December 2020

Knowing Crane Options: Types, Sizes and Supports

Determining the right crane for your building can be the difference in winning or losing out on a project. Knowing the crane capacity is just the first step of many when determining your crane – it is also essential to determine what style of crane you need (Top Running Single/Double Girder, Underhung Single/Double Girder, Monorail, Jib or Gantry) along with the appropriate support (Bracket, Stepped Column or Independent Column). This article will briefly go over each example and some "rules-of-thumb" to follow.

Top Running Bridge Crane

The image to the right shows a double vs single girder Top Running Bridge Crane (TRDG and TRSG) and indicates the typical capacity and bridge spans.

Underhung Bridge Crane

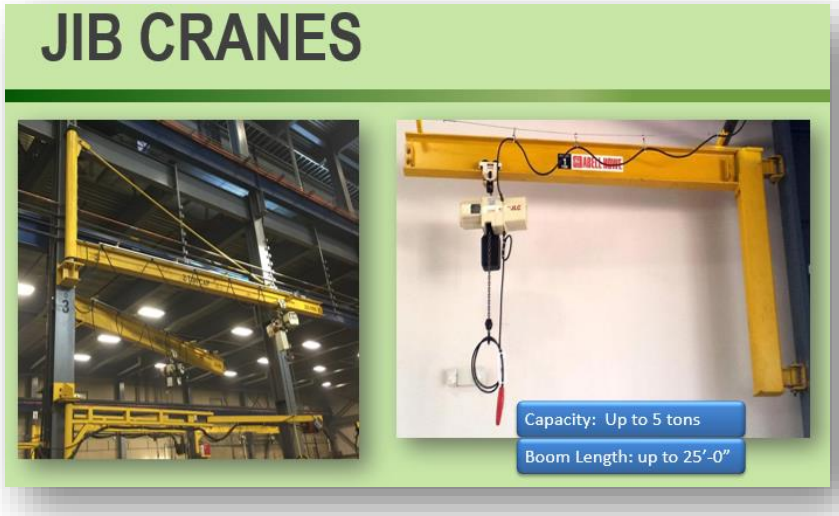
An Underhung Bridge Crane (UHSG or UHDG depending on if it is a single or double girder) usually stays below 10 tons, but has an advantage with clearance needed above the required hook height.

Monorail Cranes

Monorail cranes are similar to UHSG in that they are typically smaller cranes and require very little clearance above the hook height. These cranes usually max out at 5 tons before requiring a different crane type.

Jib Cranes

Jib Cranes are unique due to the 180 degrees rotational arm versus travelling down an aisle/runway. Depending on the vertical clearance, you can choose between a cable-supported boom or a cantilevered boom. The cable-supported boom will give you a lighter crane system typically, but at the cost of adding to the vertical clearance needed.

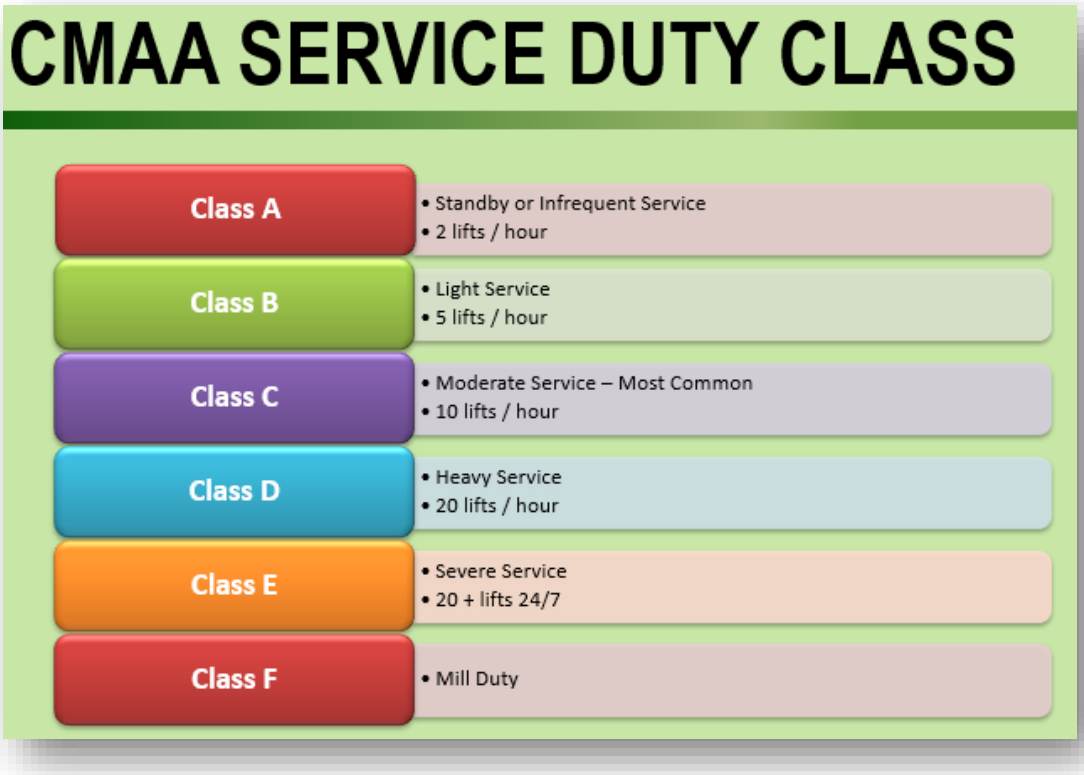


Gantry Cranes

Gantry Cranes are the most expensive crane types but will have much larger capacities/spans if needed.

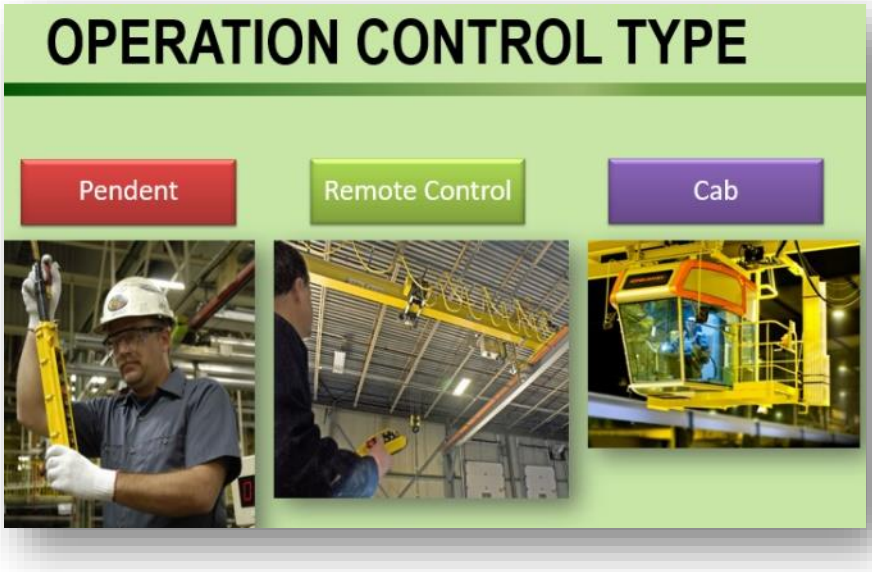
CMAA Service Duty Class

The next criteria needed is determining the CMAA Service Duty Class. This will determine certain criteria needed when designing crane beams, crane stops, and bracing systems. Class A is the "cheapest/lightest" option, while Class F is the "heavy duty/non-stop/expensive" option. The end owner will need to be involved with the determination of the CMAA Service Duty Class.



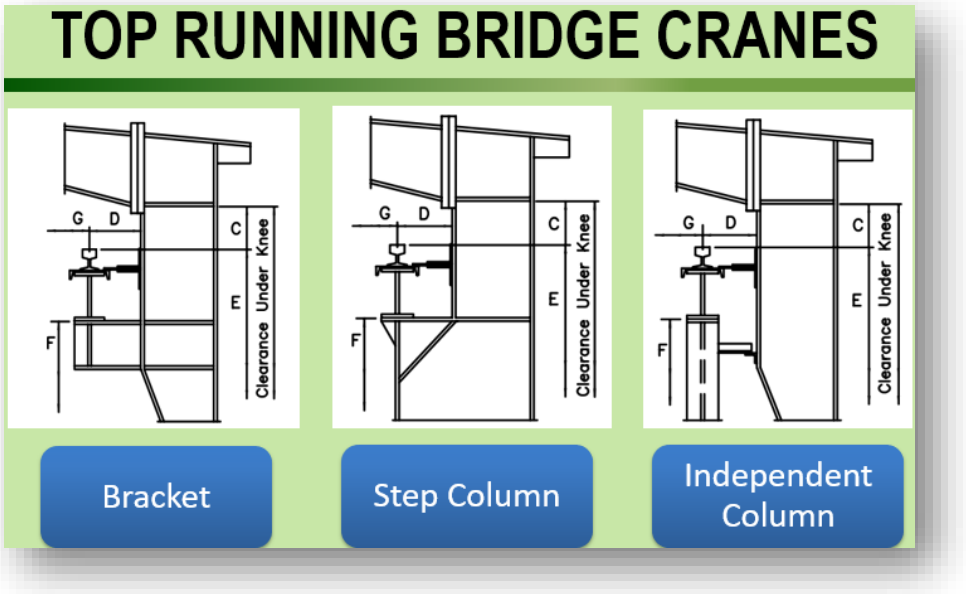
Operation Control Type

Selecting the Operation Control type is also an important step that can help impact the loads the crane system needs to be designed for. If your crane can be controlled by a pendent this will result in the cheapest option, followed by a remote control, and then a cab control.



Top Running Bridge Cranes

When working with your sales/estimating team it is important to have an idea of what support is needed, especially when trying to optimize the floor space. The crane capacity and span will play a big part in determining what is possible and what you can expect. Typically, the bracket support can be designed to resist up to 50 kips before considering a stronger support type. The stepped column support can usually see anywhere from 50-100 kips, and the independent crane column can be designed to see 100+ kips. These numbers are guidelines, rather than hard cutoffs; there are a lot of factors that go into determining the best support type and what is/isn't possible.



To determine the approximate loading each support is seeing we can use this equation:

$$\textbf{Support (kips)} = \frac{[\text{Crane Capacity (tons)} * (2000\ \text{lbs/ton})] + [\tfrac{1}{2} * \text{Bridge Weight (lbs)}] + \text{Hoist/Trolley (lbs)}}{(1000\ \text{lbs/kip})}$$

The more crane information you have at the sales/estimating stage the better, in order to dial in the price. Knowing the CMAA Service Duty Class, Operation Control type, Crane type and which support you can expect can help set the project up for success.