CICA – Vic / Tas Branch
Crane Safety Bulletin
#295 December 2021

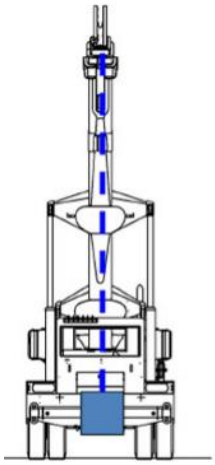
Articulated pick and carry crane side slope deration

Greetings all, today we are going to talk about articulated crane side slope deration.

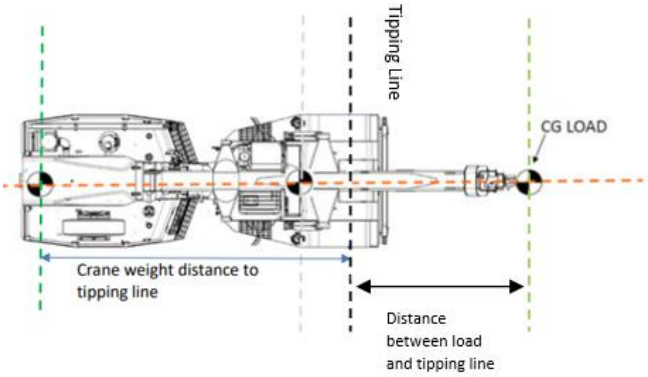
Due to their mobility and versatility as a crane, they are often used in a wide variety of applications.

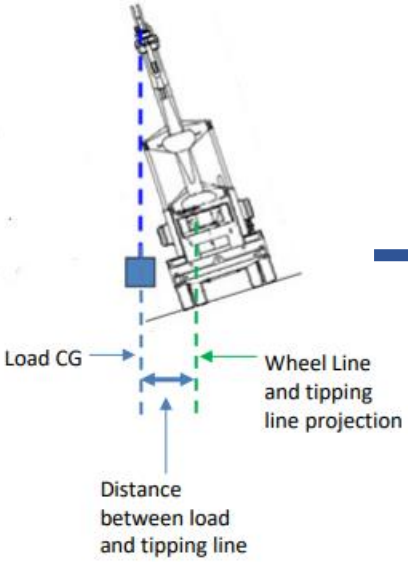
The articulated pick and carry cranes have unique design characteristics and features that differentiate them from slewing cranes. On one hand, these features make them popular for a vast number of lifting tasks, on the other hand, it means the crane operator needs to have the relevant skills and knowledge to utilise these features.

One of key areas of interest to industry is articulated crane side slope deration. Why is this important? Because lifting on a side slope induces a side load as the load swings down the slope and this affects the stability tipping line of the crane. Any deviation to firm level conditions requires the rated capacity to be reduced accordingly to the manufacturer's recommendations.

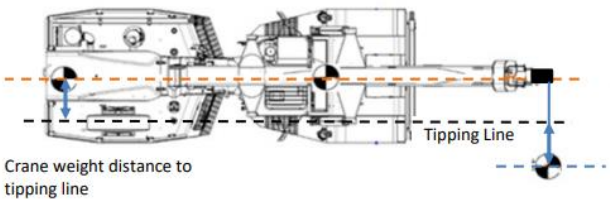


Crane on
levelled ground





Crane on
side slope



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How do we calculate the articulated crane capacity when the crane needs to operate on side slopes? Deration load charts are provided by manufacturers to guide the operator how to calculate the rated capacity reduction when a side slope is encountered. Crane operators shall follow the deration percentage specified on the chart to calculate the appropriate crane rated capacity for their lifting configuration and environment. See an example below.

If a Franna AT-20 crane is operating at 6 meter radius with 10 meter boom length and articulated at 40°. With a load chart below, it has a rated capacity of 4500kg. When it's operating on a side slope up to 5°, according to the side-slope deration chart, the crane capacity shall reduce 40% to:

4500kg – 4500kg x 40% = 2700 kg (Don't forget to further deduct weight of hook block and hook!)

LMI Duty **01**
Lifting on WINCH

RC (KG) LESS THAN 10 DEG ARTICULATION
RC (KG) GREATER THAN 10 DEG ARTICULATION
BOOM ANGLE OR (RADIUS AT 0 DEG BOOM ANGLE)

Mass of slings & hook block to be added to load
Read and understand warning notes before operating crane
Loads above bold red line are structural

RADIUS	BOOM LENGTH (m)														
	5.67	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	10.50	11.00	11.50	12.00	12
1.6	16800	16250	15450	14900											
	12600	12600	12600	12600											
	48	51	54	57											
2.0	16800	16800	16500	15700	15100	14700	14350								
	12600	12600	12600	12600	12600	12600	12600								
	42	46	50	53	56	58	60								
2.5	13900	13900	13900	13850	13850	13850	13850	13200	13000						
	12150	12150	12100	12100	12100	12100	12100	12050	12050						
	34	39	44	48	51	54	56	58	60						
3.0	11450	11450	11450	11400	11400	11400	11400	11400	11400	11150	10250				
	9950	9950	9950	9950	9950	9950	9900	9900	9900	9900	9900				
	25	31	37	42	46	49	52	55	57	59	60				
3.5	9650	9650	9650	9650	9650	9650	9650	9650	9650	9650	9500	8150	7500		
	8400	8400	8400	8400	8400	8400	8400	8400	8350	8350	8350	8150	7500		
	8	20	29	36	41	45	48	51	53	55	57	59	60		
4.0	9450	8550	8350	8350	8350	8350	8350	8350	8300	8300	8300	7600	7000	6700	64
	8200	7450	7250	7250	7250	7250	7250	7250	7200	7200	7200	7200	7000	6700	64
	(3.57)	(3.90)	19	28	35	39	43	47	49	52	54	56	57	59	6
4.5			7500	7300	7300	7300	7300	7300	7300	7300	7300	7150	6550	6250	60
			6500	6350	6350	6350	6350	6350	6300	6300	6300	6300	6300	6250	60
			(4.40)	19	27	34	38	42	45	48	50	52	54	56	5
5.0				6650	6500	6500	6500	6500	6500	6500	6500	6500	6150	5900	56
				5750	5600	5600	5600	5600	5600	5600	5600	5600	5600	5600	56
				(4.90)	18	27	33	37	41	[illegible]	47	49	51	53	5
6.0					5950	5350	5250	5250	5250	5250	5250	5250	5250	5250	50
					5100	4600	4550	4550	4550	4500	4500	4500	4500	4500	45
					(5.40)	(5.90)	17	25	31	35	39	42	45	47	4
7.0							4850	4450	4400	4400	4400	4400	4400	4350	43
							4200	3800	3750	3750	3750	3750	3750	3750	37
							(6.40)	(6.90)	16	24	29	34	37	40	4
									4100	3750	3700	3700	3700	3700	37

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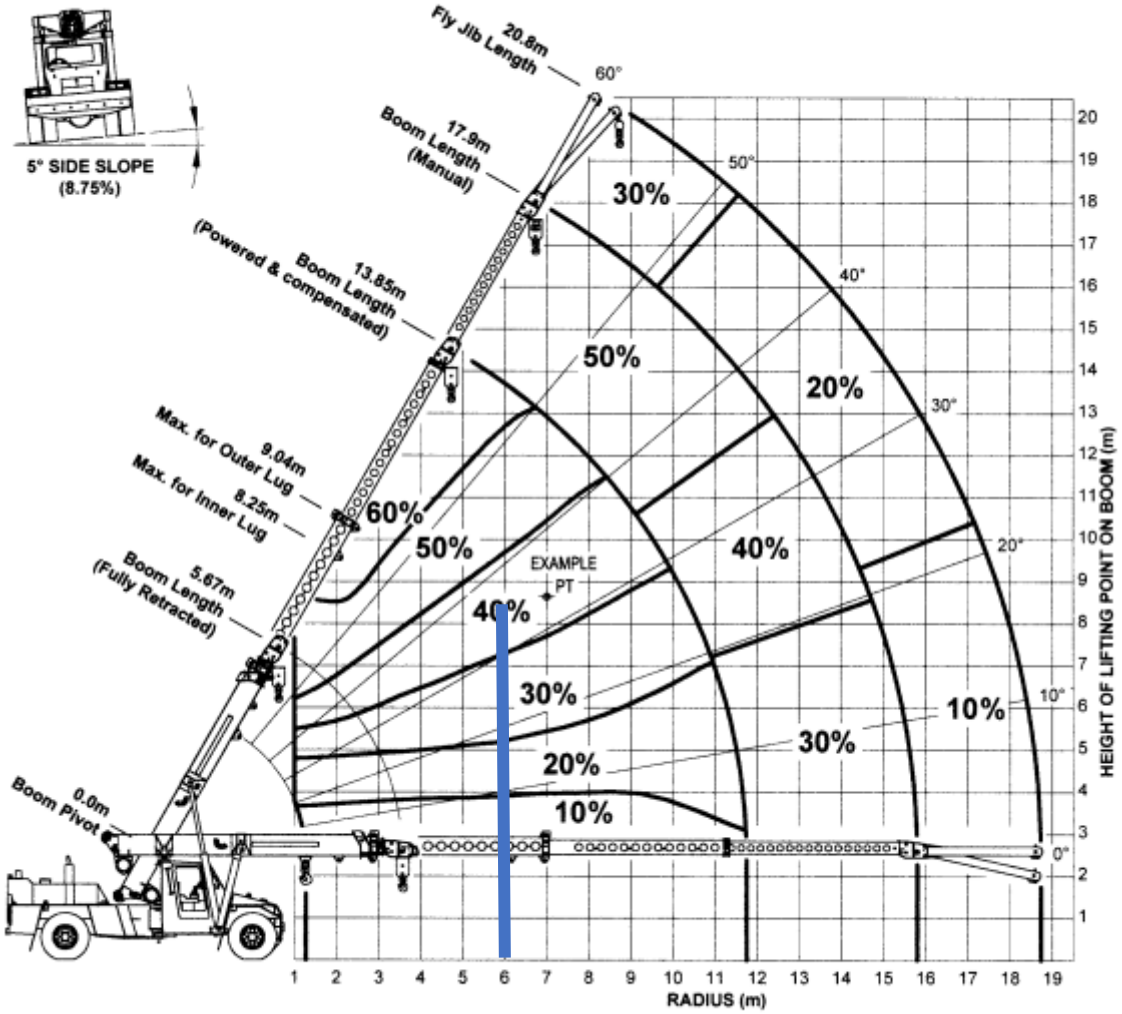

Figure 1: Percentage Deration Chart for AT-20 at 5° Side Slope

To assist you with planning your lift using articulated prick and carry cranes, CICA together with Multiplex have developed an easy-to-use side slope deration calculation tool according to the manufacturer's instructions.

1. Select your crane model, boom length and radius
2. Enter the articulation degree and side slope degree
3. Choose the load weight required to lift, to determine whether the load is within the crane's rated capacity.

The picture below demonstrates how the calculation tool works, using the calculation example above, when lifting a load of 2.5 tones, 2500kg ÷ 2700kg = 92.5% of the rated capacity is used, this is the same as shown under the RC in the picture.

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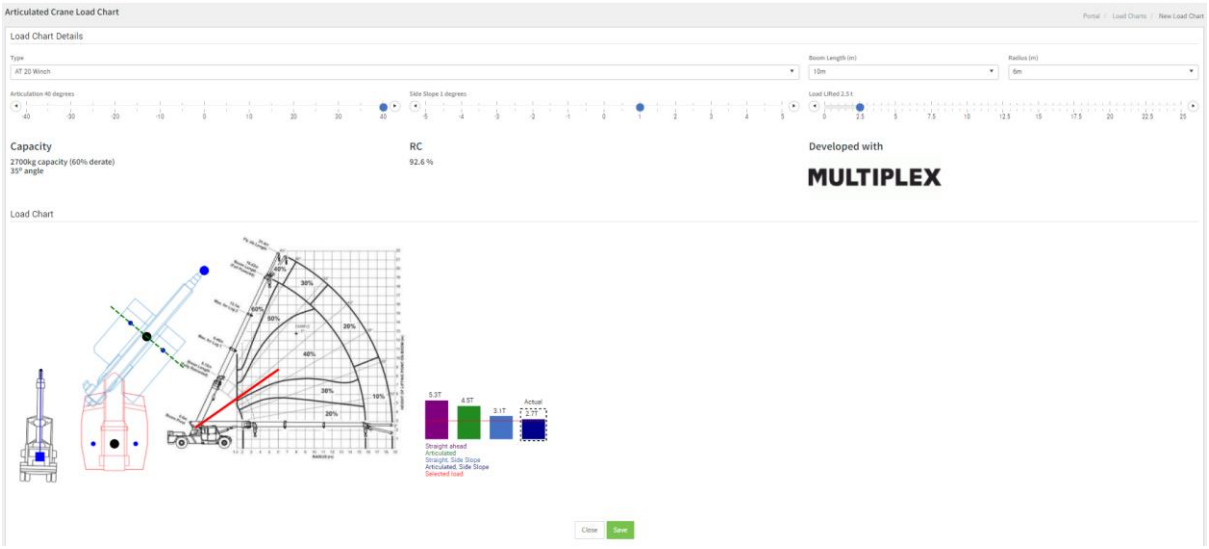
The calculation tool is available at this link: https://www.cica.com.au/resources-safety
NB: CICA Members can save, store and send the calculations through the CICA Member Portal



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