

thick webs for good lateral-load resistance and tapered flanges helpful for self-alignment of trolley wheels. Recently, proprietary tracks described above have been increasingly gaining in popularity. The runway beam suspension and bracing details for underhung cranes are the same as for monorails, except that only one of the two runways needs to be laterally braced to allow for variations in alignment and crane deflections.³

Since both monorails and underhung cranes can use the same design of patented track, they can be interconnected by various interlocking devices and switches. The resulting combined crane coverage can be custom-tailored to the process at hand, yet very cost-efficient.

15.5.3 Design Data

An example of minimum clearances required for single-girder underhung cranes is given in Fig. 15.8, reproduced with permission from Ref. 12. Figure 15.8 also includes maximum crane-wheel loads, crane weights, and hoist data. ANSI MH 27.1 provides additional information on some design issues relating to underhung cranes.

As explained in Sec. 15.4.5, rafters of main frames which support underhung cranes should have two-sided welds connecting the flanges to the web.

Whenever proprietary runway-beam sections, stops, or switches are specified, it is best to let the crane supplier provide all of them for the sake of product compatibility. Standard-section runway beams can be provided by the metal building manufacturer if required by contract.

15.6 TOP-RUNNING BRIDGE CRANES

15.6.1 System Description

A typical top-running bridge crane is supported on building columns and provides crane coverage for most of the aisle—the space between the columns. Crane movement is effected by two end trucks riding on top of rails supported by runway beams. The speed of travel is generally higher than that of underhung cranes.

The crane bridge can consist of a single girder that carries a trolley hoist traveling on its bottom flange monorail-style (Fig. 15.9*a*), or of a double girder that supports a top-running trolley (Fig. 15.9*b*). Double-girder cranes can lift heavier loads and can accommodate greater lifting heights than single-girder cranes; even greater loads can be lifted by box-girder cranes.

Top-running bridge cranes are mostly electrically operated, except for some single-girder models, and are normally controlled by pushbutton pendants. Some heavy box-girder cranes feature operator-controlled attached cabs.

Single-girder top-running cranes are limited in lifting capacities from 1 to 10 tons and to spans from 20 to 60 ft. They represent a good choice for budget-conscious owners whose modest material handling needs can be satisfied with the crane of a low service classification. A sample of dimensional and loading data for single-girder cranes is shown in Fig. 15.10.

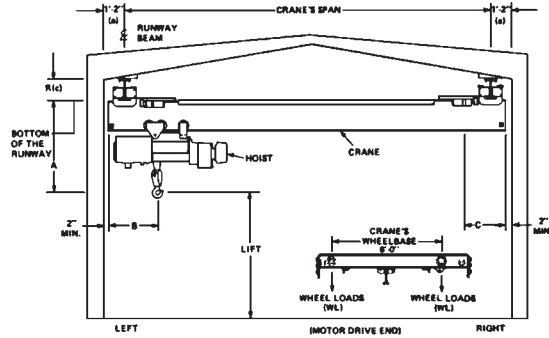
Double-girder pendant-operated cranes can lift from 5 to 25 tons, can be designed to higher service classifications, and can span from 30 to 100 ft. The lifting requirements in excess of 25 tons normally call for a box-girder bridge. Some cab-operated box-girder models can lift 250 tons and span up to 100 ft. Double-girder bridge cranes with top-running trolleys offer the largest lifting distances of all the crane types discussed here, and models with low-headroom profile are available for those cases where a few extra inches of headroom are worth the inevitable sacrifices in span and lifting capacity.

An example of dimensional and loading requirements for double-girder cranes is given in Fig. 15.11. (As with all such tables reproduced in this chapter, the cranes produced by other manufacturers do not necessarily conform to these data.) For all top-running cranes, a minimum overhead clearance of 3 in and a minimum side clearance of 2 in are required by CMAA 70 and CMAA 74.

Single girder underhung crane

As the name implies, this crane runs on the bottom flanges of a rail suspended from the roof joists.

This style is most economical for clear-span gabled buildings with continuous rigid frames that feature tapered wall columns if the crane and its load can be supported from the building trusses.



Capacity In Tons	Crane Max. Span In feet	Bottom of Running Beam to Upper Hook Position in inches A	Min. Hook Approach in inches B	Min. Hook Approach in inches C	Crane Product #	Crane Wt.	Wheel Load Per Pair In lbs. WL (b)
1	20	36-1/2	20	21	5260020	1,960#	1,880#
	30	42-1/2	20	21	5260040	3,040#	2,180#
	40	44-1/2	20	21	5260070	4,700#	2,640#
	50	48-1/2	20	21	5260090	6,240#	3,060#
2	20	39-1/4	21	20	5260110	2,180#	3,110#
	30	39-1/4	21	20	5260140	3,000#	3,330#
	40	44-1/4	21	20	5260160	4,700#	3,800#
	50	46-1/4	21	20	5260180	6,240#	4,230#
3	20	45-3/8	41	25	5260210	2,450#	4,720#
	30	42-3/8	45	25	5260230	3,000#	4,870#
	40	47-3/8	49	25	5260250	5,000#	5,420#
	50	51-3/8	56	25	5260270	6,630#	5,870#
5	20	47-3/8	40	25	5260380	2,950#	7,200#
	30	45-3/8	44	25	5260400	3,810#	7,440#
	40	47-3/8	48	25	5260420	5,030#	7,770#
	50	51-3/8	56	25	5260450	7,220#	8,370#
7-1/2	20	50-7/8	35	26	5260580	3,660#	10,750#
	30	52-7/8	38	26	5260600	4,560#	11,000#
	40	56-7/8	42	26	5260630	7,010#	11,670#
	50	57-3/8	50	26	5260650	9,160#	12,260#
10	20	50-7/8	35	26	5260680	3,390#	13,550#
	30	52-7/8	38	26	5260710	4,730#	13,920#
	40	56-7/8	42	26	5260740	6,890#	14,510#
	50	57-3/8	50	26	5260760	9,930#	15,350#

- (a) This dimension includes OSHA minimum lateral clearance of 2 inches.
- (b) Wheel load includes allowance of 15% impact with a maximum hoist speed of 30 FPM standard industrial service. Refer to Acco Structural Beam Guide for other requirements.
- (c) This dimension represents the height of the runway beam. Step 4 of this planning guide will determine this dimension.

Hoists for Single Girder Cranes

Capacity In Tons	Hoist Product #	Bridge Speed (FPM)	Hoist Speed (FPM)	Trolley Speed (FPM)	Hoist Lift In Feet	Hoist Wt.
1	2214600	70	16	65	20	350#
2	2215180	70	15	65	20	380#
3	3250360	70	15	65	23	1,080#
5	3250420	70	15	65	23	1,160#
7-1/2	3373950	70	15	65	25	2,030#
10	3374010	70	12	65	25	2,030#

NOTE: Hoists are single speed with single speed trolley. The 1 and 2 ton hoists are single reeved units. Hook approaches B & C are approximate. Hook moves lateral from high to low hook position. If necessary contact Acco representative for actual dimensions. The 3, 5, 7-1/2 and 10 ton hoists are double reeved units.

FIGURE 15.8 Dimensional and loading data for single-girder underhung cranes. (FKI Industries, Inc.)