

the
Double Award
Winning

Excalibur®
SCREWBOLTS

NEW

**HIGH CORROSION
RESISTANT**

PLUS BOLT

- + COST EFFECTIVE ALTERNATIVE
TO STAINLESS STEEL
- + QUICK & EASY TO INSTALL
- + ULTRA DURABLE WITH
UNLIMITED APPLICATIONS

Tested
independently
in excess of
6000hrs NSS
(Salt Spray
Resistance)

*the Original
threaded anchor*



CLIENT BRIEF: Crossrail

A non-corrosive, 120 year design life, bespoke screwbolt for use in Crossrail's tunnels, to secure the platform edge screens.

EXCALIBUR'S RESPONSE:

To further develop our PLUS Bolt, a long-lasting bolt highly resistant to corrosion, and have it independently tested.

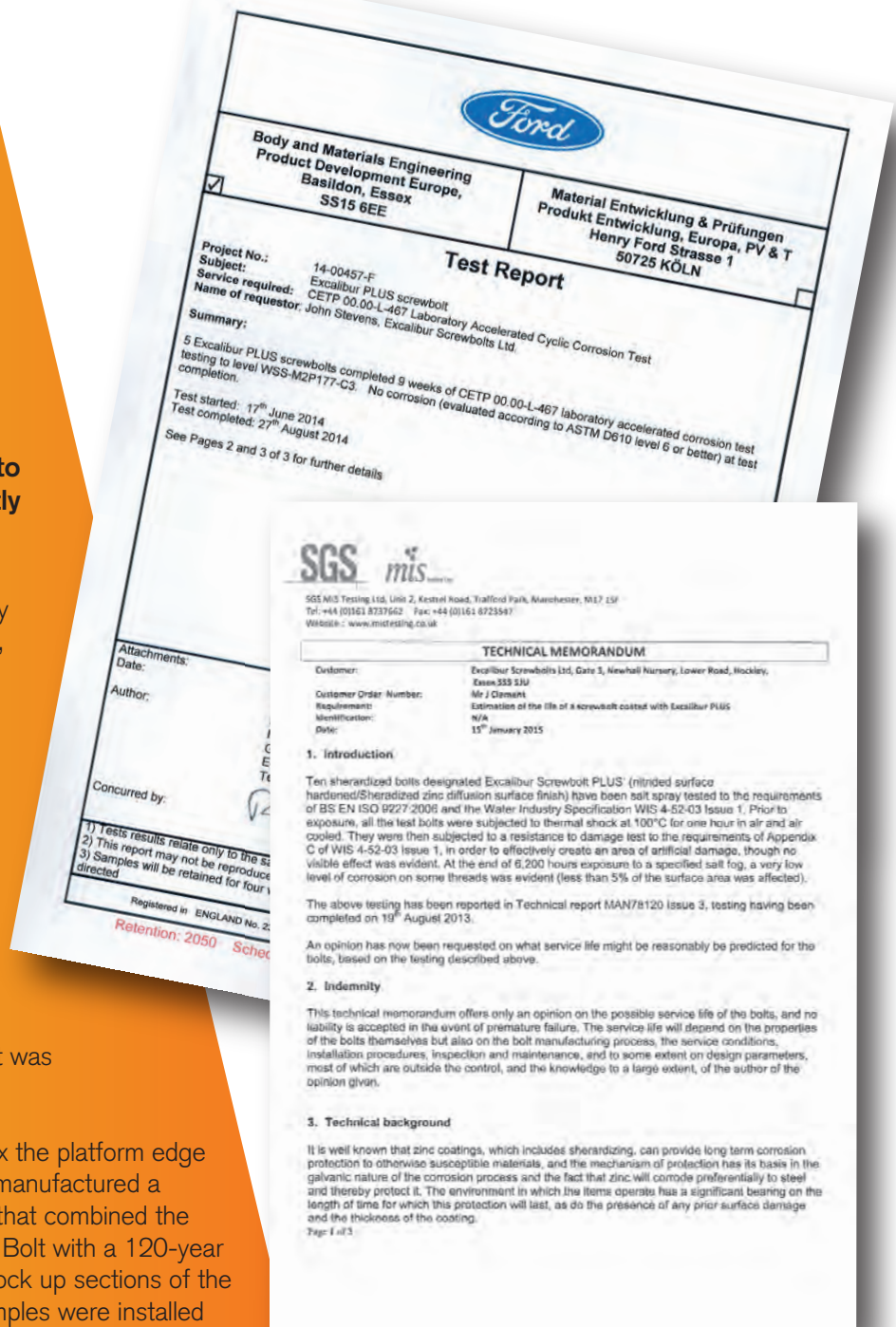
Excalibur's PLUS Bolt was independently tested by a UKAS accredited test house, for over 6,200 hours of salt spray resistance and revealed no significant signs of corrosion. The Ford Motor Company also evaluated the bolt through their nine week accelerated cyclic corrosion test. Results showed no signs of corrosion.

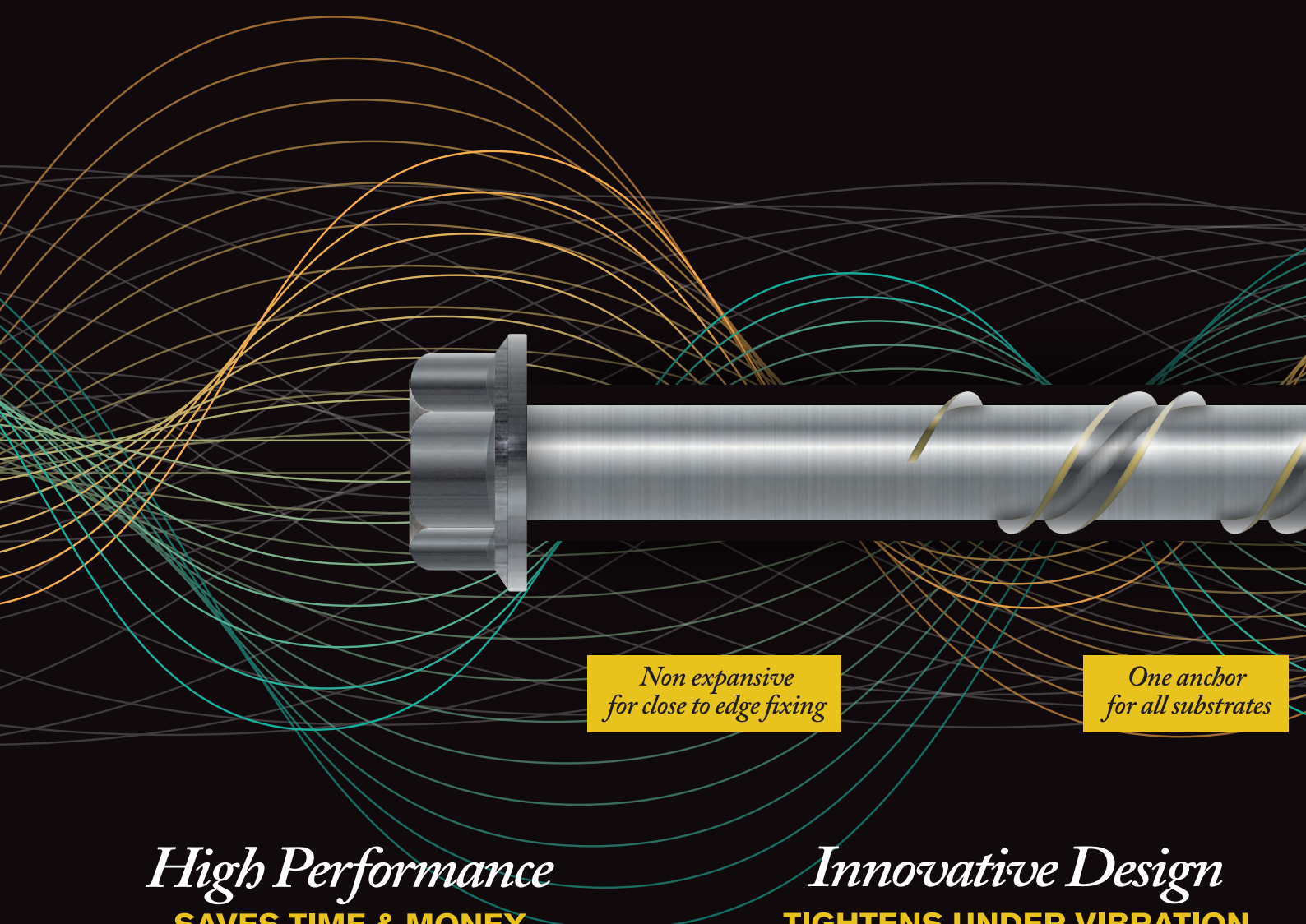
Tunnels being subjected to C5 environmental conditions meant any anchors fixing into the tunnel lining needed to have a life span of 120 years: the new Excalibur PLUS Bolt was the ideal solution.

Particularly long bolts were required to fix the platform edge steelwork to the tunnel lining. Excalibur manufactured a small quantity of longer bolts for testing that combined the anti-corrosion specification of the PLUS Bolt with a 120-year design life. Vinci Technology provided mock up sections of the tunnel lining into which the Excalibur samples were installed and rigorously tested at Imperial College London.

In July 2015 Excalibur's PLUS Bolts were first used in the installation of the platform edge screens at Tottenham Court Road station. Four further Crossrail stations have since been successfully completed; Bond St., Farringdon, Liverpool St. and Whitechapel.

Excalibur has now produced a range of M12, 16 and 20 Hexagonal Head PLUS Bolts for the tunnelling, marine and general construction industries. Not only are the PLUS Bolt concrete screw anchors highly resistant to corrosion, they have all the advantages of the standard Excalibur anchor for ease of use and speed of application.





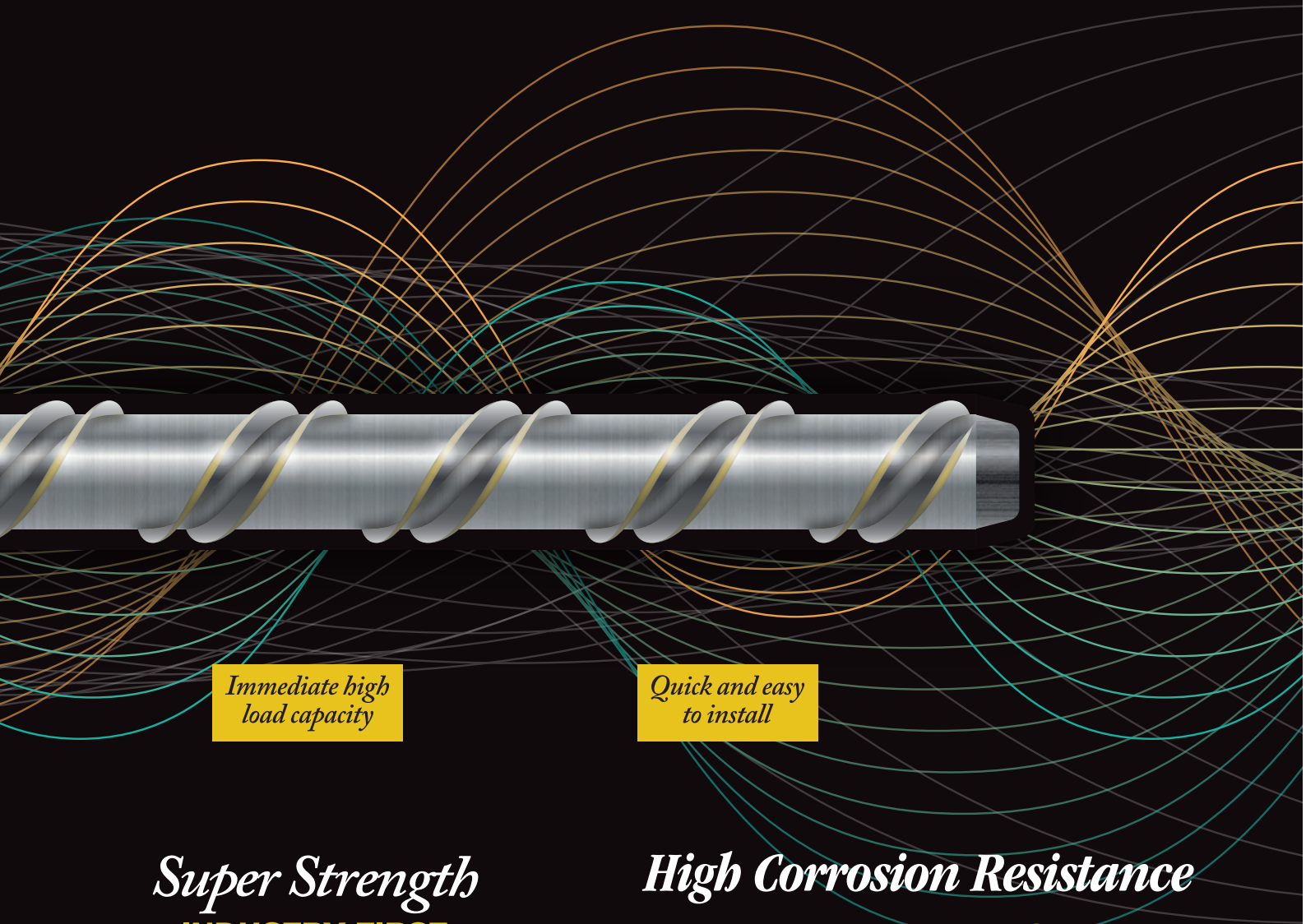
*Non expansive
for close to edge fixing*

*One anchor
for all substrates*

High Performance
SAVES TIME & MONEY

Innovative Design
TIGHTENS UNDER VIBRATION

the
DoubleAward
Winning
Excalibur®
SCREWBOLTS



*Immediate high
load capacity*

*Quick and easy
to install*

Super Strength

INDUSTRY FIRST

*NEW M20/300
supports 25 tonnes
ultimate tensile load in
25Nm² concrete*

High Corrosion Resistance

ALTERNATIVE TO STAINLESS STEEL



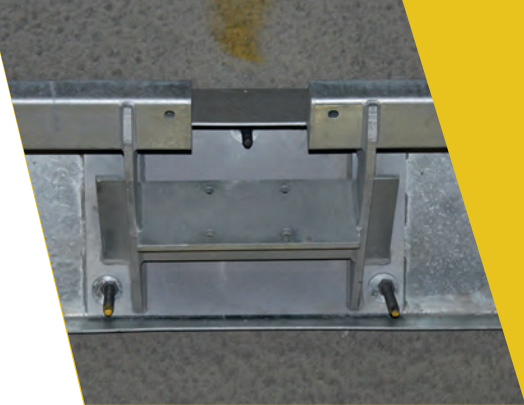
THE QUEEN'S AWARDS
FOR ENTERPRISE:
INNOVATION
2016



John Stevens and Jim Clement receiving Excalibur's second Queen's Award in 2016



Crossrail, Tottenham Court Road
PLUS Bolt installations



PLUS Bolt high corrosive resistant anchor
Design Tables based on ETAG 001 pt3

Table 1: Mean Ultimate resistance ($N_{ru,m}$ from test results)

Anchor Size (mm)	10	12	16	20
H_{ef} nominal (mm)	-	90	130	120
Non-Cracked Concrete	-	C30	C30	C30
Tensile $N_{ru,m}$ [kN]	-	35.13	64.36	77.82
Shear $V_{ru,m}$ [kN]	-	37.02	83.63	116.63

Table 2: Characteristic resistance (N_{rk} (1-k_{5%}V))

Anchor Size (mm)	10	12	16	20
H_{ef} nominal (mm)	-	90	130	120
Non-Cracked Concrete	-	C30	C30	C30
Tensile N_{rk} [kN]	-	30.35	47.93	62.20
Shear V_{rk} [kN]	-	30.22	54.91	101.20

Table 3: Design resistance ($N_{rk} = N_{ru,m}/\gamma_m$) γ taken as 1.8 (1.5 for steel/shear)

Anchor Size (mm)	10	12	16	20
H_{ef} nominal (mm)	-	90	130	120
Non-Cracked Concrete	-	C30	C30	C30
Tensile N_{rd} [kN]	-	16.86	26.62	34.55
Shear V_{rd} [kN]	-	20.14	30.50	67.40

Table 4: Recommended Load ($N_{rec} = N_{rd}/\gamma$) γ taken as 1.4

Anchor Size (mm)	10	12	16	20
H_{ef} nominal (mm)	-	90	130	120
Non-Cracked Concrete	-	C30	C30	C30
Tensile N_{rec} [kN]	-	12.04	19.01	24.67
Shear V_{rec} [kN]	-	14.39	21.79	48.10

Specific performance
test data in Sprayed
Concrete Lining is also
available on request.

PLUS Bolts used to fix GRC panels and associated brackets to Crossrail sprayed concrete tunnel linings. Sizes: 12mm/16mm/20mm



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