



# Cost-effective repair and overhaul of track-maintenance machines: Nationwide experience in Germany

*Keeping the railways competitive means ensuring the highest possible availability of all systems, particularly the track, at the lowest possible cost. Track-maintenance strategies, based on the regulations in force, together with optimized worksite planning have developed into useful tools for reaching economic targets. At the same time, attention needs to be paid to the quality standard of each individual track component as well as to entire sections of line. The use of modern track-laying and track-maintenance machinery has helped meet three requirements: high cost-effectiveness, outstanding quality and the resultant highest possible availability.*

## 1 Introduction

Heavy demands are placed on the machines used for the maintenance of railway track. These have to be improved constantly with regard to working speed, quality of work and reliability. Only a reliable track-maintenance machine will enable its operator to carry out the customer's work successfully. To meet this challenge, it is advisable to follow a consistent maintenance and repair strategy.

Track maintenance machines may be subject to a high degree of wear during operation, depending on the prevailing conditions. Besides the regular maintenance and inspection work, general overhauls are recommended (usually performed during the winter months) to ensure that track-maintenance machines



Fig. 1: Repair centres all over Germany

will cause no problems in use. It may also happen that unforeseen events occur, such as accidents on the track or fire damage.

## 2 Repair centres all over Germany



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The basis for cost-effective use of the machines is a preventive maintenance policy spread over the entire year and the possibility of reacting quickly to any incidents which may negatively affect the smooth operation of the track-maintenance machines.

Deutsche Plasser has evolved over recent years to become a reliable and competent partner to the operators of Plasser & Theurer's track-maintenance machines, achieving a high level of availability in these machines [1].

For more than four decades, Deutsche Plasser has offered machine operators a nationwide network of service engineers. These engineers assist the machine operators with training and with any repair and maintenance work that may be necessary. Moreover, they carry out the corresponding periodic tests and inspection work on safety-relevant components and measuring systems on the customer's premises. In recent months, new centres have been opened for the repair and overhaul of complete machines (Fig. 1).

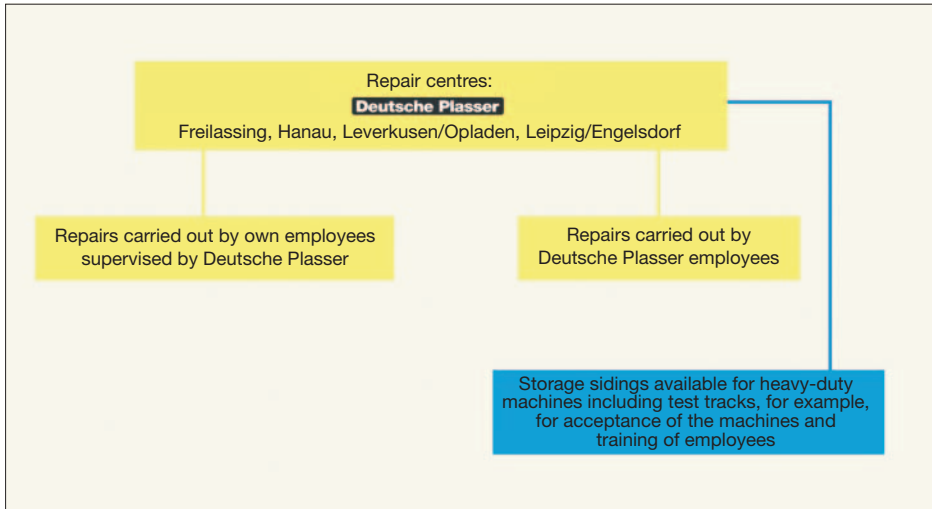


Fig. 2: Possible uses of the repair centres

This means that machine operators now also have access to specialized facilities in which the necessary repairs on complete machines can be carried out as quickly as possible. This is in addition to the access already provided to the specialists in the repair-engineering department in Munich, who are primarily responsible for inspecting and maintaining the tamping units and electronic devices, such as recording units, ALC on-board computers, longitudinal level and alignment lasers, fixed-point measuring devices, lining value roller transducers, pendulums and printed-circuit boards for controls.

This sort of repair and overhaul work used to be carried out by Deutsche Plasser's service engineers either at the Robel factory in Freilassing or on the customer's premises.

To meet the rising demand and to minimize transfer distances, as well as the time and money needed for transport, Deutsche Plasser now offers additional service and repair centres, some even with local sidings for heavy-duty machines (Fig. 2).

These repair works all have the necessary equipment, such as hoists, inspection pits and tools for all the relevant repair and overhaul jobs. The work is supervised and performed by Deutsche Plasser service engineers. All works are very easy to reach by either rail or road.

### 3 Deutsche Plasser service centres with railway access

#### 3.1 Freilassing (Fig.3)

The Robel workshops perform all the work required on machines and also carry out inspections. This takes in repair and maintenance after accidents and periodic inspections of work units involving checking, brake inspections, N2 inspections and accident-damage inspections. The modern workshops provide several tracks up to 100-metres long. The necessary machinery, equipment and tools, as well as specialized, trained staff, are available to the service engineers at any time.



Fig. 3: Repair centre in Freilassing (Robel)

Extensive calibration and test tracks make it possible to test the overhauled machines as well. All safety-relevant jobs on the axles and bogies of the machines being overhauled are performed here too. If necessary, these machine components can be dismantled at any of the repair works and sent in to the specialist workshop in Freilassing.

#### 3.2 Hanau (Fig. 4)

A workshop now occupying the site of a former Deutsche Bahn maintenance depot has three tracks with lengths of up to 60 metres. Here too, the fully-equipped facility assures correct handling of all the necessary repair and overhaul jobs. Thanks to cooperation with other companies at the location, it is possible to complete the necessary repairs quickly and professionally.

#### 3.3 Leverkusen/Opladen (Fig. 5)

Apart from a spacious workshop with three tracks of up to 70 metres long, one particular feature that this service centre offers is its extensive enclosed on-site sidings. Here it is possible to carry out test operations following repairs or to hold training sessions for employees. Furthermore, there is adequate siding space for machines and machine systems, including heavy-duty ones, together with several material-conveyor and hopper units. A company-owned rail vehicle (SKL) is available to perform any necessary on-site shunting.

#### 3.4 Leipzig/Engelsdorf (Fig. 6)

A workshop with two tracks of up to 60 metres long is available for all types of repair and maintenance work. Gantry cranes and inspection pits as well as all



Fig. 4: Repair centre in Hanau



Fig. 5: Repair centre in Leverkusen/Opladen



Fig. 6: Repair centre in Leipzig/Engelsdorf

the necessary tools make it possible for specialized maintenance to be performed on each machine. The cooperation with a neighbouring firm specialized in the overhaul of freight wagons allows a wide spectrum of work to be carried out. In addition to the workshop, there is also enclosed siding space for machines.

Munich assures the fitters a fast supply of all major components.

The extensive equipment of each of the workshops makes it possible to take prompt and flexible action in each individual case. Here it is necessary to coordinate and execute a large number of different jobs:

- ▷ annual inspections/maintenance,
- ▷ periodic checks in accordance with the N2 general inspection,
- ▷ repairs following accidents, and
- ▷ repairs following fire damage.

- ▷ inspection of tamping units,
- ▷ examination of paintwork, and
- ▷ final test of operability.

#### 4.2 Repairs following accidents

In 2004, a Unimat 09-16 4S tamping machine that had been damaged in an accident was repaired in the Robel factory in Freilassing. Some of the jobs that were carried out were:

- ▷ Dismantling of:
  - sweeper trailer and all equipment mounted on it
  - bogies and gearboxes
- ▷ Inspection and repair of:
  - sweeper trailer, reusing all components still usable
  - two trailer drawbars and coupling bolts
  - all welded seams on the frame
  - all tamping units and their fixtures
  - the drive cabins
  - fuel and hydraulic tanks
  - bogie frames, wheelsets and wheel bearings
  - travel drive and work drive, and
  - all electro-mechanical measuring units
- ▷ Assembly of the checked and repaired parts
- ▷ Painting
- ▷ Adjustment work and trial runs including Deutsche Bahn acceptance and re-approval certification

This wide variety of different jobs was carried out by the trained service personnel at Deutsche Plasser in cooperation with Robel's specialists in Freilassing.

#### 4.3 Repairs following fire damage

Repair work following fire damage requires a similar amount of effort. In 2004, a Unimat 08-275 3S tamping machine was

## 4 Services offered at each repair centre

Repair and overhaul work must be completed as quickly as possible if track machines are to be operated cost-effectively. Long down-times can lead to substantial losses if contracts cannot be fulfilled at all, or only in difficult conditions. In such cases, the nearest workshop is usually the best. This also requires versatile and experienced employees, who can carry out the work promptly. In recent years, the Deutsche Plasser engineers have carried out a large number of different jobs on a wide variety of machines. These have included not only repair work following fire damage and accidents, but also the respective periodic inspections on tamping machines such as the 09-32 CSM, Unimat 09-32 4S, Unimat 09-16 4S, Unimat 08-475 4S, Unimat 08-275 3S and 08-275 ZW. Service work has also been carried out on ballast ploughs (such as the SSP 110 SW), ballast-cleaning machines (such as the RM 900), rail-grinding machines (such as the GWM 550) and various motor tower cars.

The fluctuating requirements of the work-in-hand call for good planning, profound specialist training for employees and also direct links to the design engineers of each particular machine. Above all, the comprehensive stock of spare parts and wearing parts at Deutsche Plasser in

#### 4.1 Periodic checks in accordance with the N2 general inspection

Long-term planning is possible for periodic inspection work. The right time and the most economic location can be selected with regard to availability and transport costs. The employees responsible at the Deutsche Plasser repair centres make sure that there are always sufficient stocks of all the necessary repair and hoisting equipment, as well as the original spare parts and wearing parts that may be needed.

All the periodic inspections required are performed in rapid succession. These consist, for example, in the following tasks:

- ▷ inspection of vehicle body, frame and axle suspensions,
- ▷ maintenance of wheelsets, wheelset bearings and wheelset gearboxes,
- ▷ inspection of buffing and draw gear,
- ▷ examination of brake units and performance of brake inspections as per BR3,
- ▷ inspection of engines, gearboxes and cardan shafts,
- ▷ functional test of all signalling equipment and electrical systems,

repaired at the Hanau centre. In addition to the list of work mentioned above, special attention was paid to all the electrical equipment and to the complete cable systems within the machine. All the printed circuit boards were also examined in Deutsche Plasser's specialist workshop in Munich. For this contract too, all the necessary Deutsche Bahn acceptance tests, the re-approval procedure, trial runs and attendance during the first working shifts were carried out by the Deutsche Plasser service engineers.

## 5 Concluding summary

The prompt and professional performance of repairs with short journeys to the workshop makes an important contribution to the cost-effective utilization of track-maintenance machines. As a result of the rationalization of the infrastructure of several railways, there are fewer and fewer workshops available for maintenance and repairs, and fewer storage areas and sidings.

Deutsche Plasser's reaction to this is to offer workshops nationwide, which are fast and easy to reach and where the necessary repairs, periodic inspections and overhauls can be performed. In addition, some locations also provide secure facilities for holding machines and whole work trains. These extensive track installations also offer a suitable environment for performing acceptance work, trial operations and the training of machine operators.

Qualified service engineers are available at each of these centres and they have all the necessary equipment available to them in the workshops for repairing heavy-duty machines. Fast access to original spare parts and wearing parts, as well as close cooperation with the design-engineering offices and Plasser & Theurer's research and testing department, enable them to take prompt and flexible action, offering customers the benefit of many years of experience in the supervision and execution of a wide variety of maintenance jobs following accidents or fire damage, or in accordance with service intervals.

Short transport distances and the associated lower costs and high flexibility in the completion of all the necessary jobs ensure cost-effective maintenance and ultra high availability of the track-maintenance machines.

Thanks to the continuous expansion of service capacity, customers are given the option of competent repairs and the regular performance of maintenance work for their Plasser & Theurer machine fleet.

### References:

- [1] Flatscher, Peter Josef: Gezielte Maschinenreparatur und Überholung zur Erhöhung der Einsatzbereitschaft von Gleisbaumaschinen (Targeted machine repair and overhaul to raise the operational availability of track-maintenance machines), Der Eisenbahningenieur 5/2004 pp. 18-21.

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