

# DURA<sup>®</sup> UB650 UNIVERSAL BEAM

## Description

**DURA<sup>®</sup> UB650** Universal Beam is a newly innovated product suitable for the concept of Industrialized Building System (IBS) such as buildings or warehouses construction which required light-weight, long span and durable system. **DURA<sup>®</sup> UB650** made from the revolutionary composite material of ultra-high performance concrete and high-carbon-high-tensile steel fibres. It is an excellent solution for buildings with long span requirements of up to 22 m without intermediate support.

## Features

- **Dura<sup>®</sup> UB650** 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<sup>®</sup> UB650** has a characteristic compressive strength range between 120 to 140 MPa, and characteristic flexural strength of 20 MPa.
- **DURA<sup>®</sup> UB650** 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<sup>®</sup> UB650 used in portal frame.

## Advantages of DURA<sup>®</sup> UB650

- **DURA<sup>®</sup> UB650** is highly durable and impermeable. It is therefore suitable for use even in harsh environments.
- **DURA<sup>®</sup> UB650** used “un-cracked section” design approach at SLS. Thus it further assures its serviceability and durability.
- **DURA<sup>®</sup> UB650** 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<sup>®</sup> UB650** 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<sup>®</sup> UB650** 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<sup>®</sup> UB650** supports the 'Green' vision as it is a more environmentally friendly material compared to conventional beam such as RC beam and structural steel beam (see Figure 2).
- **Dura<sup>®</sup> UB650** used special fiber to provide sufficient resistance in the event of fire.

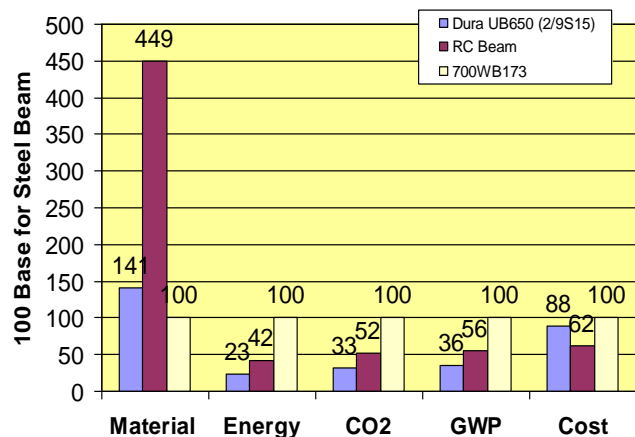
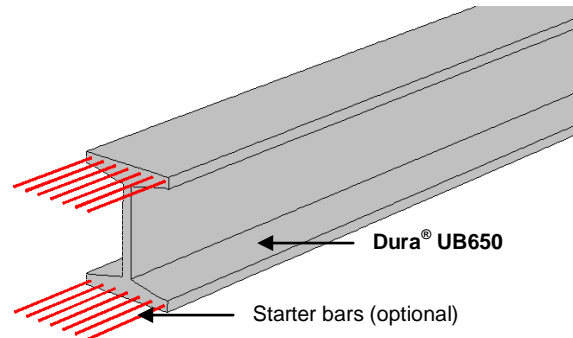
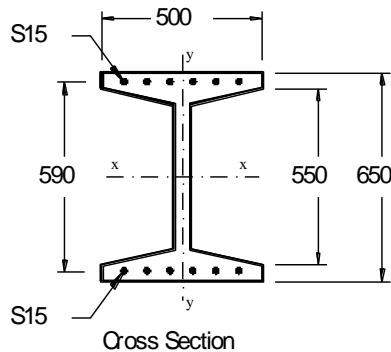


Figure 2 – Cost and environmental impact comparisons.

## DURA<sup>®</sup> UB650



**Table 1: Technical Data for DURA<sup>®</sup> UB650.**

		Unit	UB650
Self-Weight	G	kg/m	240
Length	L	m	8 ~ 22 <sup>↓</sup>
Sectional Area	A <sub>g</sub>	x 10 <sup>3</sup> mm <sup>2</sup>	100
Neutral Axis	y <sub>top</sub>	mm	325
	y <sub>bot</sub>	mm	325
2 <sup>nd</sup> Moment of Inertia	I <sub>xx</sub>	x 10 <sup>9</sup> mm <sup>4</sup>	6.708
	I <sub>yy</sub>	x 10 <sup>9</sup> mm <sup>4</sup>	1.336
Elastic Section Modulus X-X	Z <sub>top,xx</sub>	x 10 <sup>6</sup> mm <sup>3</sup>	20.64
	Z <sub>bot,xx</sub>	x 10 <sup>6</sup> mm <sup>3</sup>	20.64
Torsion Constant	J	x 10 <sup>6</sup> mm <sup>3</sup>	193.83
Warping Constant	I <sub>w</sub>	x 10 <sup>12</sup> mm <sup>3</sup>	110.4

<sup>↓</sup> Can be customized

**Table 2: Design Capacity of DURA<sup>®</sup> UB650.**

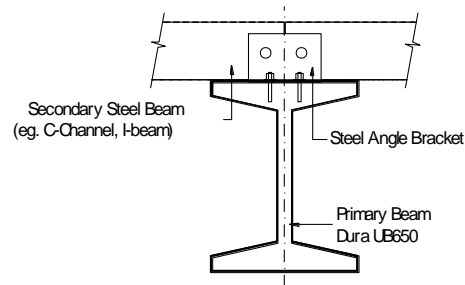
		Unit	UB650					
			2/6S15	2/7S15	2/8S15	2/9S15	2/10S15	2/11S15
Top Strands		Nos.	2	2	2	2	2	2
Bottom Strands		Nos.	6	7	8	9	10	11
Cracking Moment	M <sub>cr</sub>	kNm	593	673	743	824	902	970
Ultimate Moment	M <sub>u</sub>	kNm	933	1085	1238	1386	1515	1657
Recommended Design Bending Moment (φ = 0.8) <sup>↑</sup>	M <sup>*</sup>	kNm	<b>746</b>	<b>868</b>	<b>990</b>	<b>1109</b>	<b>1212</b>	<b>1326</b>
Cracking Shear Strength	V <sub>cr</sub>	kN	225	225	225	225	225	225
Ultimate Shear Strength	V <sub>u</sub>	kN	350	350	350	350	350	350
Recommended Design Shear Strength (φ = 0.7) <sup>↑</sup>	V <sup>*</sup>	kN	<b>245</b>	<b>245</b>	<b>245</b>	<b>245</b>	<b>245</b>	<b>245</b>

<sup>↑</sup> φ = strength reduction factor as per AS3600-2001

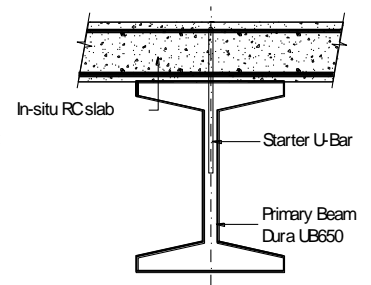
## Applications

Dura<sup>®</sup> UB650 can be used in a number of ways such as:

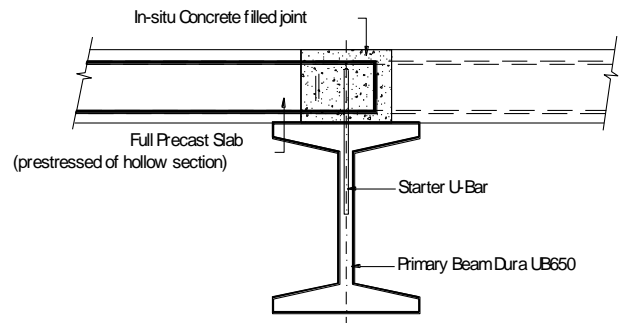
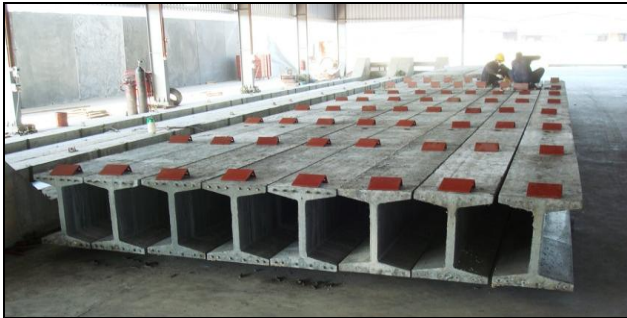
1. composite with steel beams / purlins;
2. composite with in-situ cast RC slab ;
3. composite with full precast RC slab; and
4. composite with half precast slab.



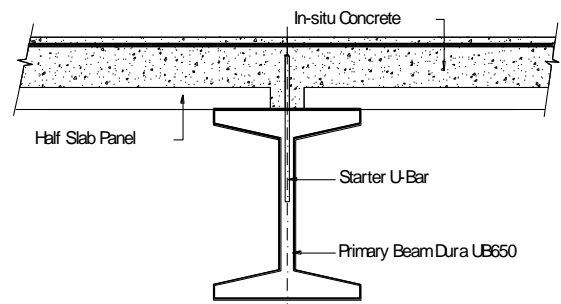
With Steel Beam



Composite With In-situ Cast RC Slab

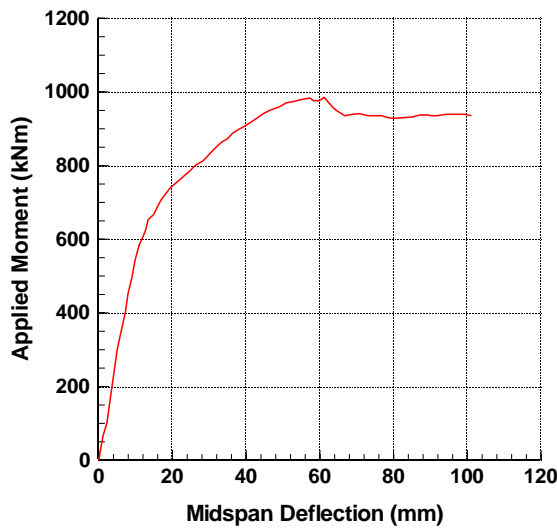


Composite With Full Precast Slab

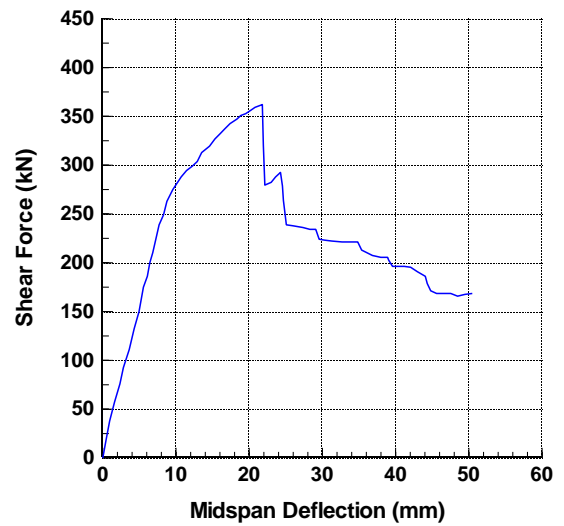


Composite With Half Precast Slab



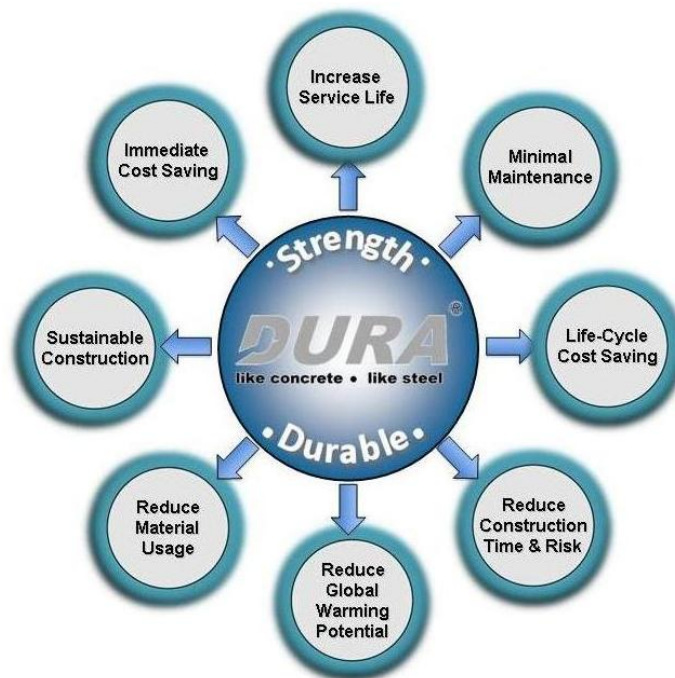


Experimental Flexure Strength Result of Dura<sup>®</sup> UB650 (6/6S15)



Experimental Shear Strength Result of Dura<sup>®</sup> UB650 (6/6S15)

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



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