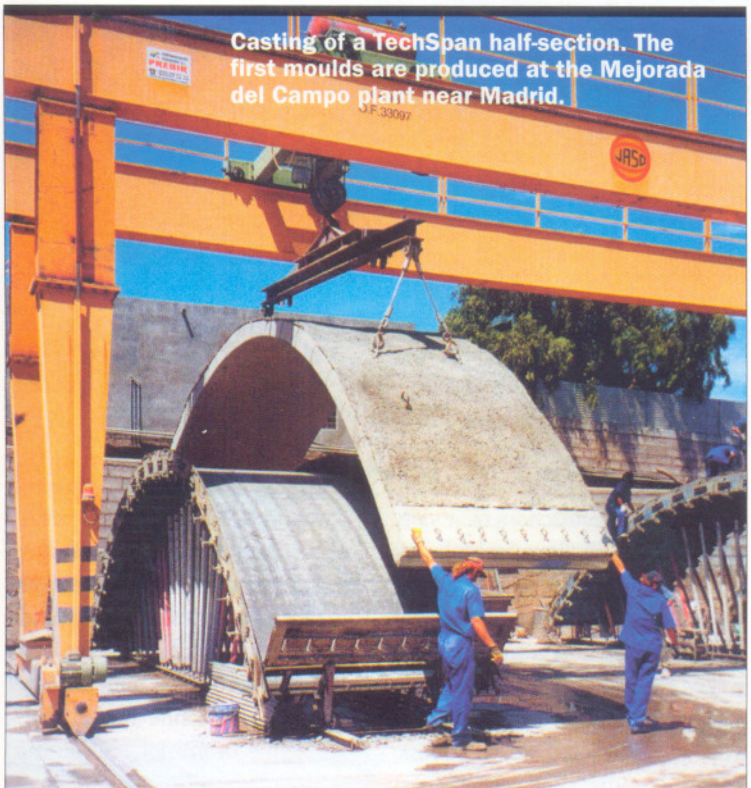
TECHSPAN: arches for the modern world

Launched more than 20 years ago by Terre Armée, TechSpan arches provide an innovative solution for the construction of buried, hydraulic, road or rail structures, and meet increasingly complex requirements.



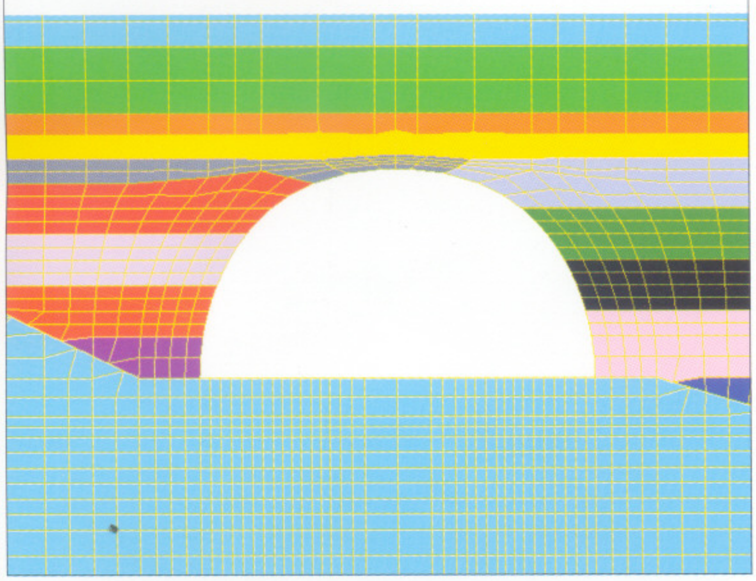
Casting of a TechSpan half-section. The first moulds are produced at the Mejorada del Campo plant near Madrid.

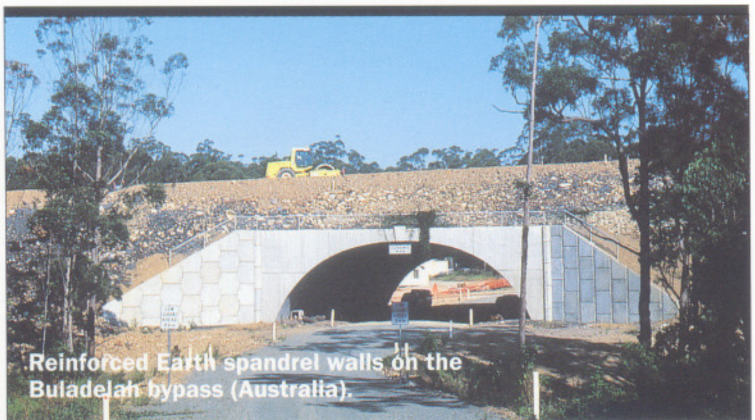
1983 The history of TechSpan precast arches begins in Spain in around 1983, when Terre Armée undertook to enter the specific market of underpasses and drainage structures. The TechSpan concept is simple: precast reinforced concrete half-arches are placed on foundations and support each other by pressing against each other at the crown. In practice, the casting of the elements, particularly the moulds, presented some difficulties. After several months of testing at the Mejorada del Campo plant, near Madrid, a first system of steel shuttering panels connected by rubber joints was produced. The process was underway and continued to improve.

1985 Even though the first tests had scarcely been conducted, and the first mould had not been produced, a structure had already been sold in Galicia! Two prototype moulds were produced and despite difficulties (fragility of the moulds), two sections were cast and dispatched to site several days later. This very first arch had a span of 6.20 m, a rise of 5.00 m, a thickness of 0.20 m and a length of 13.90 m linear metres. The first 100 arches were then built in a space of three years.

1986 34 structures, still of modest dimensions, were built during this year. Some, however, had curve alignment problems. The construction of an arch at the El Ferrol bus station in Galicia was a first in the history of the process, due to the length of the structure (220 m) and its very pronounced curvature. This was also the first time a transverse section had to be calculated with extremely asymmetric loads, due to the location of one of the platforms on the arches.

1987 The calculation method reached a turning point with the first large-dimension railway structure (length of over 20 m, span of 12.50 m and rise of 8.50 m), which required the use of the finite element method. In parallel, structural design and sizing software was developed, incorporating complex behaviour models in an attempt to obtain the best possible simulation of the real behaviour of the backfill material. This has been perfected over time.



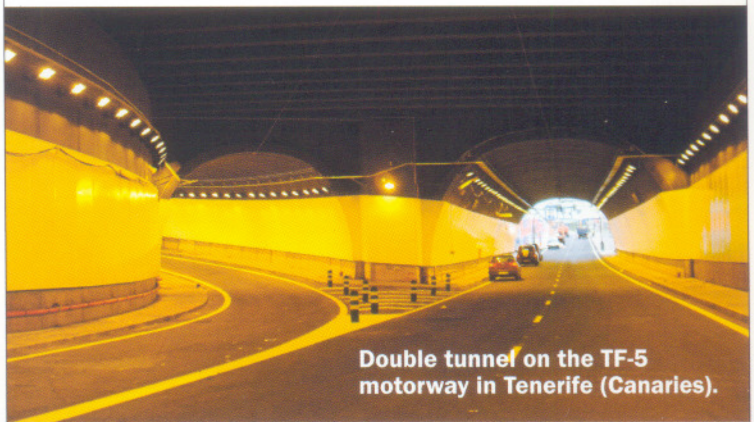


Reinforced Earth spandrel walls on the Buladelah bypass (Australia).

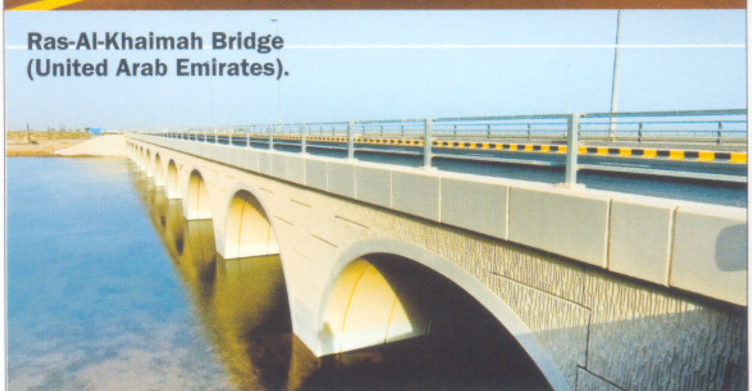
1996 The finish of the structures changed too. Initially, concrete spandrel walls were cast in situ, then they were precast, and then they were replaced by Reinforced Earth retaining walls. 1996 saw the perfecting of the oblique cut ends solution, necessary to interconnect the half-arches and attach them to the foundations.

Oblique cut ends near Leon (Spain).

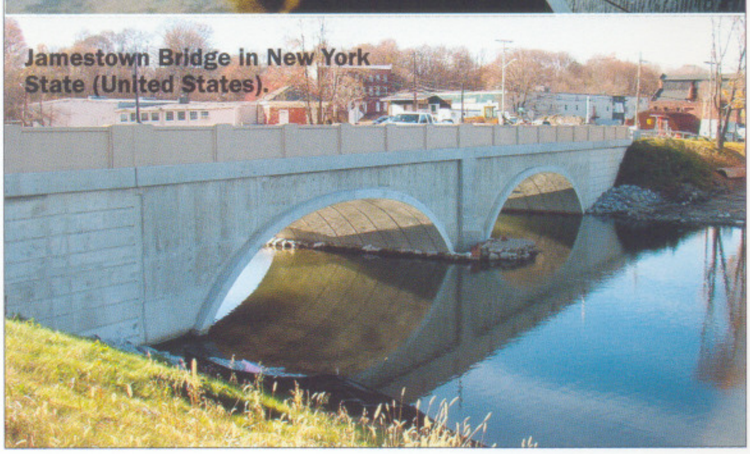
2000 Emerging in the 1990s, the cut-and-cover market became established and structures began to reach impressive lengths. In 1995, the Montecelo tunnel in Galicia exceeded 500 m. In 2000, two exceptional structures were built: the La Horadada tunnel on the Alicante-Cartagena motorway, nearly 2 km long, and an urban structure more than 1 km long on the TF-5 motorway in Tenerife (Canaries), attached to which are a number of arch junctions. In 20 years, TechSpan arches have undergone significant changes, with their dimensions constantly increasing and with horizontal spans of more than 20 m, rises of more than 10 m and backfill cover heights over the arch reaching up to 50 m above the crown. In Spain alone, more than 1,000 structures have been built. Placed end-to-end, they would create a TechSpan arch nearly 60 km long! TechSpan arches are also used in civil engineering structures.



Double tunnel on the TF-5 motorway in Tenerife (Canaries).



Ras-Al-Khaimah Bridge (United Arab Emirates).



Jamestown Bridge in New York State (United States).