

TUnIS Ring Sequencing

If pre-fabricated concrete segments are used for the tunnel lining, not only the determination of the current TBM position is important but the room available in the tail skin and the optimal orientation for the most appropriate ring type must be defined as well as the expected shield drive for the advance.

This is even more important using tapered rings which are most suitable for alternating curved and straight tunnel alignments. The optimal ring positioning is a decisive part of the tunnel boring process. Depending on the selected ring rotation, the next ring will have a specific build direction which should ideally follow the shield axis to avoid damage to the inner and outer side of the concrete segments.

Based on the ring position TUnIS Ring Sequencing provides an anticipatory calculation of ring sequencing, taking into account the actual TBM position.

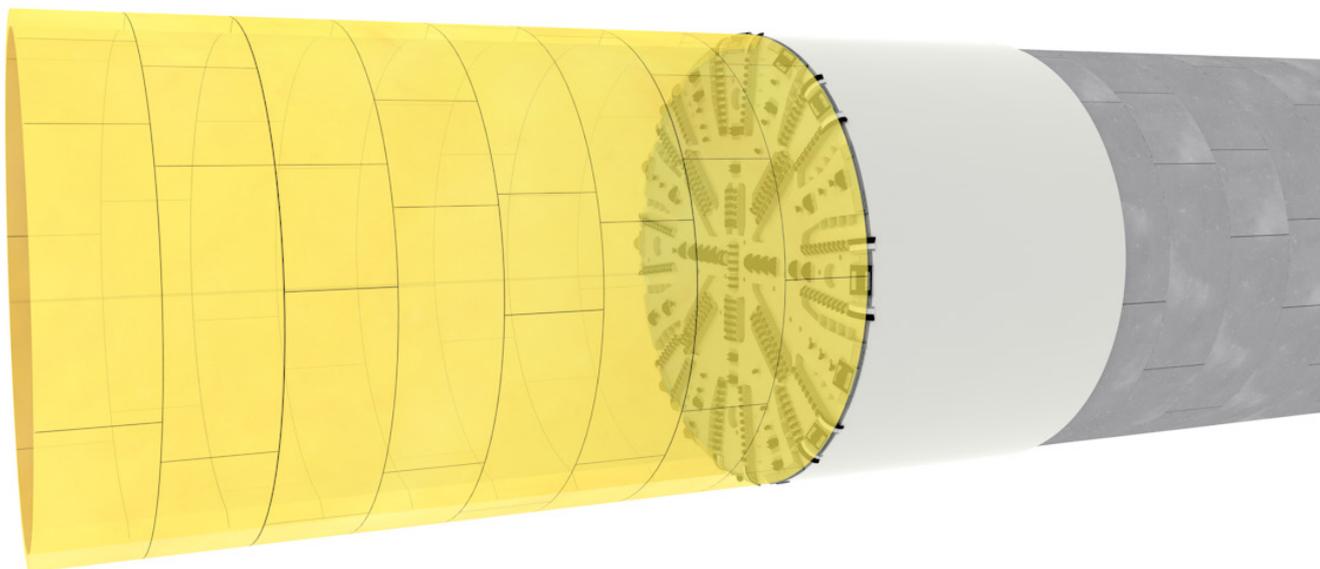
In addition to the TBM position the ring sequencing calculation has to consider further influencing factors such as the course actually driven by the TBM, main shove ram extensions and tail skin clearance values. The TUnIS Ring Sequencing manages these requirements in two ways: First of all the system has an inbuilt learning system to incorporate the experiences, already gained during the construction progress, into future

calculations. Secondly it is possible to establish terms that will influence the result of the calculations by flexible configurations. This considers not only the planned project preconditions but also unexpected events.



Benefits

- ▣ Enabling of a centric ring build to avoid damage to segments and machine
- ▣ Acceleration of the work process by automatic and continuous calculation prevents time lag between advance and ring structure
- ▣ Optimization of segment logistics and avoidance of waiting times due to prompt provision of next ring in warehouse



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The optimum ring sequence calculated is visualised in the module both graphically and numerically. The user is also given a graphical illustration and justification for the selection criteria specially for the next ring to be built.



Features

- Field of application:
TUnIS Navigation Systems for tunnelling with segmental lining
- Automatic and forward-looking ring sequence (max. 10) calculation, taking into account current machine and advance parameters (such as TBM position, cylinder performance, tail skin clearance)
- Specification of installation position of next ring, taking into account the current TBM journey

The combination of TUnIS Navigation Systems and TUnIS Ring Sequencing enables a definite calculation of the ring build position. In spite of more complex machine geometry the precise acquisition of tail skin axis as well as of the ring position is guaranteed.

Advice and competence from VMT

We do not leave you alone for the configuration and operation of TUnIS Ring Sequencing. We offer you competent support against the background of our 25 years' experience in more than 2,000 successful tunnelling projects.

The screenshot displays the 'Ring sequencing' software interface. It includes input fields for tail skin clearance at the reference ring (R02) with values 415 mm, 424 mm, and 428 mm. It also shows offsets for the ring to the tail skin (Before and After erection) and ring lead (Before and After erection). A ring selection table is shown below, listing rings 4 through 10 with their respective segmentations (A3-R, A4-R, B-R, K-R, C-R, A1-R, A2-R for right-side rings and A1-L, A2-L, A3-L, A4-L, B-L, K-L, C-L for left-side rings). A graphical diagram shows the current ring R02 and the next ring R03 with a 100% lead and 100% TSC (Tail Skin Clearance) indicated.

No.	Ring	Development
4	R03	A3-R A4-R B-R K-R C-R A1-R A2-R
5	R02	A3-R A4-R B-R K-R C-R A1-R A2-R
6	R03	A3-R A4-R B-R K-R C-R A1-R A2-R
7	R02	A3-R A4-R B-R K-R C-R A1-R A2-R
8	R03	A3-R A4-R B-R K-R C-R A1-R A2-R
9	L13	A1-L A2-L A3-L A4-L B-L K-L C-L
10	L12	A2-L A3-L A4-L B-L K-L C-L A1-L

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