



RAIL TECHNOLOGY

INNOVATION, TECHNOLOGY AND HIGHEST PRODUCTIVITY



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SINCE 1959

WE'VE BEEN DOING

WHAT OTHERS ARE NOW

BEGINNING TO ATTEMPT

TRUST THE
INVENTOR

CONTENT

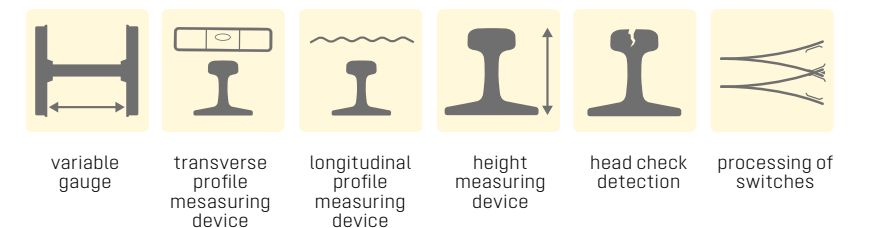
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RAIL TECHNOLOGY
RAIL MILLING AND GRINDING TECHNOLOGY

All rails - from railways, trams to metros - are subject to a permanent wear process. In order to increase driving safety and at the same time extend the rail life and reduce the life cycle costs, rails must be maintained regularly. In order to minimise operational disruptions that occur during this process, LINSINGER has developed special rail milling machines to work on the rail head on site without disassembling it. All LINSINGER rail milling machines are individually adapted for use on main line tracks, suburban trains, metros, trams and private railways as well as for main tracks, switches, railroad crossings and tunnels.

Increased train frequencies and loads have a negative effect on the wheel / rail system due to accelerated rail damage development. For this reason, infrastructure owners are forced to apply new maintenance strategies and procedures. Such a case requires technology that can restore the surface of the rail almost independently of the state of damage, but is still applicable to common maintenance strategies. LINSINGER high-performance milling technology fulfils precisely these requirements and contributes in a flexible and economical way to sustainable extension of rail life even under these increased load conditions.





CHALLENGE

Increasingly large freight volumes, rising passenger numbers, shorter train intervals and higher speeds in passenger traffic lead to deformations at the wheel/rail contact area. Resulting rail defects are accompanied by the following negative aspects:

- Security risk
- Reduced speed - delay
- Downtime - high failure costs
- Noise pollution
- Reduced service life
- Rail and wheel wear
- Formation of corrugations, ripples, rail breaks and other rail defects
- Reduced driving comfort

THE CHALLENGE

Security risk



LINSINGER HIGH PERFORMANCE MILLING TECHNOLOGY

LINSINGER milling technology makes it possible, with regular adaption of the rails, to extend the service life of the track and thus reduce costs significantly. Through years of experience, it is possible for us to remove rail defects of any kind. The continuous aggregate setting allows a removal rate of up to 5* mm at the driving surface and a removal of up to 10 mm* at the running edge in one working pass.

Other important advantages of Linsinger technology are:

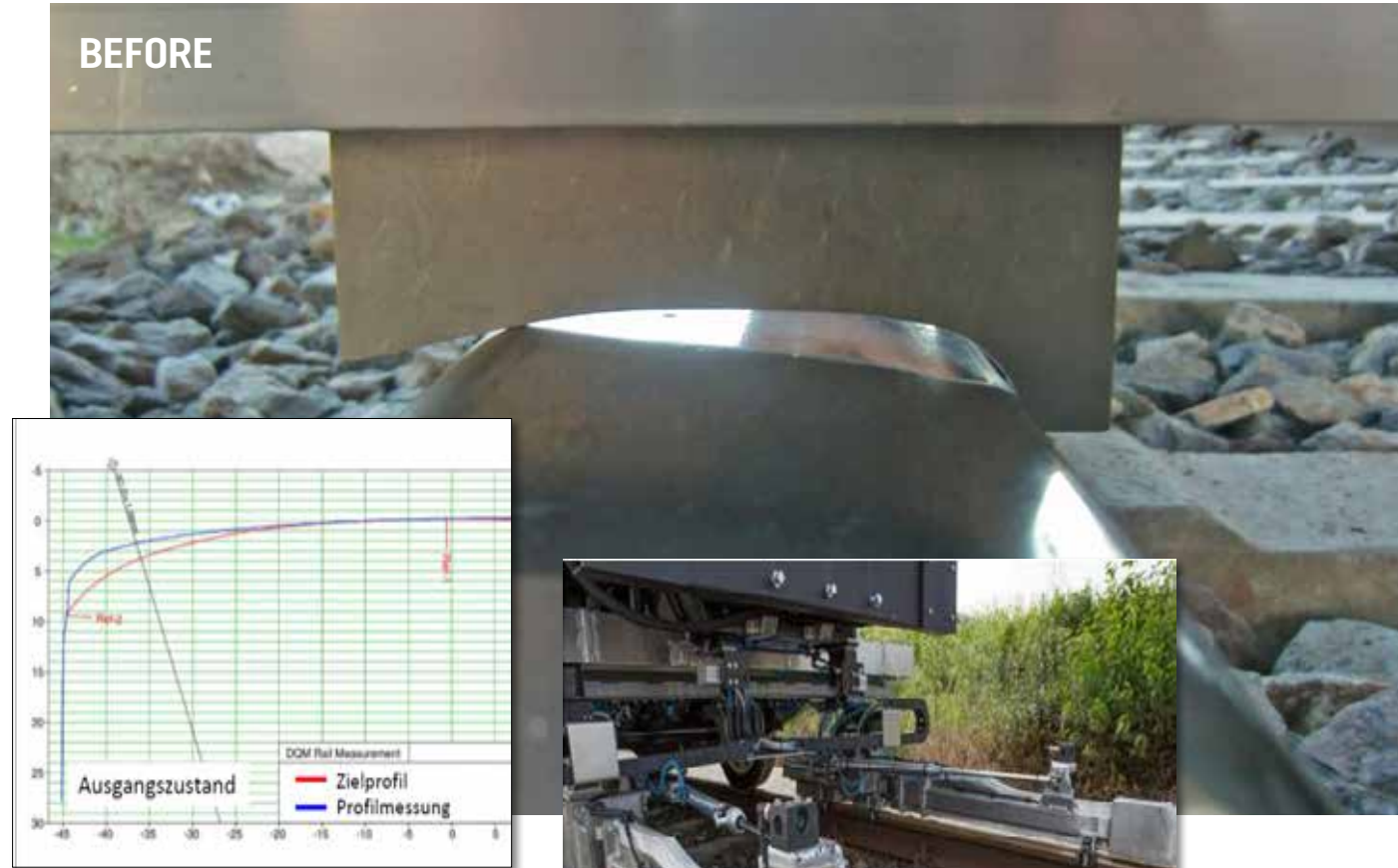
- Restoration of the rail head target profile
- Environmentally friendly - chips and sanding dust are extracted separately
- No water, no extinguishing agent required
- Lowest surface roughness
- Material removal of 0.1-5mm in ONE WORKING PASS*
- No flying sparks - no risk of fire
- No metallurgical change (blue colouration) of the rail head; heat is dissipated via the chip
- Highest accuracy of longitudinal profiles and cross track correction
- Recording track quality after processing*
- No „concealment“ of rail defects
- Low carbide requirement - processing costs

*depending on machine type

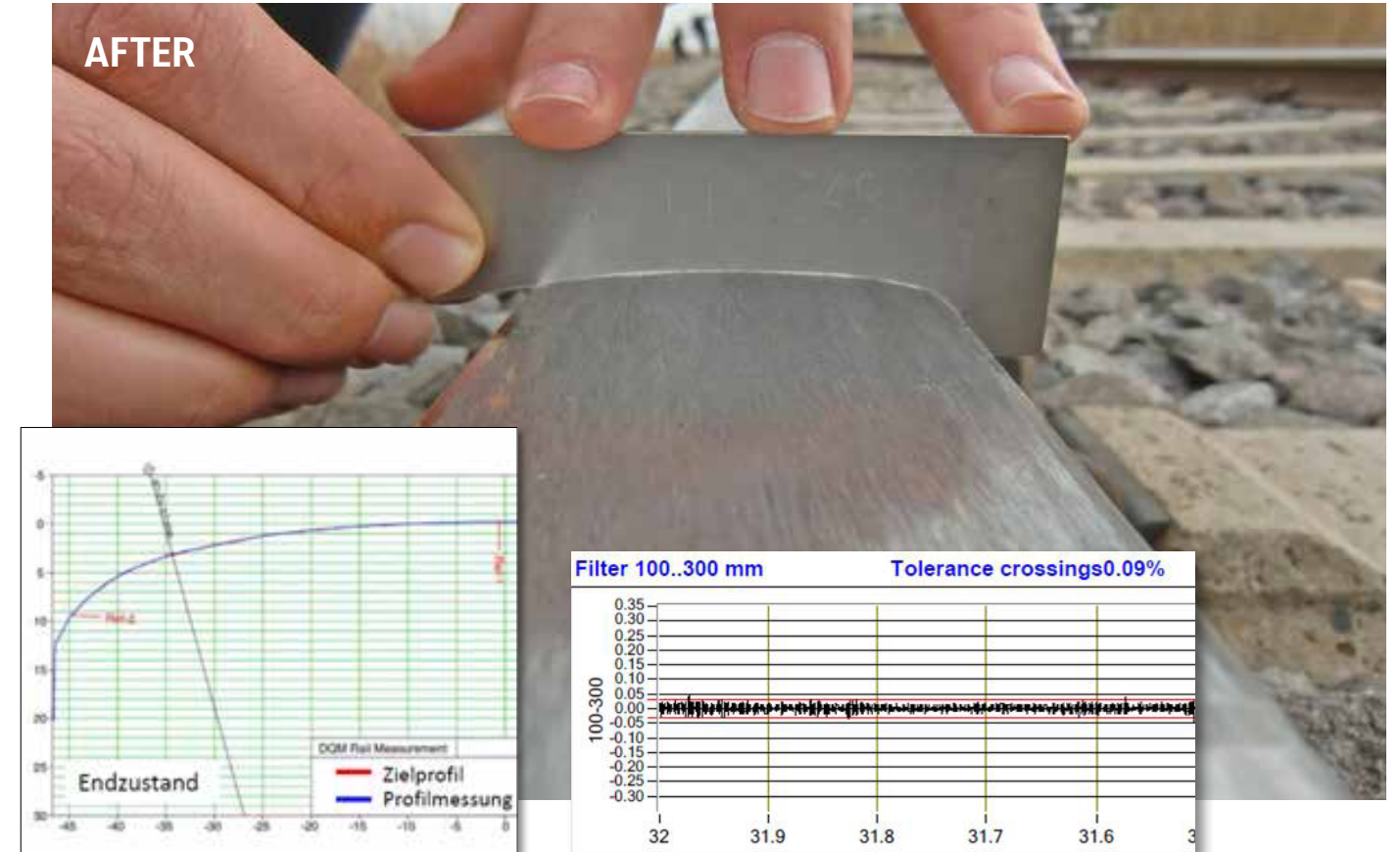
THE LINSINGER TECHNOLOGY

Material removal
from
0,1-5 mm
in one working pass

BEFORE

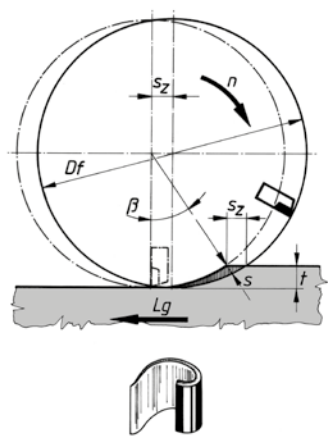


AFTER



THE PROCESS

LINSINGER's high-performance milling technology uses a patented circumferential milling process, which restores the lateral and longitudinal profile within the strictest tolerances and completely removes all surface defects in just one pass. Because this is a rotary cutting process, only milling chips (and no dust) are produced, and these are temporarily stored in a chip bunker on the machine for later recycling.



Years of research and development of the most important factors, such as the optimal cutter-head diameter and perfectly matched cutting performance, which in turn affect vehicle weight and the resulting vibration behaviour of the substructure, clearly put the LINSINGER technology in pole position. Milling machines with the highest levels of efficiency, together with specially developed carbide tools for this application, with up to eight cutting edges per indexable insert, achieve sustainability and lead to better economic results.

Only a completely faultless rail surface with a precisely adjusted profile can make a significant contribution to reducing the travel - life cycle - costs by optimising rail life. Because LINSINGER's milling technology produces a defined, reproducible and documented track condition with the highest quality (freedom from defects, narrowest cross-profile tolerances, lowest longitudinal ripples and lowest surface roughnesses), this procedure is excellently suited for preventive and corrective maintenance as well as for all other current maintenance strategies.

THE GOAL - SUSTAINABILITY

Maintenance process with the LINSINGER high-performance rail milling technology - the right solution for every strategy:

- A **preventive maintenance strategy** aims to remove damage shortly after emergence with minimal material removal, thus keeping the surface of the rail virtually free of damage.
- A **cyclical maintenance strategy** is a modification of the preventive approach. Here, maintenance is performed not based on level of damage but on operational experience with respect to damage and/or wear in a specified time or load interval.
- For flaws with medium to high failure depth, a corrective maintenance strategy is suitable. As soon as the **corrective maintenance** threshold with regard to failure depth is reached, the rail must be maintained or exchanged. The location of this intervention threshold depends on local maintenance options.

These maintenance concepts can increase the service life of the tracks many times, so that Life Cycle Costs (LCC) can be drastically reduced.



Waste - not at LINSINGER!
Our milling chips are 100% recyclable



WHY WE INVENTED RAIL MILLING

TO REDUCE LIFE-CYCLE COSTS
TO PROTECT THE ENVIRONMENT
TO NOT CHANGE THE METALLURGICAL COMPOSITION
TO AVOID RAIL DEFECTS IN THE FUTURE

TRUST THE INVENTOR

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MOBILE SOLUTIONS



**RAIL MILLING TRAIN MG31
FOR LARGE WORKLOADS**

APPLICATION:

High speed lines, main lines

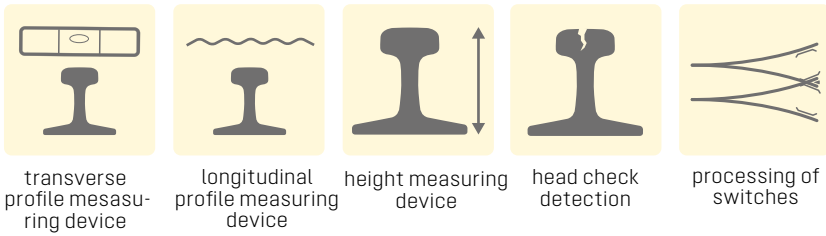
ADVANTAGES

- Fastest processing thanks to newly developed milling units
- Large material removal possible with coarse rail defects
- Automatic tool change for long consistent adaption
- Transfer speed up to 100 km/h
- Long service life of the tools
- Continuously accessible
- Integrated measuring system
- Robust construction



MG 31

The most efficient
rail milling train
in the world



TECHNICAL SPECIFICATIONS

Drive type of units	three milling units per side: electric / one grinding unit: electric
Traction drive	hydraulic
Main engine	830 kW; Tier 4 Final
Processing speed	6 m/min - 30 m/min
Max. removal rate per pass	4,5 mm on the rail surface / 10 mm on the running edge
Weight / max. axle load	173 t / per axle max. 20 t
Gauge	1435 mm
Minimal curve radius for processing	150 m
Cant at gauge system 1435 mm	180 mm
Chip container volume	16 m³
Maximum speed self propelled	100 km/h
Max. gradient	40‰

Driver's cab 1 Aggregate room Tool magazine Engine room Suction device Chip container Crew room Technique room Driver's cab 2



4 Processing units

Polishing unit

Mobile measuring device



**RAIL MILLING TRAIN SF06-FFS PLUS
FOR LARGE WORKLOADS**

APPLICATION

Main lines

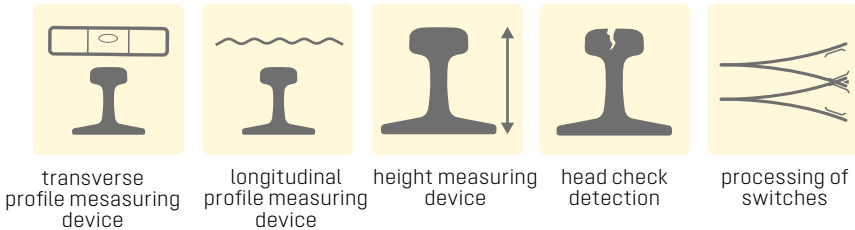
ADVANTAGES

- Continuous operation through autonomous systems
- Customer specific design and arrangements
- Support trailer with office space and social area
- High transfer speeds
- Modular configuration
- Capacity for extension
- Cabin to cavin gangway
- Machine integrated measuring device



SF06-FFS

The most autonomous
rail milling train
in the world



TECHNICAL SPECIFICATIONS

Drive type of units	two milling units per side: electrical / one grinding unit: electrical
Traction drive	hydraulic
Main engine	750 KW
Processing speed	16 m/min - 25 m/min
Max. removal rate per pass	3 mm on the rail surface / 7 mm on the running edge
Weight / max. axle load	160 t / per axle max. 20 t
Gauge	1435 mm
Minimal curve radius for processing	150 m
Cant at gauge system 1435 mm	180 mm
Chip container volume	16 m³
Max. speed self propelled	100 km/h
Max. gradient	40‰





RAIL MILLING TRAIN SF03-FFS
THE STANDARD MACHINE FOR ALL RAILWAYS

APPLICATION

Universally applicable, customised vehicle design

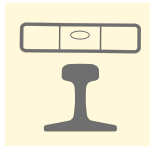
ADVANTAGES

- DB-proven and approved
- High efficiency
- Continuous operation through autonomous systems
- Suitable for high-speed lines
- High planning reliability
- Customer specific design
- Modular configuration
- Machine integrated measuring system
- Expansion capacity



SF03-FFS

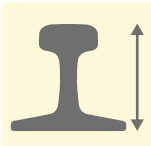
The most proven
rail milling train
in the world



transverse profile
mesasuring
device



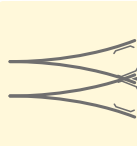
longitudinal
profile measuring
device



height measuring
device



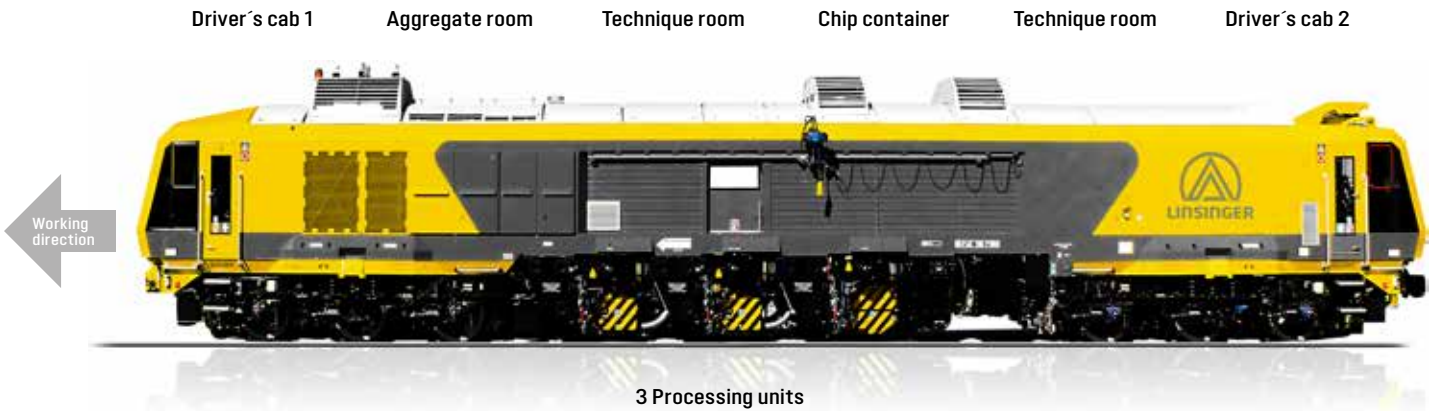
head check
detection



processing of
switches

TECHNICAL SPECIFICATIONS

Drive type of units	two milling units per side: electrical / one grinding unit: electrical
Traction drive	hydraulic
Main engine	750 KW
Processing speed	6 m/min - 30 m/min
Max. removal rate per pass	3 mm on the rail surface / 7 mm on the running edge
Weight / max. axle load	118 t / pro Achse max. 20 t
Gauge	1435 mm
Minimal curve radius for processing	150 m
Cant at gauge system 1435 mm	180 mm
Chip container volume	8 m³
Max. speed self propelled	100 km/h
Max. gradient	40‰





MG31- The most efficient rail milling train in the world

Processing speed up to 2000 m/h	Max. axle load 20 t
Max. removal rate per pass 0,1 - 5 mm	Max. dead weight 173 t
Max. speed	Min. gauge 150 m
self propelled 100 km/h	Variable gauge: No
Total length 48 m	Processing unit per side
Height 4,26 m / width 3,10 m	3x milling, 1x grinding



SF06-FFS Plus - Highest performance requirement in long-term use

Processing speed up to 2000 m/h	Max. axle load 20 t
Max. removal rate per pass 0,1 - 3 mm	Max. dead weight 160 t
Max. speed	Min. gauge 150 m
self propelled 100 km/h	Variable gauge: No
Total length 44 m	Processing unit per side
Height 4,21 m / width 3,10 m	2x milling, 1x grinding



SF03-FFS - Universally applicable, equipped for any challenge

Processing speed up to 2000 m/h	Max. axle load 20 t
Max. removal rate per pass 0,1 - 3 mm	Max. dead weight 118 t
Max. speed	Min. gauge 150 m
self propelled 100 km/h	Variable gauge: No
Total length 24 m	Processing unit per side
Height 4,21 m / width 3,10 m	2x milling, 1x grinding



SF02T-FS - The train for special demands

Processing speed up to 1000 m/h	Max. axle load 14 t
Max. removal rate per pass 0,1 - 1,5 mm	Max. dead weight 72 t
Max. speed	Min. gauge 50 m
self propelled 80 km/h	Variable gauge: No
Total length 22 m	Processing unit per side
Height 3,4 m / width 2,50 m	1x milling, 1x grinding



SF02-TRUCK - Highest flexibility and maximum mobility

Processing speed up to 600 m/h	Max. axle load 13,5 t
Max. removal rate per pass 0,1 - 1 mm	Max. dead weight 44 t
Max. speed	Min. gauge 35 m
self propelled 45 km/h	Variable gauge: Yes
Total length 18,25 m	Processing unit per side
Height 3,4 m / Width 2,5 m	1x milling, 1x grinding



MG11 - Conceived and designed especially for small clearance gauges

Processing speed up to 600 m/h	Max. axle load 8,5 t
Max. removal rate per pass 0,1 - 0,8 mm	Max. dead weight 31 t
Max. speed	Min. gauge 35 m
self propelled 50 km/h	Variable gauge: Yes
Total length 11,9 m	Processing unit per side
Height 2,52 m / width 2,15 m	1x milling, 1x grinding



**RAIL MILLING TRAIN SF02T-FS
FOR SPECIAL DEMANDS**



APPLICATION

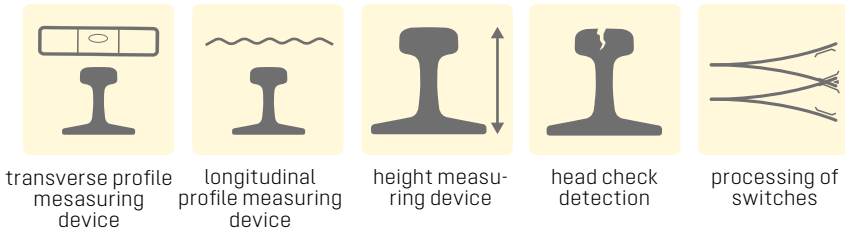
Metros, tunnels

ADVANTAGES

- For small clearance profiles
- Processing of tight curves
- Gauge convertible
- Low axle load
- Dust and spark reduced processing
- No additional track cleaning works
- Customised design
- Modular configuration
- Integrated measuring system
- Suitable for narrow gauge

SF02T-FS

The most versatile
rail milling train
in the world



TECHNICAL SPECIFICATIONS

Drive type of units	two milling units per side: electrical / one grinding unit: electrical
Traction drive	hydraulic
Main engine	420 KW; Tier 4
Processing speed	6-16 m/min
Max. removal rate per pass	1,2 mm
Weight / max. axle load	72 t / max. axle load 14 t
Gauge	1000 - 1668 mm
Minimal curve radius for processing	50 m
Cant at gauge system 1435 mm	150
Chip container volume	5 m³
Max. speed self propelled	80 km/h
Max. gradient	45‰





RAIL-ROAD-TRUCK SF02-FS TRUCK
FOR FLEXIBLE DEMANDS



APPLICATION

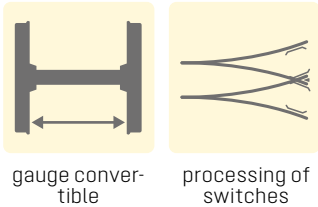
Road & rail, easy re-railing and transfer

ADVANTAGES

- Highest flexibility, maximum mobility
- No impact on rail traffic
- Transfer trips on roads and rail
- Simple rerailing
- No removal of track switching devices
- Short set-up times
- Suitable for processing grooved rails
- No damage caused by flying sparks on parked cars
- Quick transfer for processing hot spots
- For track processing on wooden bridge

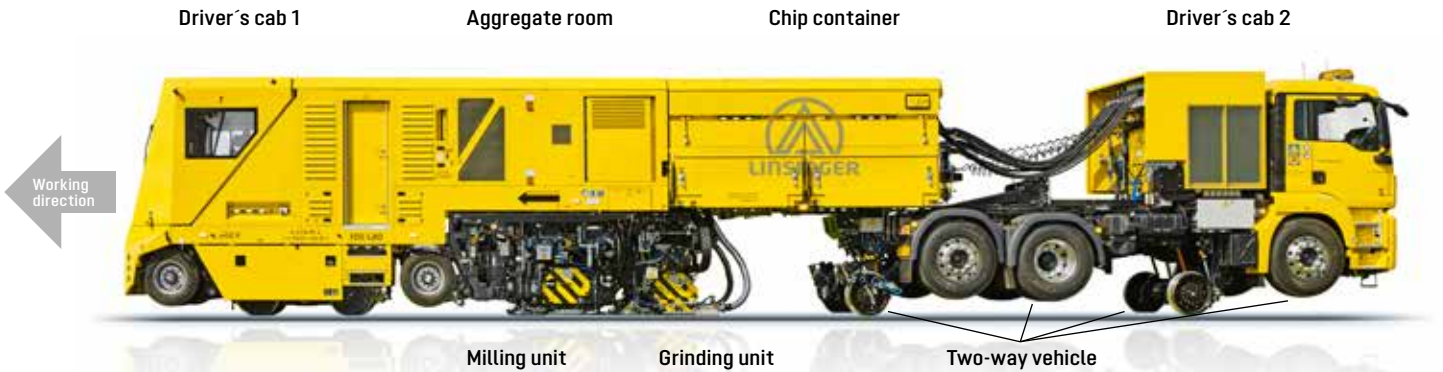
SF02-FS TRUCK

The most flexible
rail milling train
in the world



TECHNICAL SPECIFICATIONS

Drive type of units	two milling units per side: hydraulic / one grinding unit: hydraulic
Traction drive	hydraulic
Main engine	353 kW; EURO 6
Processing speed	600 m/h at 1 mm removal
Max. removal rate per pass	1,2 mm
Weight / max. axle load	ca. 44 t / max. 14 t axle load
Gauge	Customised from 1000 - 1668 mm possible
Minimal curve radius for processing	50 m
Cant at gauge system 1435 mm	160 mm
Chip container volume	4,5 m³
Max. speed self propelled	80 km/h road trip, 45 km/h rail trip
Max. gradient	40‰





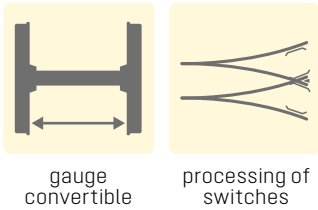
**RAIL MILLING TRAIN MG11
FOR SMALL CLEARANCE GAUGES**

APPLICATION

Metros, light rails, trams

ADVANTAGES

- Diesel electric drive
- High efficient suction system for chips (> 99,5%)
- Processing of the rail head by circumferential milling with combined circumferential grinding
- Emission standard: EPA TIER 4 Final. EU Stage IV
- Variable gauge 1000 - 1668 mm
- Transport in a shipping container or road haulage on a specific flatbed truck possible
- Low noise emission during processing
- No cooling agents needed
- Driving cab for 2 persons; machine operator position for 1 person
- Suitable for switches and turnouts
- Material removal: (0,1) 0,3 - 0,8 mm in one pass



TECHNICAL SPECIFICATIONS

Drive type of units	each side one milling unit: elektrik / one grinding unit: electric
Traction drive	electric
Main engine	242 KW; Tier 4 final
Vorschub	600 m/h at 0,8 mm removal
Processing speed	1,2 mm
Max. removal rate per pass	total net 31 t / pro axlee max. 8,5 t
Gauge	customised from 1000 - 1668 mm possible
Minimal curve radius for processing	35 m
Cant at gauge system 1435 mm	150 mm
Chip container volume	1,5 m³
Max. speed self propelled	50 km/h
Max. gradient	40‰ standard, 50‰ possible, 60‰ adjustment of gear required



MG 11

The smallest
rail milling train
in the world

**WORLDWIDE
OVER 50
MACHINES
IN USE**

**TRUST THE
INVENTOR**

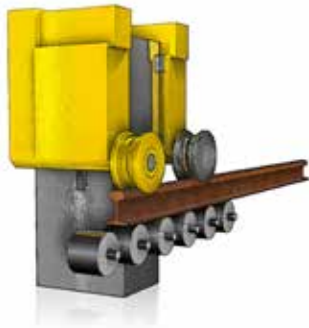


STATIONARY SOLUTIONS



**STATIONARY
RAIL HEAD MILLING MACHINE SKF
FOR STATIONARY RAIL HEAD REPROFILING**

For centralised rail head processing
Stationary rail head milling line.

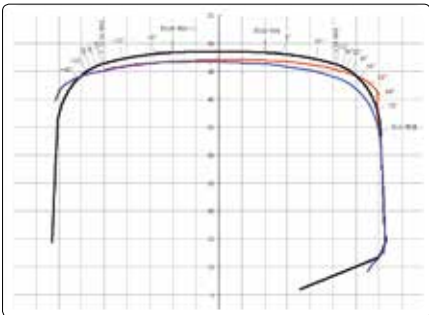


APPLICATION

- For use in welding, used rail and repair plants in 3-shift operation
- For rail manufacturers to remove the mill scale

ADVANTAGES

- Any changeable profile shape
- Side of the running edge freely selectable
- Re-profiling by milling and grinding in one simple operation
- Constant machining accuracy thanks to CNC axes
- No subsequent operation necessary



Transverse profile before and after processing

**ECONOMICALLY
VIAIBLE PROCESSING**

redoubling of rail life
through running gauge
changeover



**RAIL SAWING & DRILLING MACHINE LSB FOR
SAWING AND SIMULTTANEOUS DRILLING OF RAILS**

APPLICATIONS
Rolling mills, rail welding and switch manufacturing mills



ADVANTAGES

- Sawing and drilling in a single pass
- Inclined saw design
- Fully automated
- Turnkey solutions

OPTIONS

- Drilling hole cold pre-stressing for longer life
- Deburring unit
- Testing sample manipulator
- Longitudinal measuring system with temperature compensation

**CYCLE TIME
30 SECONDS**

One saw cut and
six drilled holes

TYPE	QTY DRILLS	RAIL HXB MAX
KSA 500 S	0	190 x 160 mm
LSB 800	0	200 x 220 mm
LSB 800/S1	1	200 x 220 mm
LSB 800/S2S	1	200 x 220 mm
LSB 800/S3	3	200 x 220 mm
LSB 800/S6	6	200 x 220 mm

*Special design for switch manufacturing mills



RAIL REPAIR AND WELDING PLANT THE COMPLETE SOLUTION FOR NEW & USED RAILS

The LINSINGER turnkey solution for new and used rails is the rail repair and welding plant. LINSINGER presents itself as the partner for turnkey solutions, from basic concept up to complete solution.

ADVANTAGES

- A partner for all solutions
- High efficiency through flexible machining in the factory
- Modular assembly according to customer requirements
- Design for 3-shift operation
- Conservation of material resources and environment

TURNKEY PACKAGE

Conservation of material
resources and environment



POSSIBLE WORKFLOW FOR USED RAILS

- Preliminary cleaning of rails, preliminary sorting by the customer
- Semi-automatic alignment of the rails
- Reprofilng by using milling and grinding tools
- Defect detection by using ultrasonic inspection and manual marking by the operator
- Removal of previously-marked defects through sawing
- Welding of rail joints, including brushing preparation
- Fully-automatic removal of excess weld bead
- Cutting to length and drilling

EXAMPLE OF WORKFLOW FOR NEW RAILS

- Welding of rail joints, including brushing preparation
- Fully-automatic removal of excess weld bead
- Ultrasonic checking of the welding seam and sawing samples
- Cutting to length and drilling



TOOL TECHNOLOGY & SERVICE



TOOL TECHNOLOGY CUTTER HEADS

LINSINGER has invested considerable effort in optimising cutter heads to increase the precision, machining speed, tool life and cost-effectiveness of the rail milling process.

In-house research and development department as well as its own design and mechanical manufacturing ensure that it meets worldwide customer requirements and generates special solutions.

Worldwide active tool technicians support customers on site. These are our guarantees for consistent LINSINGER quality and precision.

SPARE PARTS

Our well-trained service team ensures a fast and reliable supply of original spare parts, perfectly matched to LINSINGER machines

service@linsinger.com



CUSTOMER SERVICE & MAINTENANCE

The LINSINGER service team offers worldwide (remote) maintenance, repairs and maintenance for LINSINGER machines. Our highly motivated service team tries to handle all service and maintenance requests as quickly as possible, even when demand is high.

In case of emergency, we can be contacted around the clock. Our 24/7 service hotline provides experienced and highly trained LINSINGER service staff 24 hours a day, 7 days a week.

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