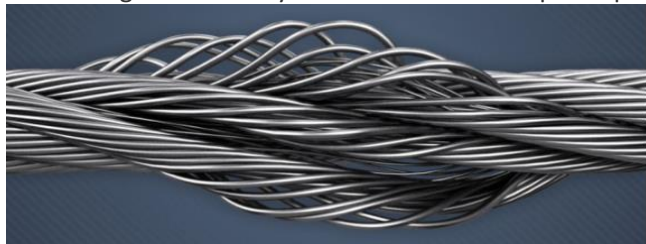
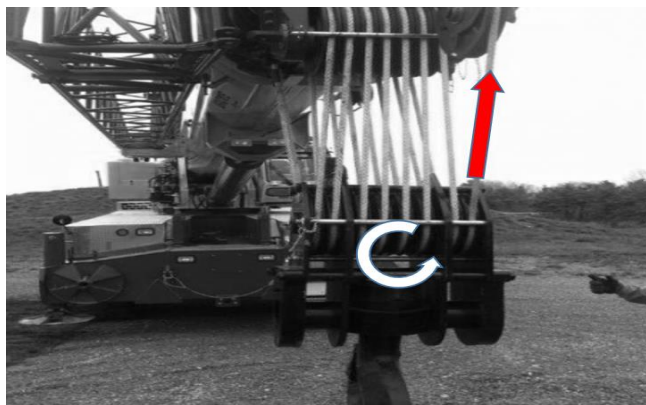


## Minimum Hook Block weights.

Due to the physical attributes of wire ropes and the way they interact with the winch and sheaves on a crane, overloading or exceeding the ropes actual capacity or line-pull is not our only concern. Wire ropes can also be seriously damaged if they are used with insufficient tension or hook weight. This is due to the unwanted compressive loads causing a ‘birdcage’ effect or partial unravelling of the many strands that make up a rope.



This can seriously damage the rope to the point that a replacement is required. A crane winch is designed to feed a rope out under tension. With insufficient hook weight or load, the tension is not maintained between the winch and boom head, and slack rope can accumulate at the winch. Another effect of insufficient hook weight is the hook can be pulled up on one side, particularly if the operator is not smooth with the controls or winches up too fast before the multiple line parts can pass through the sheaves. (See below)



In some cases, the hook block can strike the boom head causing considerable damage. When winching down with insufficient force to pull all the rope through the sheaves, the hook block may not lower initially, but instead drop suddenly creating a serious hazard for anyone underneath. So how do we know how much weight is required on the hook? That depends on your crane configuration and the manufactures recommendation first and foremost. Basically, the longer the boom, and more line pull required for a lift, the more reeving of the rope required which effectively increases the dependence on a dead weight to assist the rope running effectively. This dead weight can be referred to as the

minimum hook weight. As a guide we can also use the formula  $G = L \times M \times n \times F$

Abbreviation	Description	Unit
G	Minimum required hook block weight	kg
L	Overall boom length	m
M	Rope weight	kg/m
n	Reeving	-
F	Factor	-

Explanation of variables to calculate the minimum required hook block weight

Reeving n	Factor F
1	1.31
2	1.34
3	1.36
4	1.39
5	1.41
6	1.44

Rope diameter	Rope weight M
13 mm	0.85 kg/m
15 mm	1.12 kg/m
17 mm	1.45 kg/m
19 mm	1.81 kg/m
21 mm	2.24 kg/m
23 mm	2.67 kg/m
25 mm	3.09 kg/m

Example: 30m of boom, 25mm rope, 5 parts of line

$$30 \times 3.09 \times 5 \times 1.41 = 654\text{kgs}$$

So, your choice of hook block needs to be considered in your lift plan from the get-go. Larger hook blocks or extra hook weights aka ‘cheek-plates’ add more weight to the total load lifted and therefore reduce to maximum load permissible under the hook. (See below)



Sometimes as an industry, we are faced with ‘client requirements’ that exceed current standards and regulations for both the percentage utilisation of the cranes chart AND the allowable line pull. (Usually in the order of 80-90%). To reduce line pull, a larger and heavier multi sheave hook could be required. The heavier hook block reduces the maximum weight of the load that can be lifted while keeping the crane within its rated capacity. The flow-on effect is that more counterweight, a closer setup location to the load, or a larger crane is required. This would require tearing up the lift plan and starting again. At the end of the day, we must follow the manufactures recommendations for minimum hook weights and inspect our ropes regularly for any evidence of damage. Lift plans need to factor in all requirements and standards including those of the client’s. If these cannot all met, then a rethink is required. When we make last minute changes on the fly, (excuse the pun), we run into problems. [Stay Safe -CICA](#)