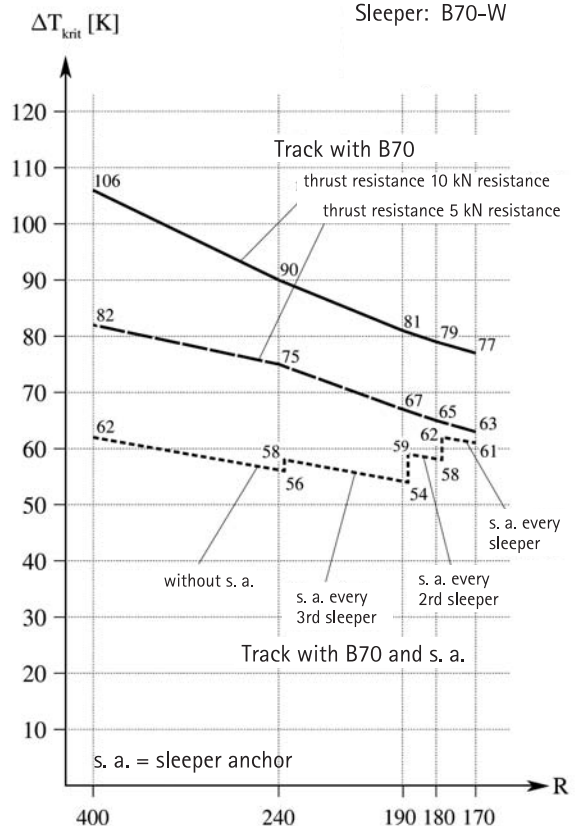
The patented innovation combines two conventional concrete sleepers to a ZSX (twin sleeper) by using steel rods as connection.

Two regular sleepers are connected by two crosswise concreted steel rods below each rail. Both sleepers connect to a stiff frame in horizontal level and still allow steep deviation in vertical level. Track stiffness increases almost to slab track level not losing its possibility of easy ballasted track realignment by tramping.

ZSX twin-sleepers improve track stability with following advantages:

- Increase of track stability even in case of critical rail temperatures
- No necessity of sleeper anchors in curves with small radii
- Reduction in emerging of track directional errors
- Less tilting of single sleepers in ballast during rollover
- Direct transition from a regular sleeper track to ZSX superstructure
- No restriction for using any tamping machines
- Similar acoustic characteristics to regular ballasted tracks

Rail: 54E4  
Sleeper: B70-W



# Twin sleeper B70-ZSX

## 1. General Information

Product	Twin sleeper B70-ZSX*	
Patented by	Leonhard Moll	
Federal Railway Ofc Approval**	524/16-Zul dated 10.02.2017	
DB-Approval	01.06.2017	
Regulation	Ril 820.2010	
Organization unit	Railway engineering and track system management, I.NPF 121 (G)	

## 2. Detailed Information

Application	Use of ZSX sleepers in curves $400\text{ m} > R > 170\text{ m}$ safes use of sleeper anchors	
Rail fastening	W 14K with ZW 686a (49E5, 54E4) or Zw 687a (60 E2)	
Technical data		Length: 2,40 m und 2,60 m, Width: 0,9 m Height in Railseat section: 217 mm, Weight: 630 kg (2,60)
Track fastening	log 54.15.0802 (2,60 m Length) 1 log 54.15.0803 (2,40 m Length) 2	log 60.15.0802 (2,60 m Length) 3 log 60.15.0830 (2,40 m Length) 4
Material Numbers	989531 (2,60 m Length) 1 689533 (2,40 m Length) 2	989532 (2,60 m Length) 3 689534 (2,40 m Length) 4
Special Features	No tamping restriction, any tramping machines can be used in ZSX superstructure	
Note	During reconstruction: sleepers laying requires a higher accuracy; lateral track axis deviation max. + 20 mm, height deviation max. 70 mm During reconstruction: when tamping one rail (inner curve) use only a partial strain (50 Nm). The other rail need to have full torque to 250 Nm. During tamping with shifts less than 5 mm, the inner rail fasteners have to be loosened and retorqued to 50 Nm. See also maintenance notes from 20.03.2020 (Dr. Plica / Moll)	