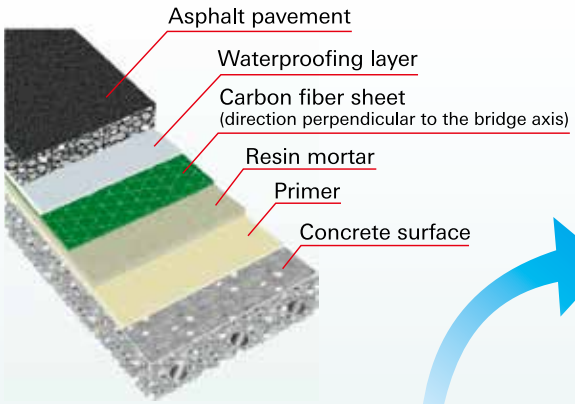
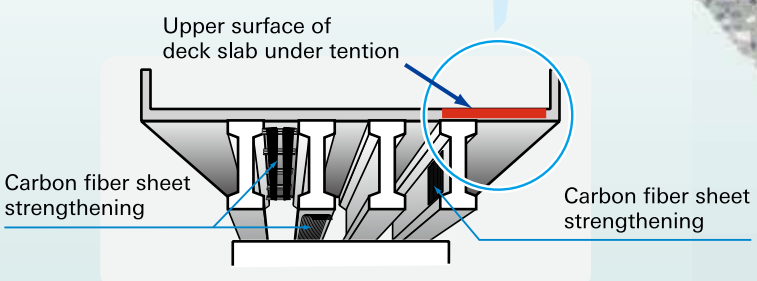
LEADLINE™

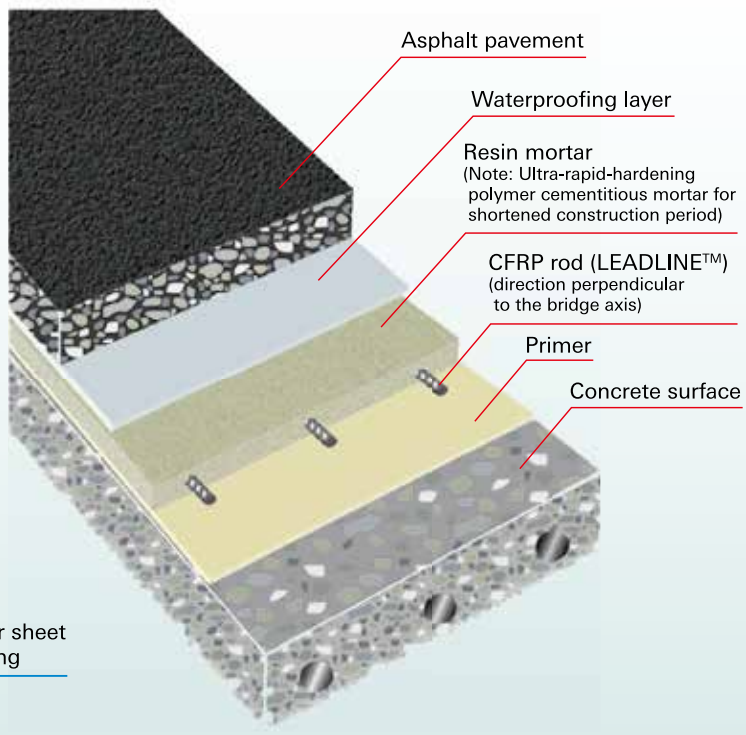
Carbon fiber reinforced plastic rods Embedding Method

Conventional method
(Carbon fiber sheet construction method)





LEADLINE™ embedding method



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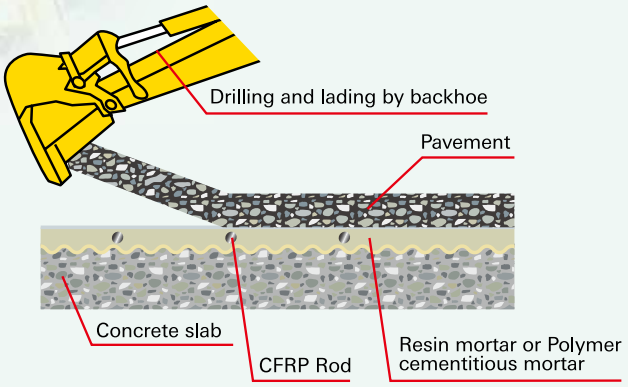
Features of the LEADLINE construction method

LEADLINE™ embedding method uses carbon fiber reinforced plastic rods that are manufactured by processing carbon fiber into a rod shape by the pultrusion method. The rods are embedded in epoxy resin mortar or ultra-rapid hardening polymer cementitious mortar and bonded to an existing concrete deck slab of a road bridge to strengthen it.

Features

- **Strengthening member protection when renewing a bridge surface**
  Prevents damage to the strengthening members when renewing the asphalt layer or bridge waterproofing layer.
- **Shortened construction period**
  Compared with the carbon fiber construction method, the number of curing cycles can be reduced, so the construction period can be shortened.
- **Cost reduction**
  LEADLINE™ embedding method reduces construction costs by 85 to 95% compared to the carbon fiber sheet method.
- **Early road opening possible**
  Since the curing time is fast, the LEADLINE™ method is ideal for repairing and strengthening road bridges that need to be opened soon.

Protection by strengthening materials



Comparison of Construction period

*1 It was calculated from the application of 40㎡ by 12 workers.
*2 The cost for carbon fiber sheet construction was indexed as 100.
*3 Use of Ultra-rapid hardening polymer cementitious mortar.

process / method	1	2	3	4	5	6	7	8	9	10	11	Cost *2
Carbon fiber fabric method (HM fabric x2 layers)	Deck slab cutting	Surface preparation	Primer application	Curing 1day	Adjusting unevenness (Resin mortar)	Curing 1day	Attaching carbon fiber fabric (2plys)	Curing 1day	Protection mortar (Resin mortar)	Curing 3days	Water-proofing / Pavement	100
CFRP rods resin mortar method (HM12 Φctc260)	Deck slab cutting	Surface preparation	Primer application	Curing 1day	Adjusting unevenness (Resin mortar)	CFRP rods arrangement	Protection mortar (Resin mortar)	Curing 3days	Water-proofing / Pavement			85
CFRP rods Ultra-rapid-hardening polymer cementitious mortar method (HM12 Φctc260)	Deck slab cutting	Surface preparation	Primer application (Continuous works)	6~7hr.*1 CFRP rod arrange-ment + Protection mortar *3	Curing 3~4hrs.	Water-proofing / Pavement						95

Experiment to confirm the strengthening effect


Static loading test


CFRP Rod


CFRP Rod with GFRP rib

Physicality of High-Modulus CFRP rod

Type	Cross-sectional shape	Nominal diameter (mm)	Cross section (mm)	Tensile modulus (kN/mm²) *1	Tensile strength (kN/mm²) *2
High elasticity product (CFRP rod)	Round	8	50.3	442	950
		10	78.5		
		12	113.1		

*1 Test method BS EN2561 compliant. *2 This specification is subject to change without prior notice.

Construction procedure

Resin mortar method

Ultra-rapid-hardening polymer cementitious mortar construction method

Removal of existing asphalt pavement

Removing concrete surface

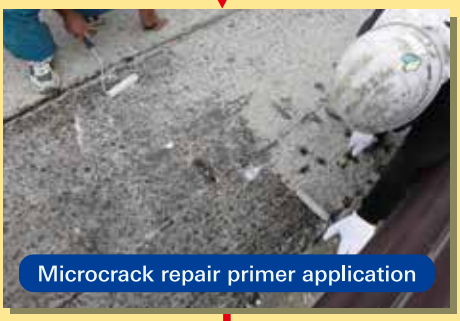
Cleaning


Primer application


Laying of resin mortar (undercoat)


CFRP rod arrangment


Laying of resin mortar (coating)


Microcrack repair primer application


Epoxy resin application to improve adhesion


Polymer cementitious mortar casting and CFRP rod embedding


Surface finishing
Note: Basically the surface is compacted using a vibrator.

Construction completed

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資料請求NO.A35013
文書NO.A35031M31001
2020年6月12日改訂(AP)