Track Machine Costs Need To Be Optimised

Optimising track maintenance machine costs helps significantly to optimise track maintenance costs. That is the conclusion of one of the key papers due to be presented at the UIC/IRJ user-producer life-cycle cost maintenance conference.

Ing Rainer Wenty
General Manager, Marketing and Sales, Plasser & Theurer, Austria

TRACK machine costs have a substantial influence on track maintenance costs and, as a result, on overall infrastructure costs. All aspects of machine operation have to be governed by the consequences for the track costs.

However, this does not necessarily mean that minimising machine expenses reduces the cost of track maintenance. When comparing different strategies, it must be considered how they influence direct work costs—the cost per metre tamped—and the life-cycle costs of the track. In addition the influence on train operation costs is also very important.

The main factors which determine machine costs and track costs include the track machine size and output. There are a number of parameters in selecting the machine size. The greater the annual output one machine can achieve, the lower the work cost will be. As an example, if a railway has an annual tamping requirement of 2000km of track, the most economical solution, employing Plasser & Theurer's equipment, would be to use three high-output track maintenance machine groups (MDZ 2000) with a three-sleeper Tamping Express as the leading machine.

High-output machines are the only solution for short track possessions. The illustration (see next page) shows the possible output in short possession times at different machine working speeds. For track possessions of less than 30 minutes, continuous-action tampers are necessary.

Modern track maintenance machines are available for travelling at speeds between 50 and 120km/h, and can be transported in train formation. On large networks and ones with dense traffic, high machine speeds and train transport capability can increase the annual performance by 20 to 30%.

Maintenance Cycles

Initial and inherent quality determine track maintenance cycles, and therefore the life-cycle costs of the track. Even on track where there is less need for train ride comfort, it is advisable to rely on machines which produce high quality work. We are using similar working units and controls on the different sizes of machines to meet this demand.

Availability and reliability of machines are most important for cost considerations. Both are dependent on the quality of machine maintenance and service, and on the availability of spare parts. Provided that a machine is of sound design it should be possible to keep figures in each case above 95%.

In addition the rate of utilisation has to be considered. This is calculated as follows:

Rate of utilisation $\alpha = t_e / t_p$

where t_e is the effective working time per year, and t_p is the possible working time per year.

Example: MDZ No 4E on Austrian Federal Railways (ÖBB) tracks in Austria:

t_e = 763 hours (according to machine logbook)

t_p = 9 months (working season) at 167 crew working hours per month = 1503 hours per year

$\alpha = {}^{763}/_{1503} = 0.508$ (50.8%)

The rate of utilisation is much lower than the availability and reliability because it also depends on waiting and travel time outside of actual possessions, and machine repair time.

The cost of machine utilisation can be calculated using a ratio of total costs incurred during a certain time and the machine utilisation during this period in terms of remuneration. If C = total cost per time unit and R = total remuneration for completed work per time unit, the cost efficiency ${}^{C}/_{R}$ is kept to a minimum by low costs per time unit and high performance.

Due to increasing repair and maintenance costs, overall machine costs rise after eight to 10 years despite falling depreciation. If new machines with higher output become available, the unit costs using new machines will be considerably lower, even if the old machines are already written off.

The number of machines on a single railway is not very large, compared with the total amount of rolling stock. Maintenance of these machines therefore has to be adapted individually. Routine checks as well as a preventive and consistent maintenance plan

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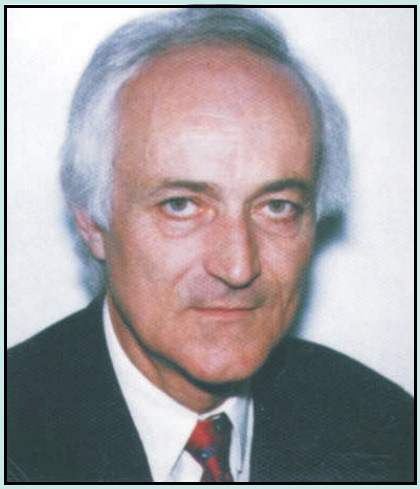


"Routine checks as well as a preventive and consistent maintenance plan are a basic requirement for the reliable use of a track maintenance machine."
—Rainer Wenty

are a basic requirement for the reliable use of a track maintenance machine.

Although general maintenance schedules are part of the operator's manual, it is not enough to rely on schedules. Experienced machine operators can detect imminent failures just as they begin to develop and can prevent costly machine breakdown by timely exchange of failing parts. Most successful is the concept of operator maintainers. Additionally, efforts should be made by the machine owner to make it attractive for an operator to retain a certain machine for at least a couple of years.

For more complex repairs a "fall-back" solution is necessary, which can employ in-house experts or service engineers from the supplier. Our worldwide service network can make service engineers available in a short time.

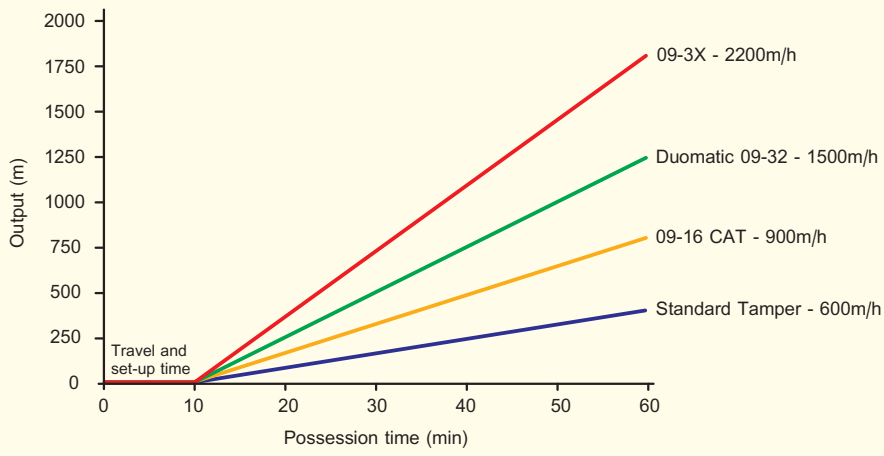
Quick spare parts supply is also essential because machine down time caused by a lack of spare parts can be very expensive. While we strive to supply original parts promptly, the machine owner should also keep a stock of frequently-used parts. Machine projects which are financed by international development banks should make a provision for an initial stock of parts, and for the purchase of parts which fail unexpectedly.

The ownership of track maintenance machines is another point of discussion. We have seen a slight increase in "private" orders for our equipment, and the share of machinery supplied to contractors is now about 30%. In the interests of modernisation, contractors need long-term contracts because the market is very limited and does not provide many alternatives.

Outsourcing services for track maintenance machines to an outside company is an interesting alternative for the railway as a machine owner. But much depends on the capability of the company's workshops, service technicians and management.

Service technicians for maintenance machines have to be qualified in several fields, and it is often not viable for railway operators to pay for these experts themselves. Plasser & Theurer has therefore set up service support companies to provide support during the guarantee period. Other services can also be ordered at fixed rates. Service support contracts are advisable, particularly for those government-owned railways which cannot order services quickly. **IRJ**

OUTPUT VERSUS POSSESSION TIME



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