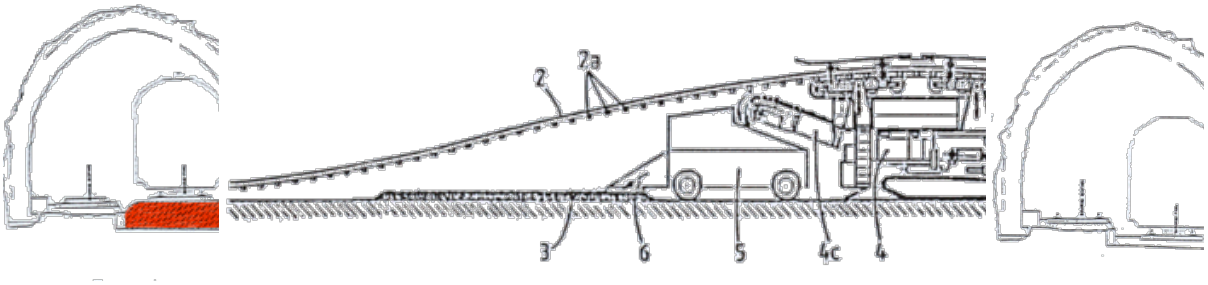
DeconX
innovative processing

Deepening the track bed

Procedure and apparatus for excavating the subgrade for the track bed

The proposed method and the apparatus described in the following permit the cross-section of the passageway of a railroad tunnel through which one or two tracks pass to be increased by excavating the subgrade (1) for the track bed in such a way that a new subgrade (1a) is deepened by approx. 50 – 100 cm. The subgrade (1) is excavated by continuous advancement, preferably through the use of a known excavator (4) of the type "tunnel boring machine" with a swivelable and extensible milling arm which is equipped with a clearing device for removing rubble and conveying it to behind the machine (4).



This excavator (4) is installed in the upper area of the conveyance components (8) and are adjustable vertically and horizontally and permits an advancement (A) of the machine (4) on the subgrade cleared of rubble and underneath the track (2) including the ties (2a). In this context, they – together with the track – are lifted in the front during the advancement (A) of the machine in order to run over the machine (4) and behind the machine (4) on a provisional bed of ballast (3) which is made from excavated material crushed in a stone crusher (5) and distributed by the machine's own levelling unit (6). An advantage is that the conveyance components' (8) treads run on a series of articulated rollers and that the overpass of the tracks (2, 2a) above the machine (4) is protected by its own structure.

The proposed procedure provides that, during the excavation of the subgrade (1), the track (2, 2a) can be used for supply and support operations for the excavator (4) and is available in particular for renewing the track bed, with a possible exchange of the track and of the ties. Especially the performance of these last-mentioned work tasks is thus possible simultaneous with the excavation processes. In the case of two railroad tracks passing through the same tunnel, all of the excavation tasks, the renewal of the track bed, and the possible exchange of the track can be carried out without interfering with the second railroad line; the railroad traffic on this second line can thus continue with full consideration of all safety requirements. Furthermore, while all work tasks are being carried out, the overhead lines are not interfered with and/or the overhead lines can possibly be used for supplying the machine with energy.

The proposed procedure provides for the following work phases:

a. Excavation of the track bed by means of a known bed clearing machine and support of the track and ties directly by the subgrade (1).
b. Separation (severance) of the track (2) at the beginning of the line on which the subgrade is to be excavated and lifting of the track (2) together with the ties (2a).
c. Positioning of the excavator (4) under the lifted track (2) and excavation of the subgrade (1) for a distance of approx. 60 - 80 m.
d. Reconnection of the track (2) behind the excavator (4) by means of the insertion of a partial segment of track (2c) in order to bridge over the gap between the ends of the track caused by lifting.
e. Excavation of the subgrade (1) over the entire length of the line to be renewed/repaired, with clearing-away of the excavated material which is crushed (5) and distributed and levelled (6) for the purpose of creating a provisional track bed (3) on which the track (2) together with the ties (2a), behind the excavator (4), and then rebedded.
f. Excavation of the provisional track bed (3) and removal of the rubble by means of a known bed clearing machine which advances behind the excavator (4) on the track (2).
g. Laying-down of the new track bed with possible implacement of the new tracks and ties using the known machine for these tasks.
h. Separation (severance) of the track at the end of the line for which the excavation of the subgrade is intended.
i. Extension of the excavator (4) together with the stone crusher (5) and the levelling unit (6) from its working position underneath the track (2) and implacement of the track.
j. Reconnection of the track (2) after an overhanging partial segment resulting from the implacement of the track is removed.

Work phases f and g can be carried out during the excavation processes; in this context, the relevant known machines operating behind the excavator (4) on the track which has been implaced on the provisional track bed (3), as a consequence of which the renewal / repair of the line can be carried out extremely quickly.

The proposed procedure also provides for the operation of a cart on segments in which the subgrade (1) is especially compact and hard; this cart operates in front of the excavator (4) on the track (2) resting with a track bed on the subgrade to be excavated (1); this cart is equipped with mechanisms for loosening the rock by impacting force, by drilling, and/or possibly the use of micro-explosions or other loosening methods. These mechanisms are mounted so as to be swivelable on the cart and can be adjusted with respect to the track (2) in order to be able to operate in the zone between the ties and at their sides.