LAMIFIL

CASESTUDY

LIGHT WEIGHT FOR EFFICIENT HEAVY LIFTING | ACCC ICE+ CONDUCTOR

ACCC ICE+ SOFT CASE STUDY

Light weight for efficient heavy lifting

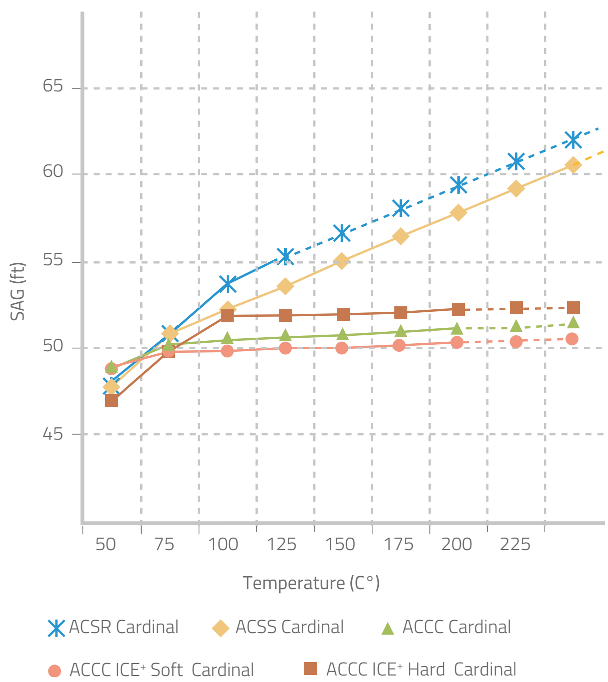
> *"Composite core conductors can be designed and optimised for maximum electrical or mechanical loads."*

THE CHALLENGE

A new line project spanning 50 miles (one circuit, twin bundle) on partly existing towers in a northern coastal area needs to be extended and upgraded. The operator needs to double the line capacity over the short term. The new line should also deliver the highest possible efficiency. The predicted annual average electrical load on the line is high and line losses are an economic and environmental concern for this utility.

Due to the tough climatic conditions, a total distance of about 19 miles of the existing section of the line are expected to be frequently exposed to 2 inch high-density ice loads. The calculated sag for high ice load should be at least 5% less than with the reference ACSR conductor. As environmental constraints exist, and time and capital expenditure are limited, fewer towers are to be constructed in the newly built part of the line.

SAG VS. TEMPERATURE



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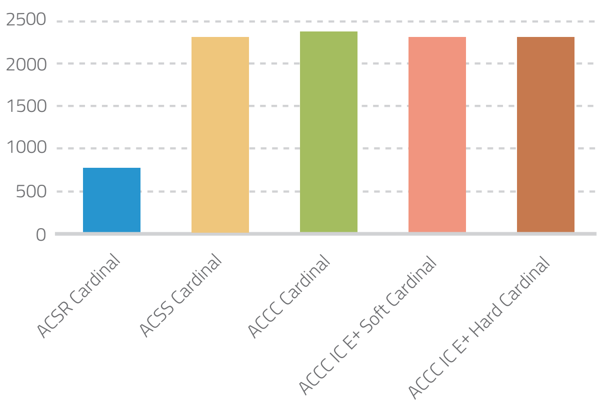
Bringing connections to life

CURRENT AT MAXIMUM OPERATING TEMPERATURE



THE CHOICE FOR ACCC ICE+ SOFT

The operator realises that conductor choice is crucial in safeguarding the reliability and efficiency of the new line. The project would greatly benefit from a solution comprising a single conductor type and size. To address these challenges, the operator ultimately chooses the ACCC ICE+ Soft ULS conductor after careful comparison. This composite core conductor offers superior efficiency while performing very well under ice loads. It also allows the operator to use fewer towers in the new part of the line.

HOW ACCC ICE+ SOFT MAKES THE DIFFERENCE

For this project, the ACCC ICE+ Soft offers the best combination of capacity, high efficiency and optimal sag under ice loads.

The ACCC ICE+ Soft ULS (at 135°C) has twice the capacity of an ACSR (at 75°C), 1620A compared to 810A. At 75°C the ACCC ICE+ Soft ULS conductor reaches 16% more capacity than the ACSR. Running at the same current as the ACSR (at 75°C) the ACCC ICE+ Soft ULS is 27% more efficient. This equals a yearly cost saving of $US 11,000 per mile or $US 3.3 million over the entire line.

The ACCC ICE+ Soft ULS design is 35% to 40% stronger than the comparable ACSR. Under the highest load, the ACCC ICE+ Soft sags 6% less than an ACSR.
Hence, for the new section of the line which is still to be built, the ACCC ICE+ Soft design requires 10 towers (5%) less than an ACSR. Moreover, thanks to the superior sag behaviour, the height of the new towers could be reduced by approximately 2 meters. This represents a significant cost saving in tower construction alone.

The combination of soft aluminium and a ULS composite core makes the ACCC ICE+ Soft ULS the ideal lightweight, super-efficient conductor capable of breaking the ice load burden.

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CONDUCTOR COMPARISON				
Cardinal		ACSR	ACSS	ACCC ICE+ Soft
Conductor specifications				
Overal diameter	inch	1.20	1.20	1.20
Weight	lbs/kft	1,280.8	1,280.8	1,259.3
Strength (RTS)	lbs	33,497	34,284	40,915
DC resistance at 20°C	Ohm/kft	0.018	0.018	0.0134
Conductor performance and efficiency				
Maximum operating T	°C	75	210	175
Current at maximum operating T	A	811	1,845	1,898
Improvement of current at max T	%		127.5%	134%
Current calculations with environment Temp: 40°C; Wind velocity = 2ft/s, Emissivity = Absorption coefficient = 0.5; Sun radiation = 92.9W/ft²; Assumption: "Costs of 1 MWh = $60"				
Joule losses				
Joule losses (811 A; 50Hz)	W/kft	14,743	14,170	10,758
Temperature at given current	°C	75.0	74.0	68.0
Improvement of Joule losses	%		4%	27%
Total cost Joule losses	$/kft	$7,749	$7,448	$5,655
Yearly cost savings per kft conductor	$/kft		$301	$2,094
Greenhouse gas reduction				
CO_2 reduction	%		4%	27%

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