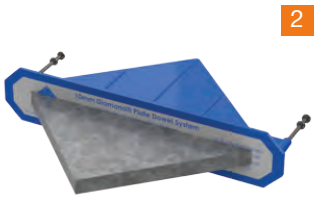
Catesby Tunnel, an innovative state of the art vehicle testing centre.

Previously a Victorian Railway tunnel, the Catesby Tunnel is home to an innovative, state-of-the-art vehicle testing centre. With aerodynamics key to accurate performance testing, it is vital that the road conditions in the 2.7 km tunnel are fully repeatable and meet exacting specifications. To meet this need, construction and civil engineering firm Stepnell worked with the team at Trent Construction to specify a solution that would meet the performance criteria required by this world-class facility. The ground-breaking project, for Brackley-based firm Aero Research Partners (ARP), is the only testing facility of its kind available for hire. It is expected to attract customers from cycling teams and major motorcycle and car manufacturers to Formula 1 cars.

Originally opened in 1897, the tunnel has undergone a multi-million-pound refurbishment to create a fully controlled environment for repeatable testing. This includes a finish that is as smooth as the highest quality racetrack, ensuring there are no bumps, cracks or imperfections that might impact the test results.

"In this environment, we couldn't run the risk of having an imperfect finish and needed to avoid the joint deflection and associated surface damage that can happen over time. Having worked with Danley previously, I knew that their solution would allow us to meet the needs of this particular application, and provide the long service life that the job required."- Chris Henderson, Director at Trent Construction



(1) Danley PD3 Cradle™ (2) Danley™ Dowels

Strategic Reinforcement™ Design
Danley® PD3® Dowel Cradles
Danley® Dowels

Project information

- Client: Aero Research Partners
- Project: Catesby Tunnel
- Location: Northamptonshire
- Concrete Road Length: 2.7km
- Main Contractor: Stepnell Ltd
- Project and Design Slab Engineer: Adept Consulting Engineers Ltd
- Concrete Contractor: Trent Construction

Danley's Services

- Technical design support to the engineer
- On-site installation training and guidance on best practices for quality assurance
- Danley® design warranty

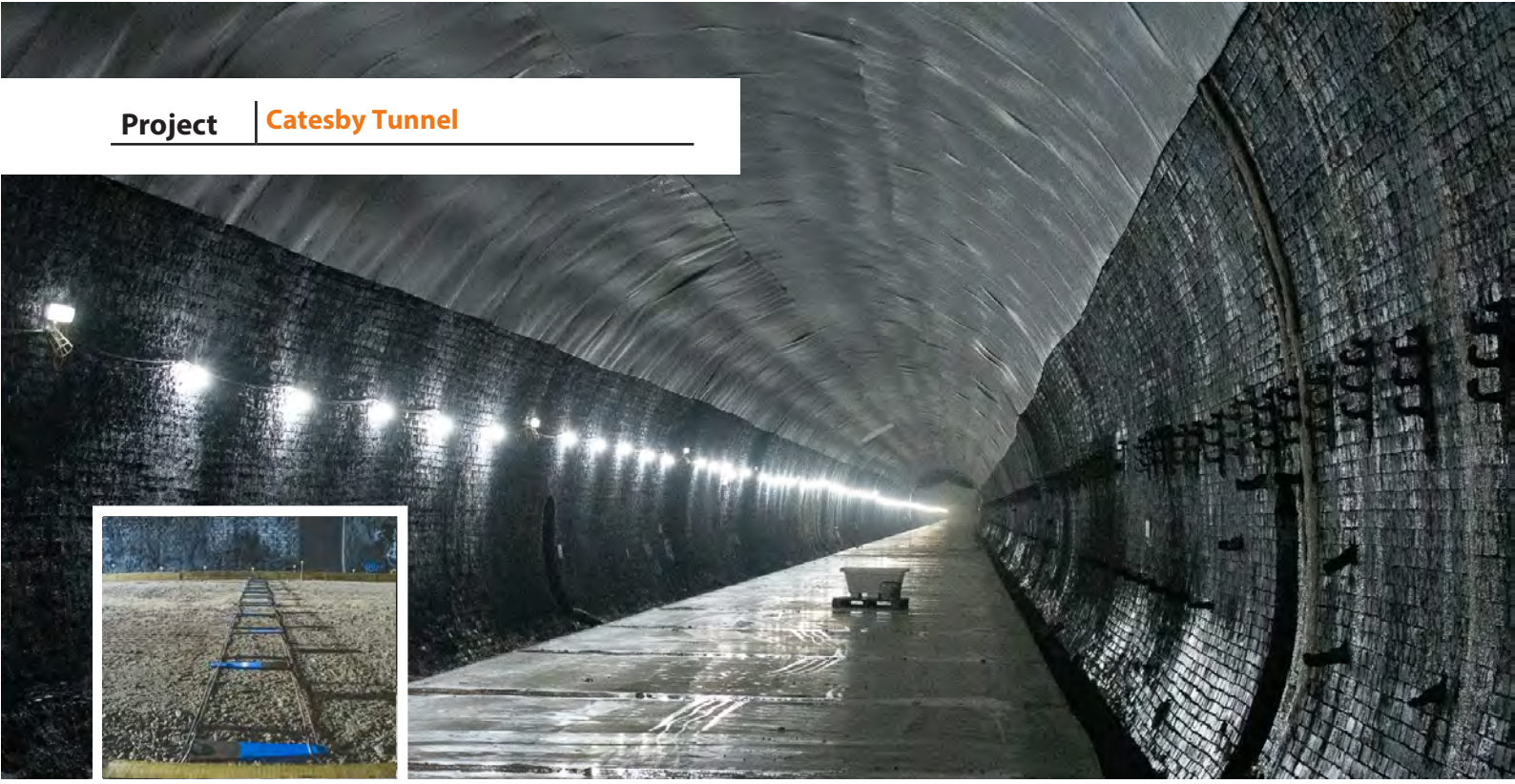
Danley® Strategic Reinforcement™ Design

- 175mm thick PAV2 C32/40 Concrete Slab
- No steel reinforcing mesh
- PD3® Dowel Cradles at contraction joints
- Danley® Dowels at construction joints
- Joints spaced at 4.2mx4.2m
- Synthetic Fibre Reinforced

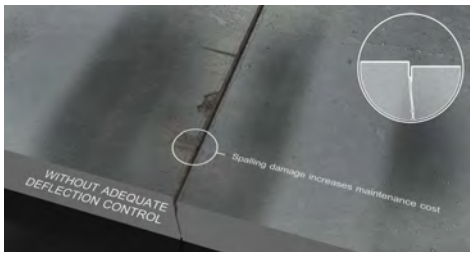
Original Design

- 175mm thick PAV2 C32/40 Concrete Slab
- 16mm x 600mm doweled construction joints at 300mm centres
- Single layer of A193 steel mesh reinforcing

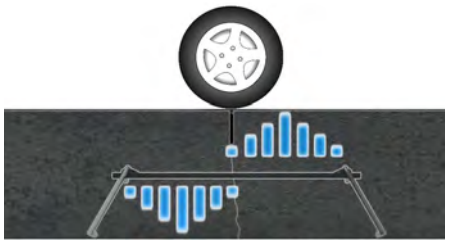
Project | Catesby Tunnel



How does Strategic Reinforcment™ Design help with differential deflection in concrete slabs?



Unstable joints deflect under load, causing spalling, cracking and faulting which leads to failure of the joint and hardstanding.



Stable joints prevent excessive deflection, improving long-term performance of the joint and the hardstanding.

Danley's strategic reinforcement solution, which offers long-term serviceability and durability of concrete ground-supported slabs by adding reinforcement at the joint, where it provides the most benefit. Matt Bolle from Danley explains, "In slab-on-ground applications such as this one, load transfer issues between slabs and across joints can cause deflection, leading to spalling, chipping, pumping and faulting – all of which can impact the performance of the surface. For this project, where a near immaculate finish was key, it was vital that the team avoid any imperfections. The Danley® solution combines concrete ground-supported slab designs with the tapered plate dowels to deliver outstanding performance-driven results. For a project like this, this combination of performance and longevity was critical to its ongoing success".

As most failures and deterioration of concrete slabs occur at the joints, the design optimises materials and labour by creating a joint design layout for the specific application – with steel placed at the joints, where it provides the most benefit in terms of reliable load transfer. Tapered plate dowels are designed and used to ensure that the concrete can shrink freely in both the lateral and longitudinal horizontal plane, without inducing restraint that leads to out-of-joint cracking. The result is superior long-term joint stability with minimised joint spalling and reduced out of joint panel cracks.

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