

DURA[®] UNIVERSAL BEAM UB-X650

Description

DURA[®] UB-X650 Universal Beam is a newly innovated product suitable especially for **Industrial Building System (IBS)** such as buildings or warehouses construction which required light-weight, long span and durable system. DURA[®] UB-X650 made from the revolutionary composite material of ultra-high performance concrete and high-carbon-high-tensile steel fibres (UHPdC). It is an excellent solution for buildings with long span requirements of up to 22 m without intermediate support.

Features

- Dura[®] UB-X650 consists of P.C. strands in longitudinal direction and typically prestress to 70~80% of the 'guaranteed' tensile strength of the strands. Strands used are 15.2 mm diameter 7-wire super strands (low relaxation) complying with AS 1311; with a guaranteed tensile load of 250 kN and ultimate breaking load of 270 kN.
- The UHPdC used for the DURA[®] UB-X650 has a characteristic compressive strength range between 120 to 140 MPa, and characteristic flexural strength of 20 MPa.
- DURA[®] UB-X650 eliminates the use of conventional steel reinforcing bars and stirrups (except starter-bars are provided at the end regions for connection purpose). All steel fibres used are made from high carbon steel wires with tensile strength over 2300 MPa.



Figure 1 – Dura[®] UB-X650 used in portal frame.

Advantages of DURA[®] UB-X650

- DURA[®] UB-X650 is highly durable and impermeable. It is therefore suitable for use even in harsh environments.
- DURA[®] UB-X650 used “un-cracked section” design approach at SLS. Thus it further assures its serviceability and durability.
- DURA[®] UB-X650 is at least 2 times lighter than conventional precast RC beam (see Figure 2). Thus lead to ease of handling/transportation and installation.
- Scaffolding, props or formwork may or may not required over the supports (depends of design).
- Reducing construction site activities, improving safety margins and eliminating in-situ casting work (except sealing of the construction joints and some minor details).
- DURA[®] UB-X650 is guaranteed to be volumetrically stable as they are steam-cured to minimized creep. This process also accelerates all long term shrinkage of the UHPdC.
- DURA[®] UB-X650 frames can be produced to desired length as specified by the designers.
- Due to its high durability, high ductility and high fatigue strength, it provides excellent resistance against impact and abrasion loads.
- Dura[®] UB-X650 supports the 'Green' vision as it is a more environmentally friendly material compare to conventional beam such as RC beam and structural steel beam (see Figure 2).
- Dura[®] UB-X650 used special fiber to provide sufficient resistance in the event of fire.

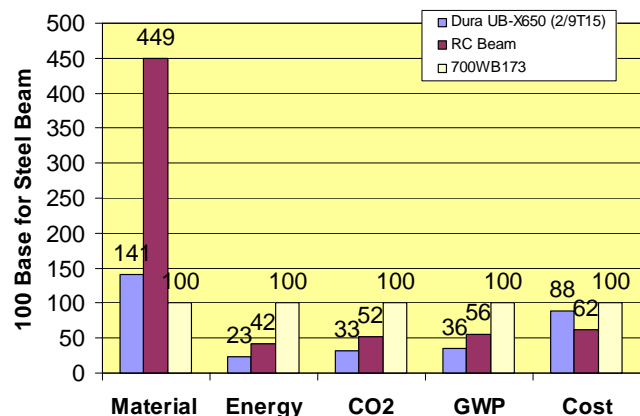


Figure 2 – Cost and environmental impact comparisons.

DURA[®] UB-X650

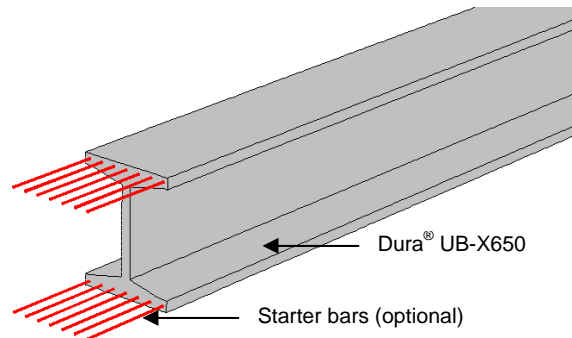
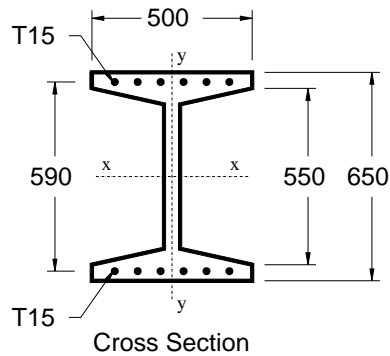


Table 1: Technical Data for DURA[®] UB-X650

		Unit	UB-X650
Self-Weight	G	kg/m	240
Length	L	m	8 ~ 22 ↓
Sectional Area	A _g	x 10 ³ mm ²	100
Neutral Axis	y _{top}	mm	325
	y _{bot}	mm	325
2 nd Moment of Inertia	I _{xx}	x 10 ⁹ mm ⁴	6.708
	I _{yy}	x 10 ⁹ mm ⁴	1.336
Elastic Section Modulus X-X	Z _{top,xx}	x 10 ⁶ mm ³	20.64
	Z _{bot,xx}	x 10 ⁶ mm ³	20.64
Torsion Constant	J	x 10 ⁶ mm ³	193.83
Warping Constant	I _w	x 10 ¹² mm ³	110.4

↓ Can be customized

Table 2: Design Capacity of DURA[®] UB-X650

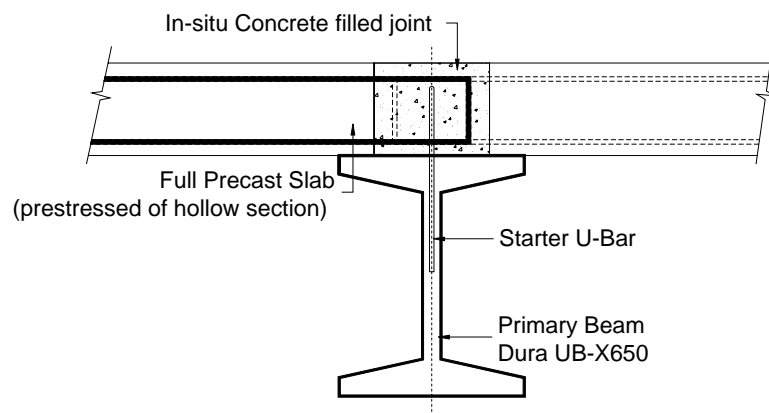
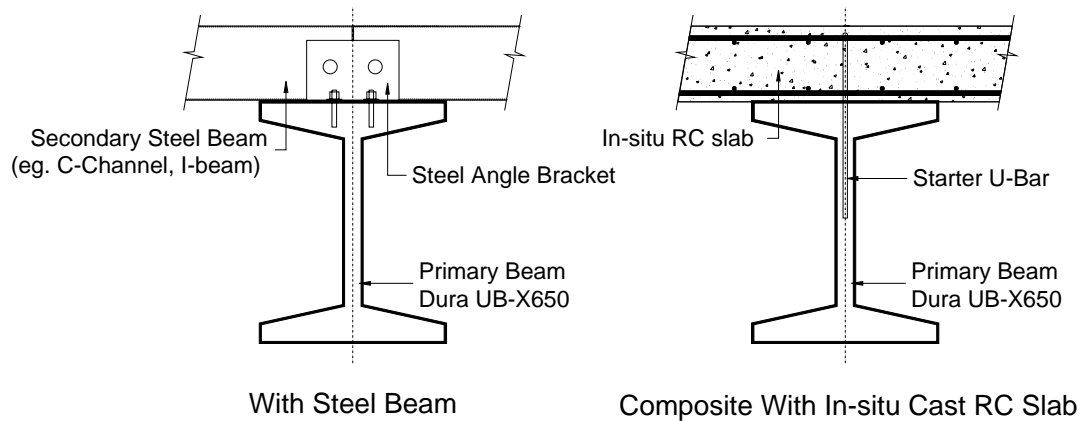
		Unit	UB-X650					
			2/6T15	2/7T15	2/8T15	2/9T15	2/10T15	2/11T15
Top Strands		Nos.	2	2	2	2	2	2
Bottom Strands		Nos.	6	7	8	9	10	11
Cracking Moment	M _{cr}	kNm	593	673	743	824	902	970
Ultimate Moment	M _u	kNm	933	1085	1238	1386	1515	1657
Recommended Design Bending Moment (φ = 0.8) ↑	M*	kNm	746	868	990	1109	1212	1326
Cracking Shear Strength	V _{cr}	kN	225	225	225	225	225	225
Ultimate Shear Strength	V _u	kN	350	350	350	350	350	350
Recommended Design Shear Strength (φ = 0.7) ↑	V*	kN	245	245	245	245	245	245

↑ φ = strength reduction factor as per AS3600-2001

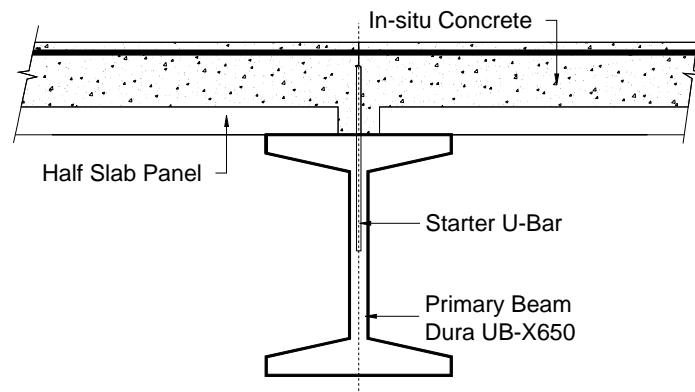
Applications

Dura[®] UB-X650 can be used in a number of ways such as:

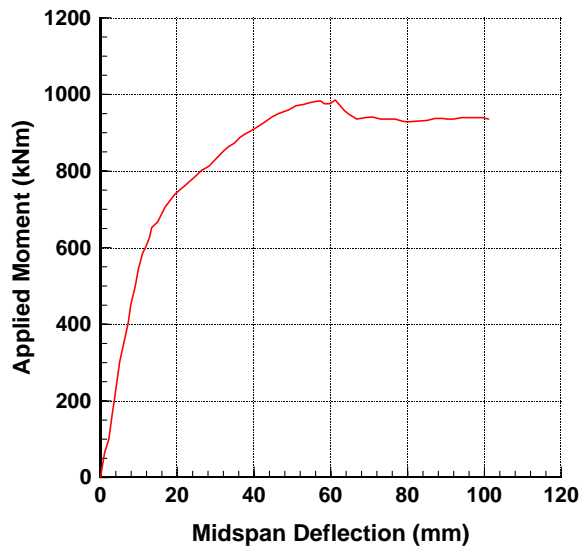
1. composite with steel beams;
2. composite with in-situ cast RC slab ;
3. composite with full precast RC slab; and
4. composite with half precast slab.



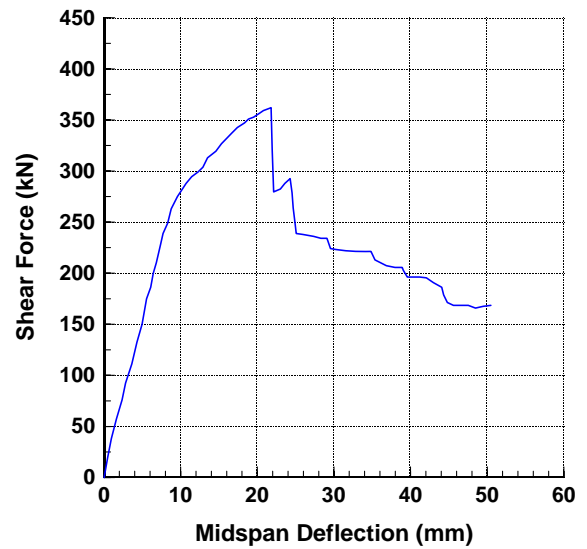
Composite With Full Precast Slab



Composite With Half Precast Slab

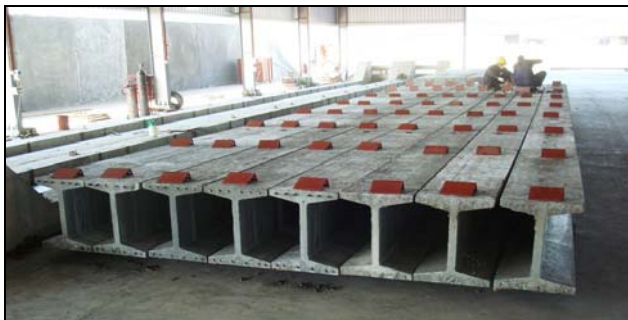


Experimental Flexure Strength of Dura[®] UB-X650 (6/6T15)



Experimental Shear Strength of Dura[®] UB-X650 (6/6T15)

Result certified by SIRIM QAS: J20085040550/(SQAS/CBMT/T.REC/CSL/15)



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