

# An overview on Manufacturing, Design and Performance of GFRP Light Poles

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# Outlines

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- Pultruded FRP Hollow Sections
- Structural Applications
- FRP Light Poles
  - Design Criteria
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- Fire Performance
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# Background



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**MANUFACTURING  
STRUCTURAL COMPOSITES  
SINCE 2002**



Head Office in Toowoomba,  
Queensland, Australia



+150 employees servicing  
global infrastructure projects



Four (4) pultrusion line  
manufacturing 300 miles of  
product per annum

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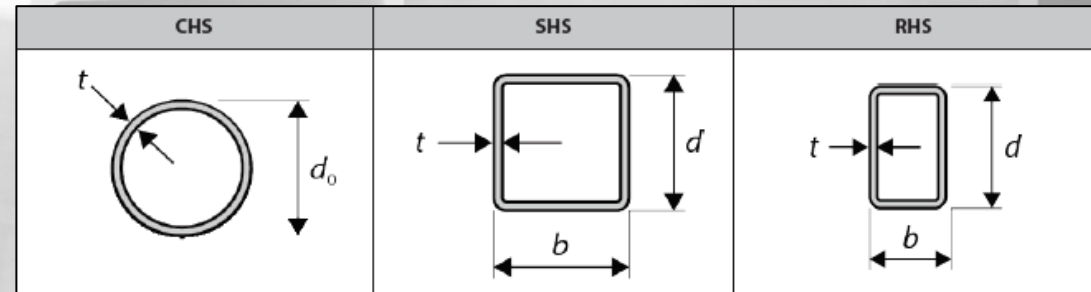


**CURRENT PULTRUSION**

# Pultruded FRP Hollow Sections

# Structural Sections

- Circular Hollow Sections (CHS)
- Square Hollow Sections (SHS)
- Rectangular Hollow Section (RHS)



# Mechanical Properties

Property	Result	UOM	Standard
Tensile Strength – Longitudinal	88	ksi	ISO 527-4
Tensile Modulus of Elasticity – Longitudinal	5264	ksi	
Tensile Strength – Transverse	8	ksi	
Tensile Modulus of Elasticity – Transverse	1566	ksi	
Compressive Strength – Longitudinal	70	ksi	ASTM D6641
Compressive Modulus of Elasticity – Longitudinal	4829	ksi	
Compressive Strength – Transverse	17.4	ksi	
Compressive Modulus of Elasticity – Transverse	1682	ksi	
In-Plane Shear Strength – Longitudinal	12	ksi	ASTM D7078
In-Plane Shear Modulus of Elasticity – Longitudinal	620	ksi	
Interlaminar Shear Strength	6	ksi	ASTM D2344





# Structural Applications

# FRP Structures



# FRP Light Poles

# FRP Light Poles

The background image shows several tall, slender FRP light poles with dual-lamp fixtures, standing in an outdoor sports area. In the foreground, there is a chain-link fence. In the background, there are several large, modern buildings with grey roofs, likely part of the Qantas Training Centre. The sky is filled with dramatic, colorful clouds in shades of orange, pink, and purple, suggesting a sunset or sunrise.

- Durable
- Non-corrosive
- Non-conductive
- High strength/weight ratio
- Rapid installation
- Low-to-zero maintenance

# FRP Light Pole Design

- US & Australian Wind Load Standards
- ASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaire, and Traffic Signals (LTS).
- 20ft, 100 SHS, Max. Design Moment: 8.5kip.ft
- 30ft, 125 SHS, Max. Design Moment: 13.8kip.ft

# Direct Burial FRP Light Poles

Direct Burial Light Poles							
PRODUCT CODE	MOUNTING HEIGHT	DIMENSIONS					
		EFFECTIVE PROJECT AREA (EPA)				DIRECT BURIAL (DB)	
	ft.	90 mph	100 mph	110 mph	120 mph	Excavation Diameter	Shaft Length
							ft.
WGN-DB-4SS10	10	21.5	17.0	13.7	11.1	1.00	5.00
WGN-DB-4SS15	15	12.9	9.8	7.5	5.7		5.00
WGN-DB-4SS20	20	7.4	5.2	3.5	2.3		5.25
WGN-DB-5SS15	15	28.7	22.1	17.3	13.6	1.25	5.75
WGN-DB-5SS20	20	17.5	12.7	9.2	6.5		5.75
WGN-DB-5SS25	25	10.2	6.5	3.8	1.7		6.00
WGN-DB-5SS30	30	4.7	2.0	n/a	n/a		6.00

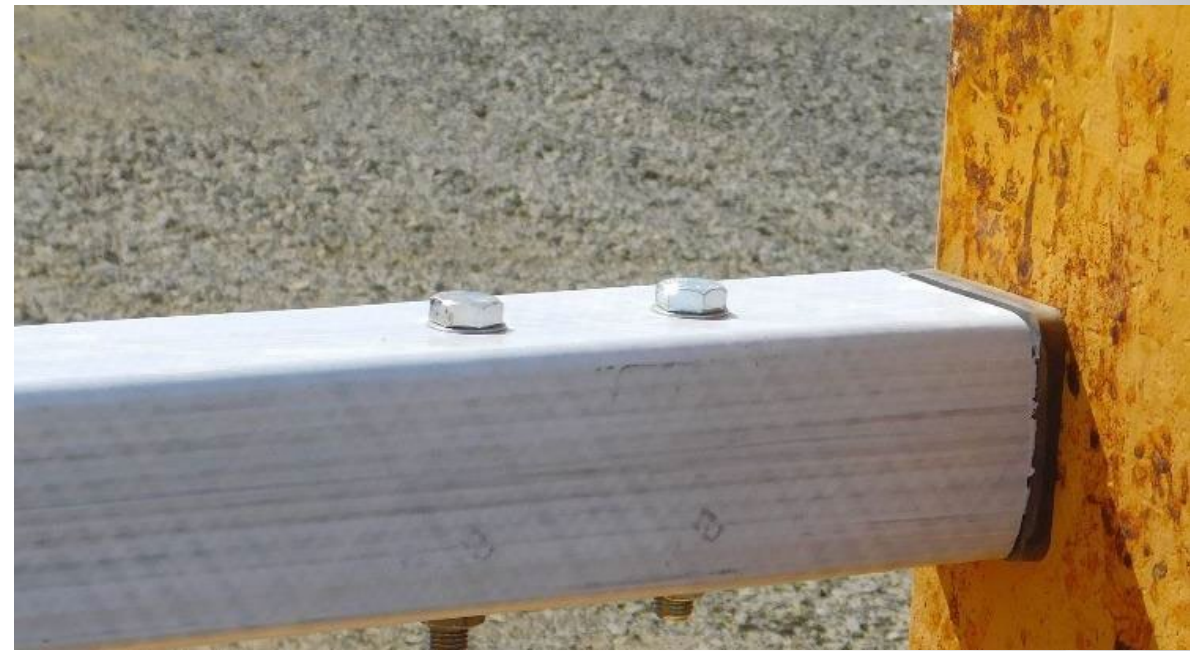
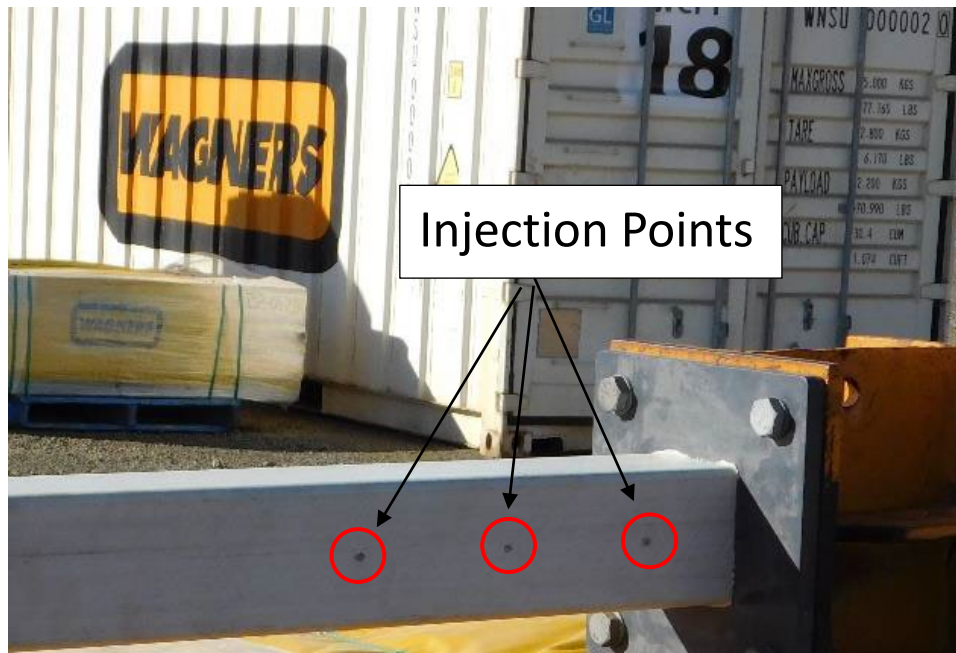


# Anchored Base FRP Light Poles

Anchor Base Light Poles									
PRODUCT CODE	MOUNTING HEIGHT	DIMENSIONS							
	ft.	EFFECTIVE PROJECT AREA (EPA)				ANCHORE BASE (AB)		CONCRETE FOUNDATION	
		90 mph	100 mph	110 mph	120 mph	Bolt Hole	Weight	Shaft Diameter	Shaft Length
						in.			
WGN-AB-4SS10	10	21.5	17.0	13.7	11.1	0.6875	39.3	1.50	4.25
WGN-AB-4SS15	15	12.9	9.8	7.5	5.7				4.25
WGN-AB-4SS20	20	7.4	5.2	3.5	2.3				4.50
WGN-AB-5SS15	15	28.7	22.1	17.3	13.6	0.8125	60.5	1.75	5.00
WGN-AB-5SS20	20	17.5	12.7	9.2	6.5				5.00
WGN-AB-5SS25	25	10.2	6.5	3.8	1.7				5.50
WGN-AB-5SS30	30	4.7	2.0	n/a	n/a				5.50

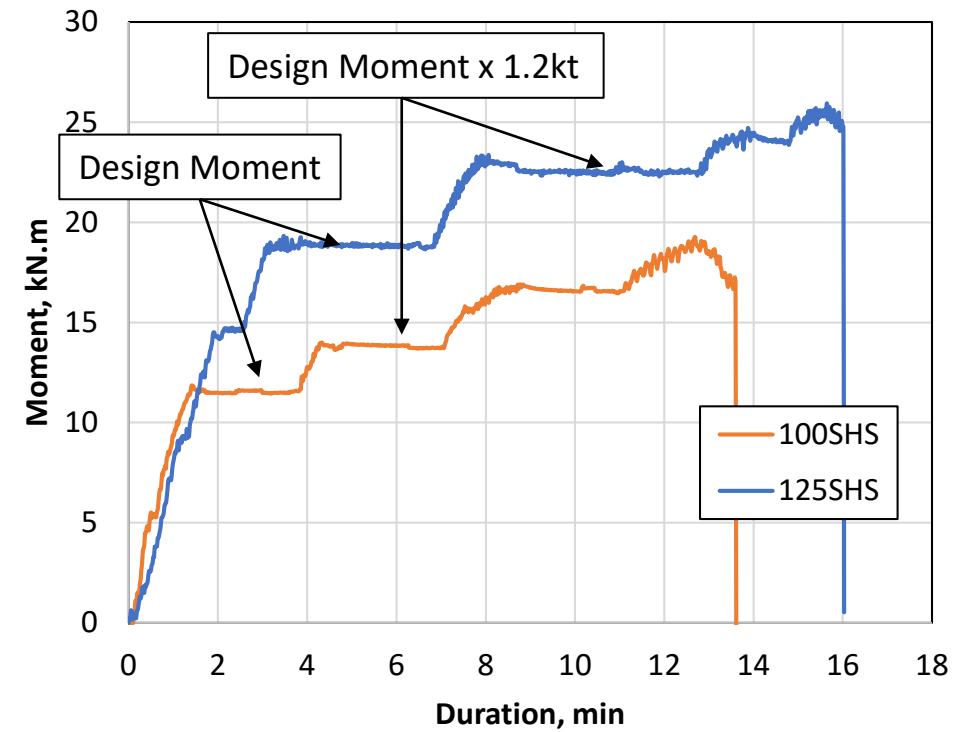


# Bonded & Bolted Anchored Base

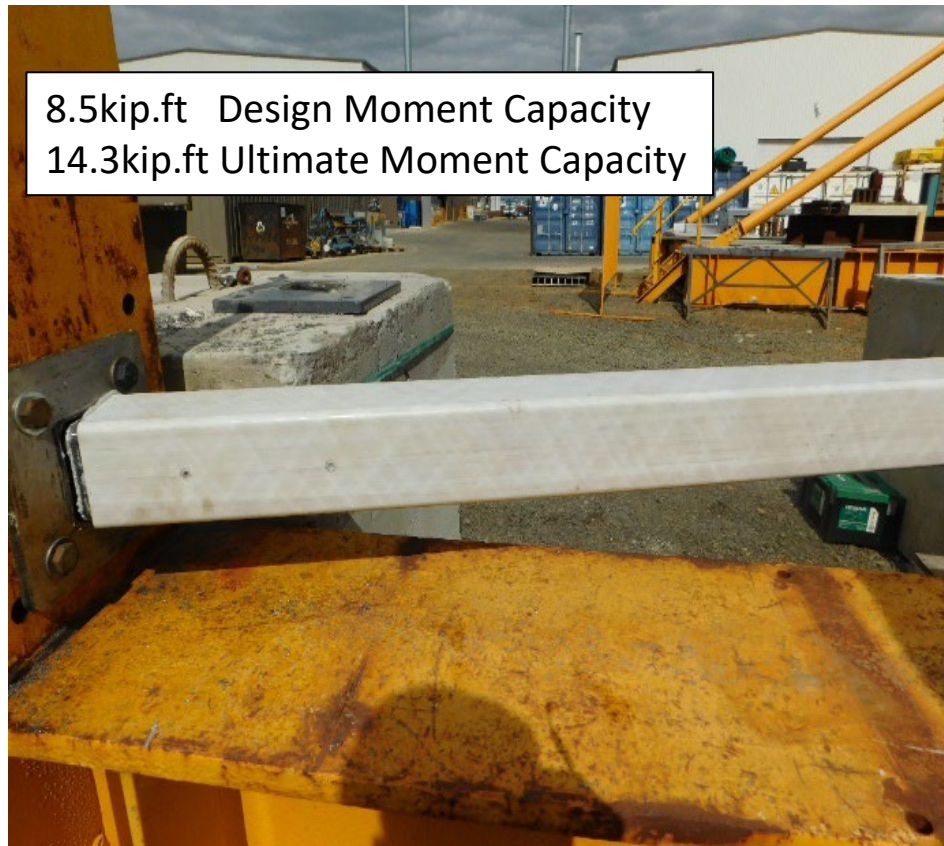




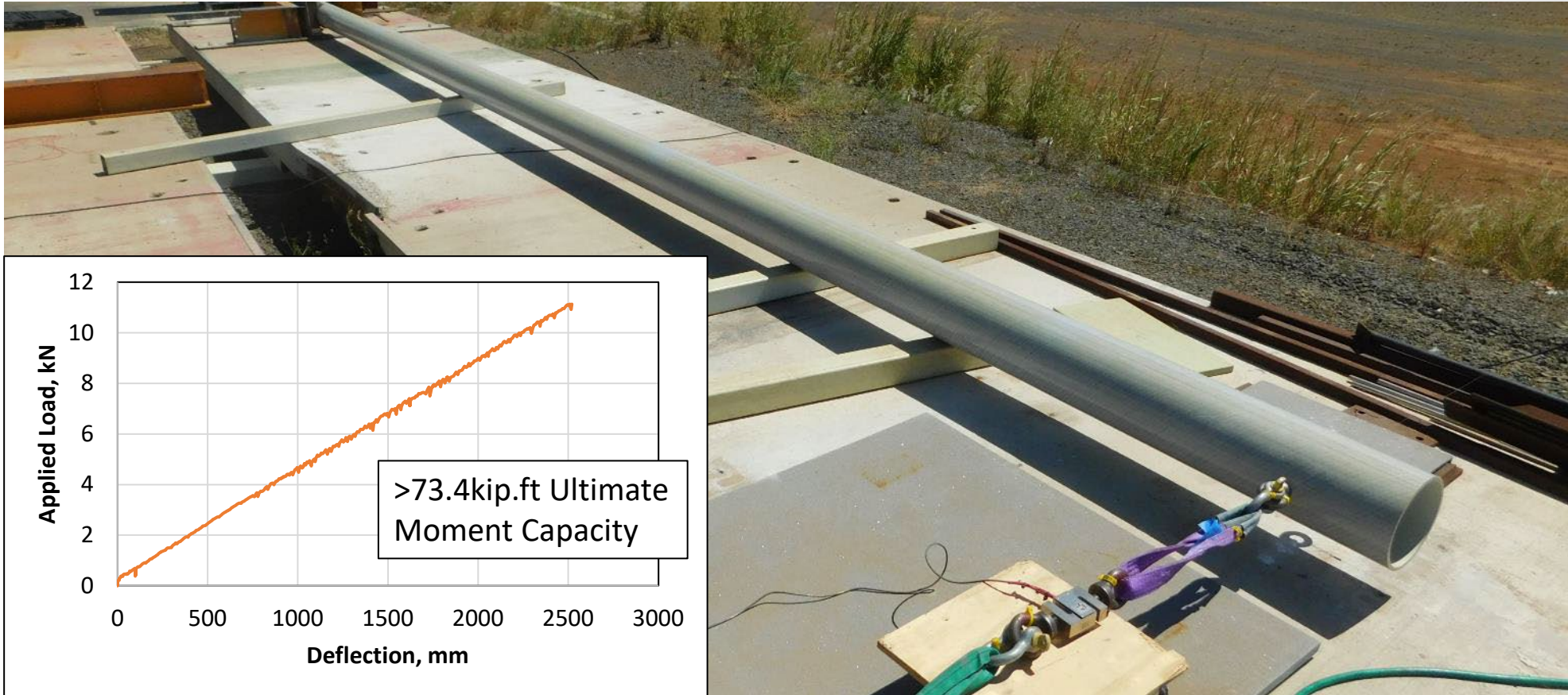
# FRP Light Pole with Bonded Base



# Failure Mode of Anchored Base Poles



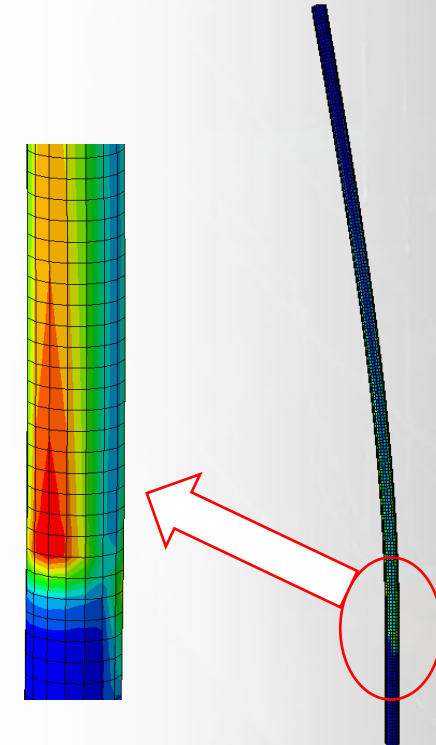
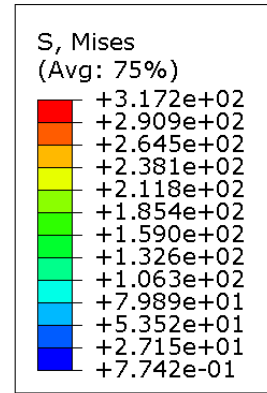
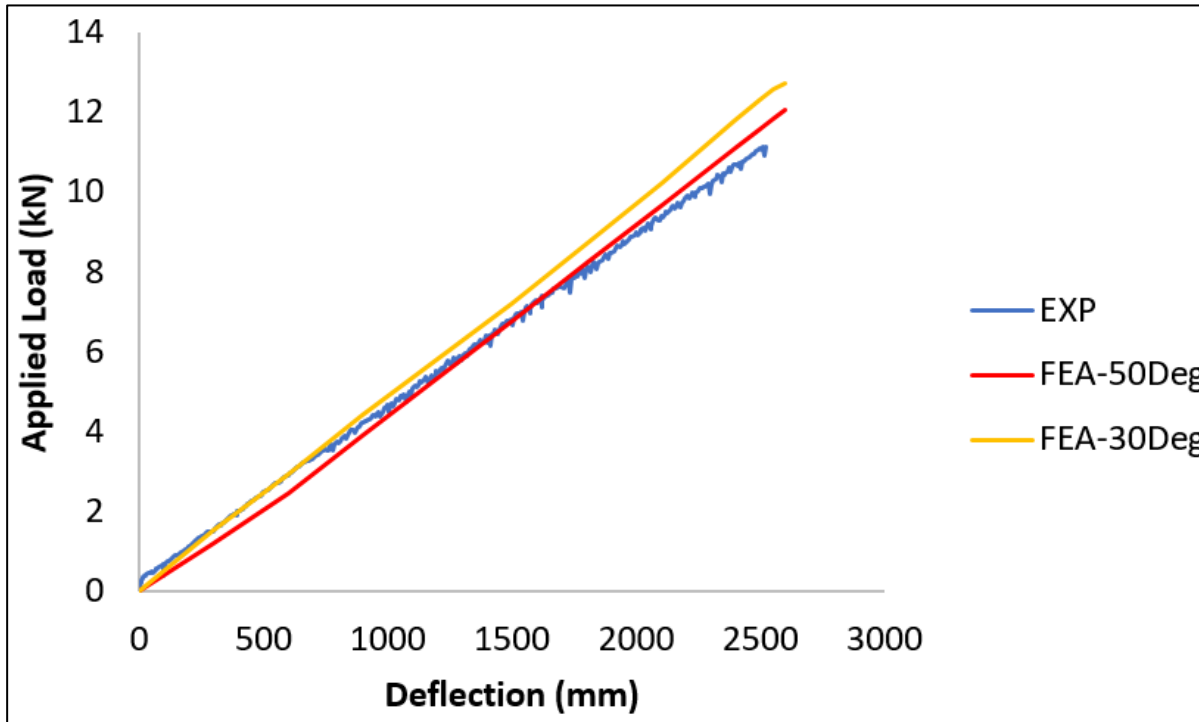
# CHS Light Pole – Direct Burial



# Failure Mode



# FRP Light Pole with Bonded Base



# Fire Performance

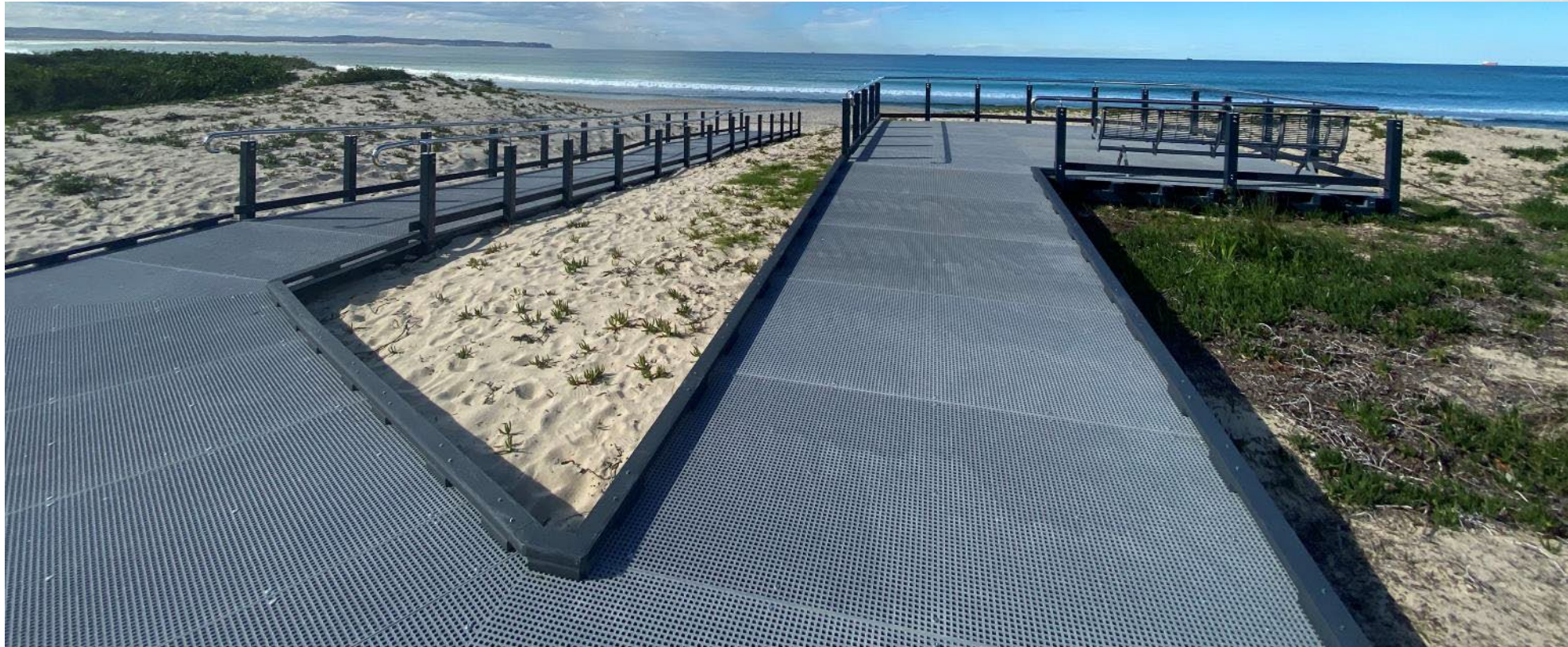
# Fire Performance

- ASTM D635 complaint
- Fire retardant and coating



# Concluding Remarks

- Broad range FRP sections, products and applications





A large white ABB industrial robot arm is positioned in a factory setting. The robot has 'ABB' written on its joints. It is situated above a grey metal structure, possibly a conveyor or worktable. The background shows a large industrial building with a corrugated metal roof and several bright lights. Another robot arm is visible in the distance on the right.

**Thank you**

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