



# Standard Designs & Composite Crossarms

**Mitch Graham**

# Topics

- Why did Unison go Composite?
- The Journey of Change
- Design Decisions for Standardisation
- Standard Arms & Components
- Experiences so far

# Why did Unison go Composite?

## Wood Arms - Issues

Splits



Bowing and twisting



Decay



Burning



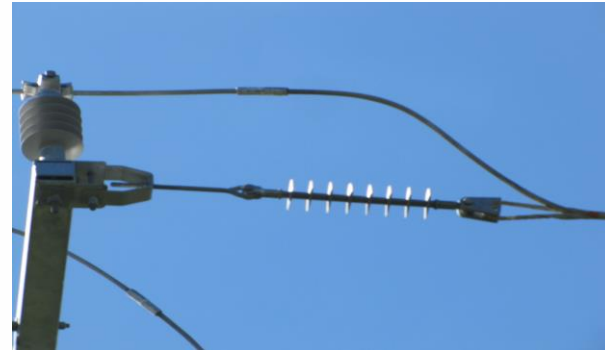
# Why did Unison go Composite?

## Steel Arms - Issues

Animal Flashover



Bird Flashover



Bird 33kV Flashover



Corrosion



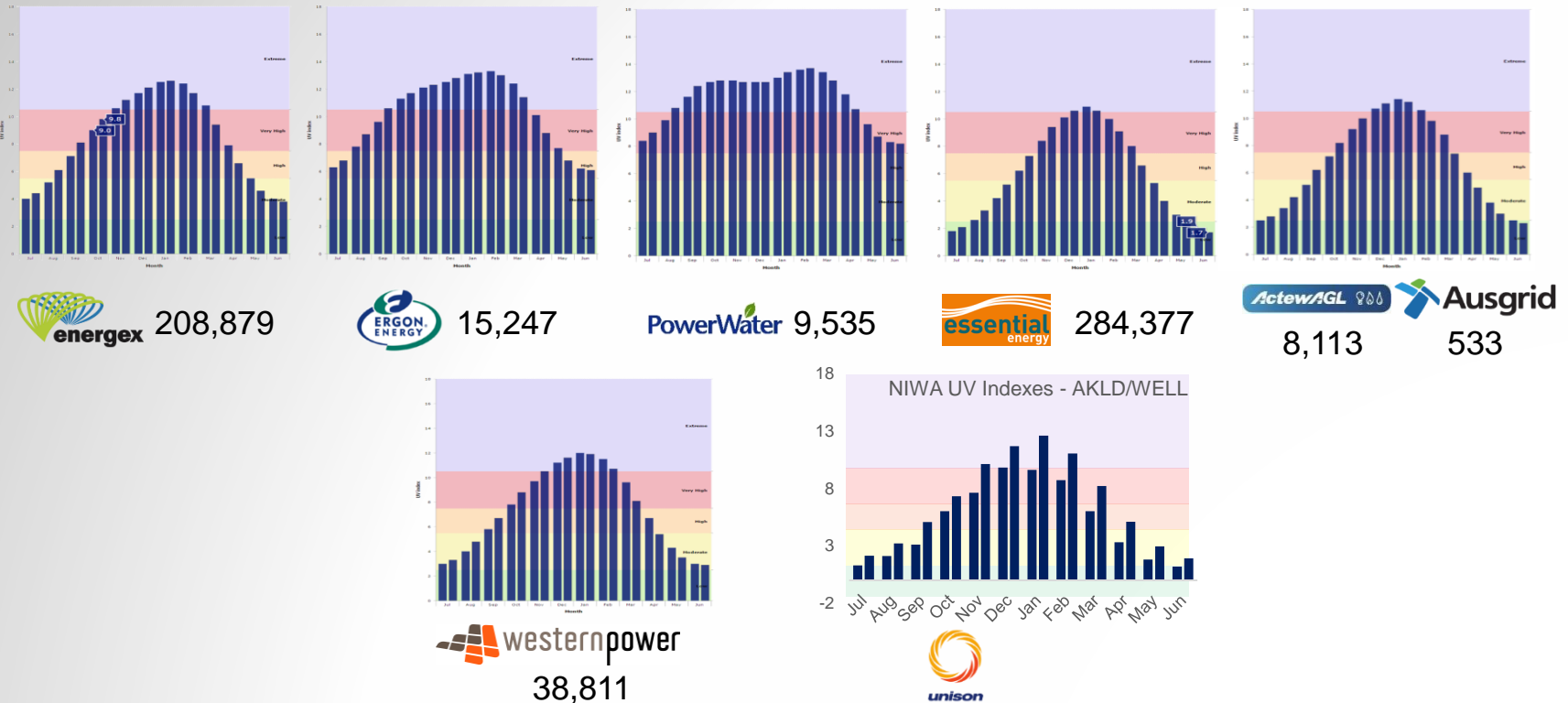
# A Journey of Change

- Market Research
- Material Comparison

	Galvanised Steel	Hardwood	Composite
Known strength	✓	✗	✓
<b>Resistant to Known Failure Modes</b>			
Rust	✗	✓	✓
Decay (rot)	✓	✗	✓
Splitting	✓	✗	✓
Burns readily	✓	✗	✓
Easily modified	✗	✓	✗
Cost	✗	✓	✓
Weight	✗	✗	✓
Insulation properties	✗	✓ limited	✓

# Potential Issues – UV and Longevity


Australasian Users of Wagner's composite arms local UV levels. Crossarm numbers from 2017



Blooming issues in coastal areas with 1<sup>st</sup> version of coating, coating revised in 2010 and no subsequent issues

# A Journey of Change

- Industry Research and Interviews

  
The Powerlines People

Please complete the following composite cross arm questionnaire:

- How long have you been using Wagner's composite arms for on your network? .....~~YRS~~
- Are they approved or under a trial? Approved/  
under trial
- Do you use any other make of composite arms on your network? Yes/No  
If 'Yes' what brand(s)?  
•  
•
- What pole materials are used on your network?

	Yes	No
Wood		
Steel		
Concrete		
Composite		

- Product trial
  - High Corrosion Sulphur Environment
  - Terminating 2 circuits



# Design Decisions - Scope

## In Scope

- 11kV arms
- 33kV arms
- Arm Braces
- Attachments:
  - ABS
  - Drop out fuses

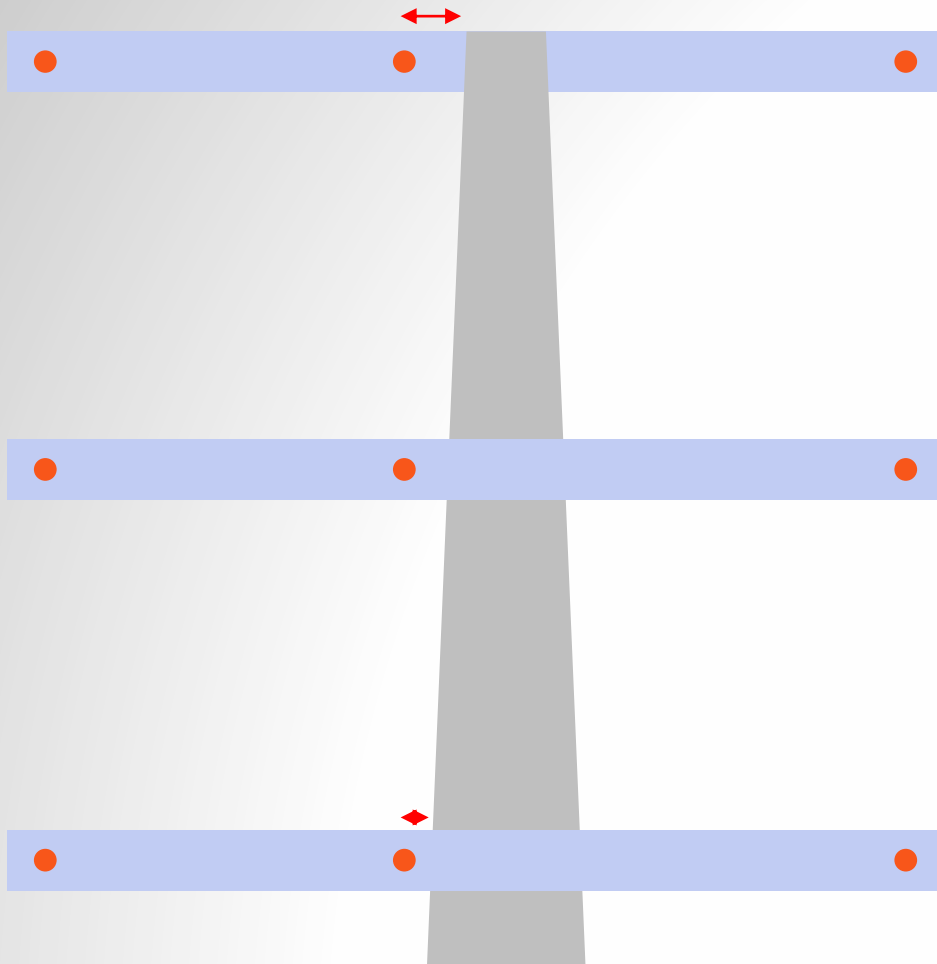
## Out of Scope

- LV arms
- Mounting:
  - Recloser/RCS
  - Regulators

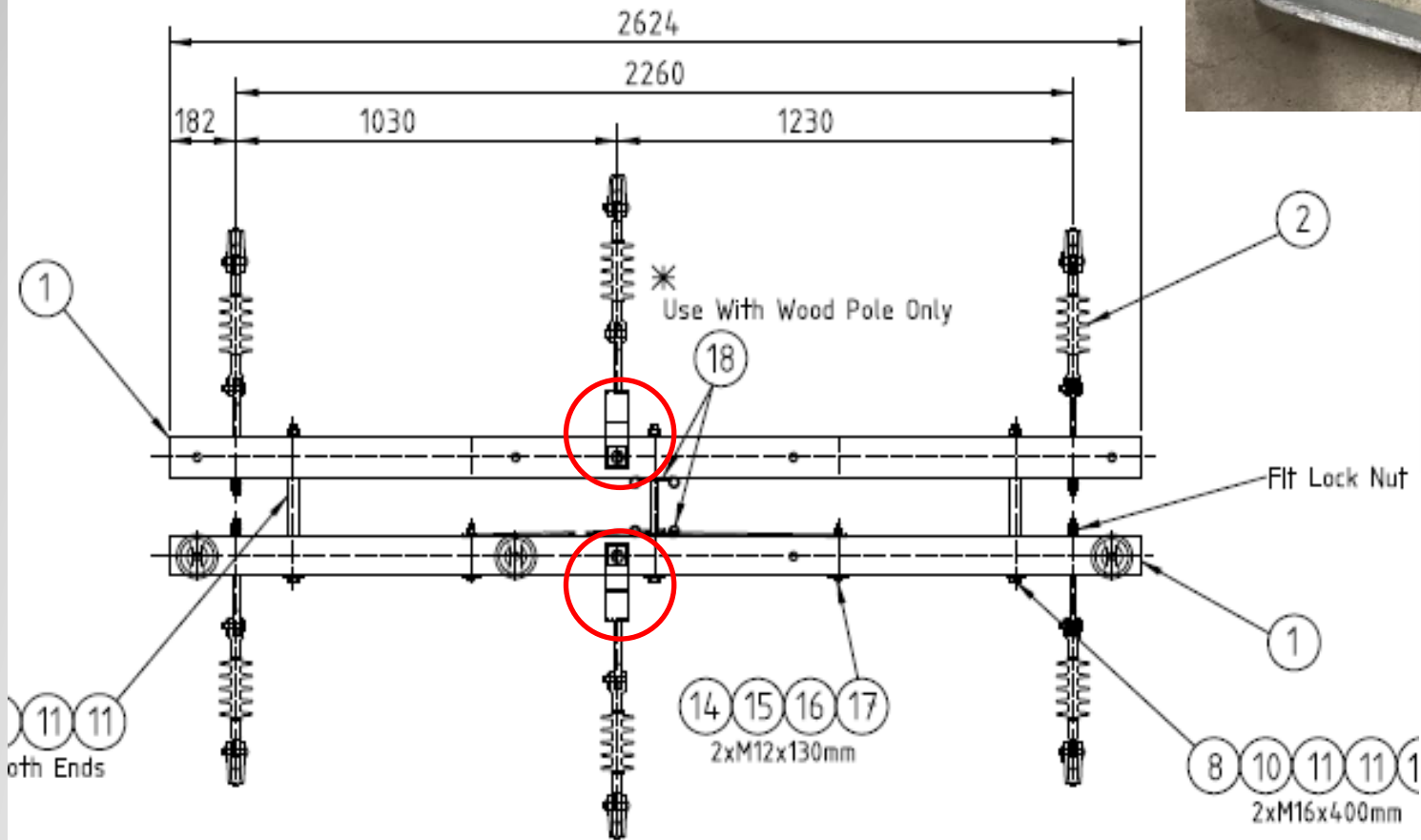


# Design Decisions

How far out to put the centre phase strain?



# Clevis

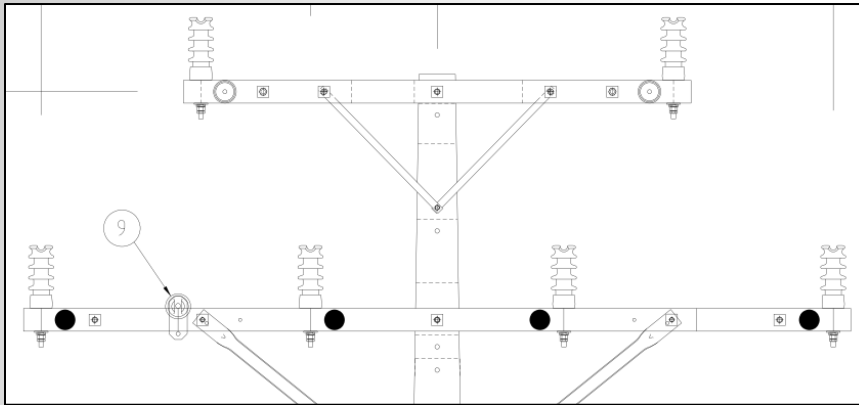


# Standard Arms

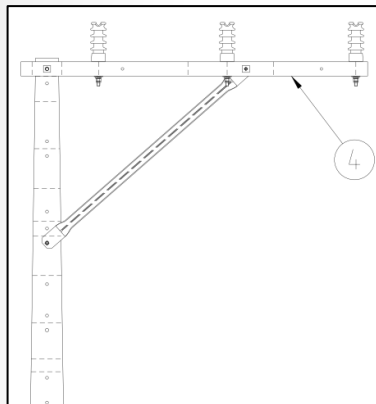
## Standard Lengths

2.2m, 2.6m, 3.2m, 4.1m

## Double Delta Arm



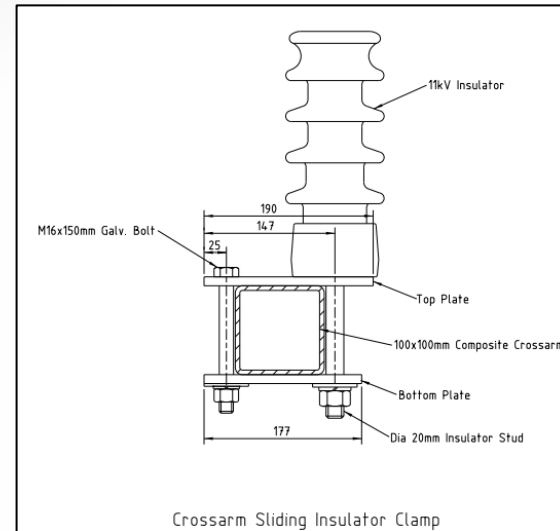
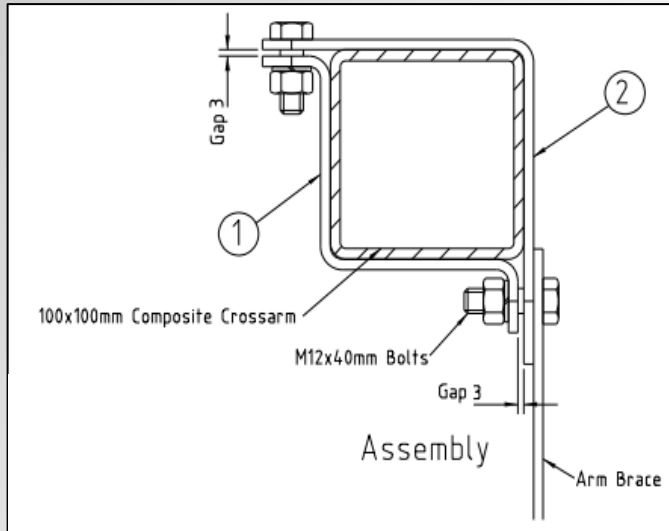
## Offset Arm



## Composite Standard Arms

Length (m)	Configuration	Dimensions (mm)
2.2	Both	100x100
2.4	Offset & ABS takeoff	100x100
2.6	Both	100x100
3.2	Both	100x100
3.6	Dual Circuit	100x100
4.1	Both	100x100

# Components & Handling



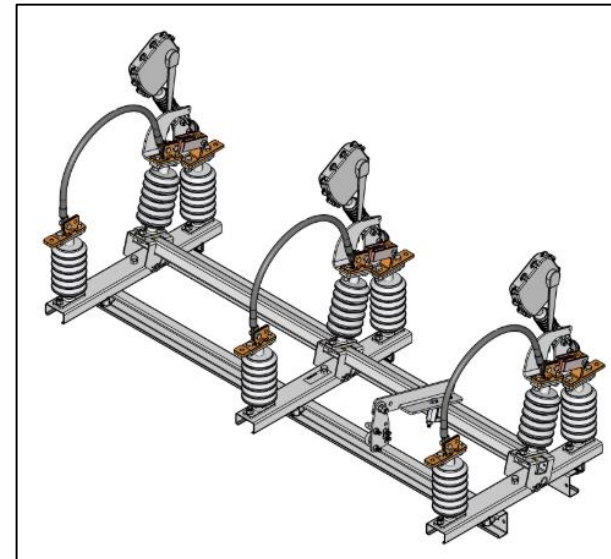
**SOP-84 Handling Composite Crossarms**

**unison**  
The Powerlines People

**Preventing damage to composite crossarms**

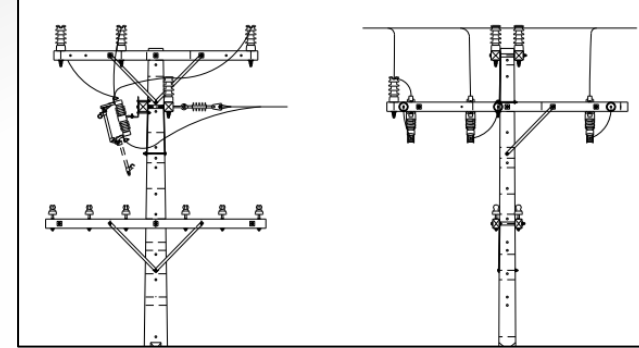
The table below summarises what to do to prevent damage to composite crossarms.

	What to do
<b>Transporting</b>	<p>When transporting crossarms:</p> <ul style="list-style-type: none"> <li>do not store crossarms on racks unless the racks have been covered with some form of non-scratch material such as cloth, rubber mats or cardboard, and</li> <li>tie down to prevent movement.</li> </ul> <p><b>Transporting Composite Crossarms</b></p>



# Standard Drawings

Identify standard components  
Develop standard arm assemblies



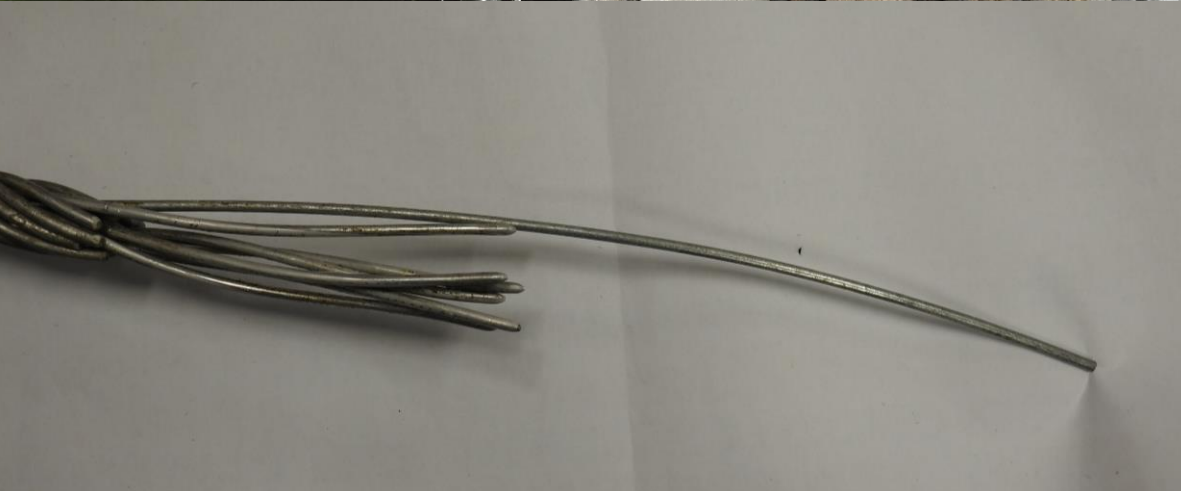
DO NOT SCALE		REMOVE ALL BURRS AND SHARP EDGES				DIMENSIONS IN MILLIMETRES				BILL OF MATERIAL												
PROJECTION																						
S4007-001-00 Rev-A		S4007-002-00 Rev-A		S4007-003-00 Rev-A		S4007-004-00 Rev-A		S4007-005-00 Rev-A		S4007-006-00 Rev-A		S4007-007-00 Rev-A										
S4007-008-00 Rev-A		S4007-009-00 Rev-A		S4007-010-00 Rev-A		S4007-011-00 Rev-A		S4007-012-00 Rev-A		S4007-013-00 Rev-A		S4007-014-00 Rev-A										
S4007-015-00 Rev-A		S4007-016-00 Rev-A		S4007-017-00 Rev-A		S4007-018-00 Rev-A		S4007-019-00 Rev-A		S4007-020-00 Rev-A		S4007-021-00 Rev-A										
File & Plot Data		Amendment		Date	By	Chk	Ap'd	Amendment		Date	By	Chk	Ap'd	Drawn	M.Gosal	Standard Drawing		Scale	NTS	 <small>This drawing is the copyright of Unison Networks Limited and may not be reproduced without prior permission.</small>		
SFLEES		A New Drawing		30/8/18	M.G.									Date	30/8/18	Busck 11.0m Pole Configurations Composite Arms Sheet - 1		S4007-000-01	Issue C			
Date		B Updated		28/1/20	M.G.									Initial								
Time		C Updated		3/12/20	M.G.									Approval								

# Industry Standardisation

- The Lines Company are using our designs. Currently working with PowerCo and Vector to standardise our arms
- Full suite of Busck pole drawing and happy to share

DO NOT SCALE		REMOVE ALL BURRS AND SHARP EDGES		DIMENSIONS IN MILLIMETRES		BILL OF MATERIALS										
S4007-041-00		S4007-042-00		S4007-043-00		S4007-044-00		S4007-045-00								
S4007-046-00		S4007-047-00		S4007-048-00		S4007-049-00		S4007-050-00								
S4007-051-00		S4007-052-00		S4007-053-00		S4007-054-00		S4007-055-00								
S4007-056-00		S4007-057-00		S4007-058-00		S4007-059-00		S4007-060-00								
File & Plot Data	Amendment	Date	By	Chk	App'd	Amendment	Date	By	Chk	App'd	Drawn	M.Gesai	Standard Drawing	Scale	NTS	 <small>This drawing is the copyright of Unison Networks Limited and may not be reproduced without prior permission.</small> <b>unison</b>
\$FILE\$	<b>A New Drawing</b>	30/8/18	MG				30/8/18						Busck 11.6m Pole Configurations Composite Arms Sheet - 3	S4007-000-03	Issue	
Date \$Date\$		25/7/18														
Time \$Time\$		17:28														

# Failure Hierarchy



# Experiences

- Less build variability with standard drawings and no drilling
- More care required when lining up H Structures
- “Lighter – much nicer on my back”
- Some minor damage from handling
- Small number of 125x125mm arms needed for strength





# Stakeholder Feedback

- Designers – Designing with a known strength
- Control Room – Improving reliability from reduced animal trippings
- Field Crews – Lighter and simple to use
- Stores – 33% fewer arm types = less stock
- Asset Management – consistent quality and long life expected



# Any Questions?

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Industry Standardisation – Get in touch if you are interested, full suite of Busck pole drawing available