

Gaggio Montano, October 8 2012

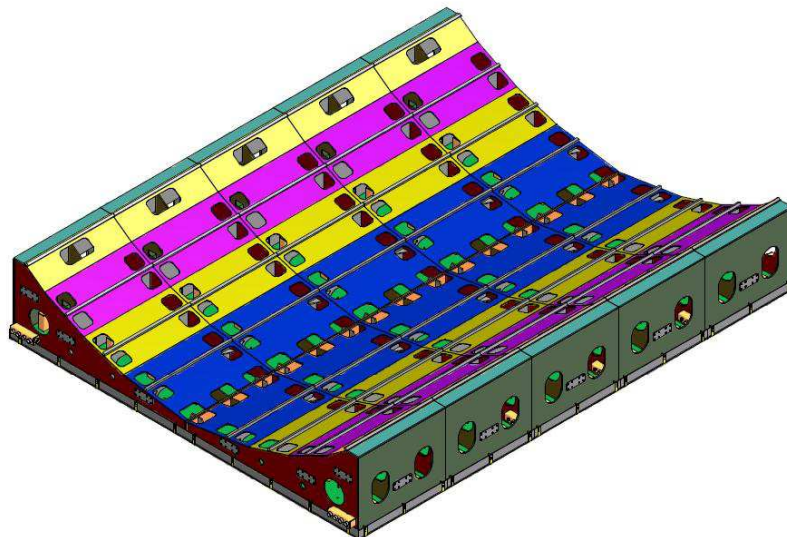
THE PALMIERI GROUP MAKES THE STRUCTURE ABLE TO LIFT THE BIGGEST MILLING MACHINE IN THE WORLD

Thanks to an innovative moving system based on air cushion technology designed and built by Palmieri Group, the contractor Toto S.p.A. Costruzioni Generali has successfully completed the first two shifting phases of "Martina" machine, the biggest TBM (*Tunnel Boring Machine*) in the world for mechanized tunneling, currently involved in the construction of the Tunnel Sparvo along the stretch motorway A1 of the new road pass.

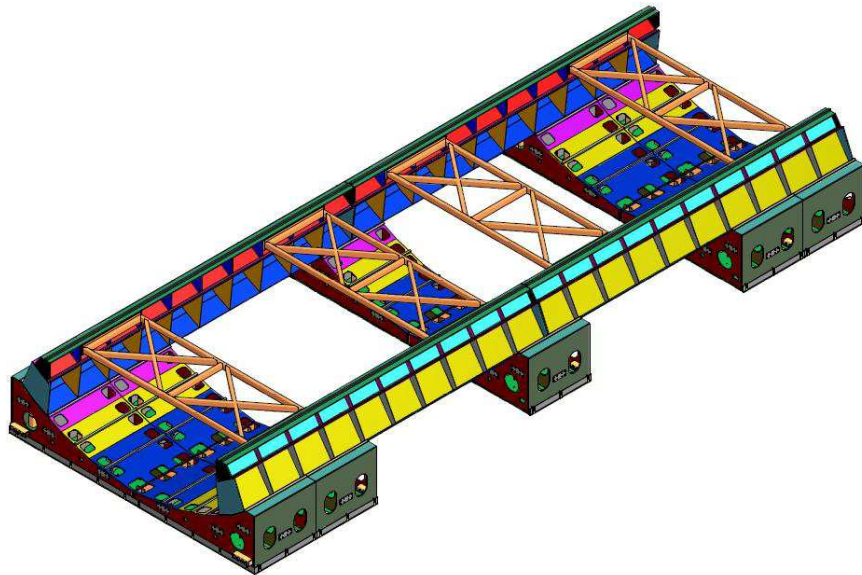
The technology of the air cushions motion by Palmieri Group made the 180° shifting possible in a record time (the machine's total weight was in the range of about 3.000 tons). No crane could have been able to move or displace such a heavy equipment a single solution and in such a short time; completing the "U-turn" maneuvering of the whole excavation system, with the traditional techniques, would have taken months of work, while with the new system the working time has been reduced to few days.

Palmieri's innovative system of Pneumatic sliding Cradles in steel construction on air cushions has rotated the mastodontic TBM (in excess of 15,6 meters in diameter) on a special sliding surface made by Toto S.p.A. with the aid of two trucks and some motor vehicles with drift checking system in complete security, literally by lifting it from the supporting surface and sliding it, almost without friction, to the launching position of the second tunnel drive.

Such a system specifically conceived and engineered by Palmieri Group for "Martina" involves the use of 10 steel fabricated structures (called "Cradles") of 2,5m x 5m each, made in a symmetrical manner in order to be used in different assembly configurations so to be able to move both the TBM and the *back-up* wagons. In the first phase of TBM shifting, the 10 cradles were assembled into a single structure with an external maximum dimensions of 10m x 12.50m; each cradle was equipped with 8 compressed air cushions, 80 cushions in total, characterized by a maximum individual lifting capacity equal to 43.5 Tons at a maximum working pressure of 4,2 Bars, ensuring during this phase, a loading capacity of over 3200 Tons.



Once the first shifting phase of the TBM was completed, the Cradles were reassembled into new configurations so to support the weight of the No. 1, 2 and 3 Back-Up wagons set during the following shifting phases.



Should any of the cushions fail, the Cradles system created by Palmieri has been designed to allow their replacement, by simply taking the damaged cushion off without affecting the loading capacity of the whole equipment.

It was the first time that such a system has been successfully tested on a machine of this exceptional size; the technological progress is moving towards the construction of ever increasing TBMs and Palmieri Group is always ready to offer innovative solutions for the future construction challenges that will come.

