Autoquip Technical Bulletin

December 9, 2011

OFF-CENTER LOADS on MOVING (Up/Down) SCISSORS LIFTS

Catalog End and Side load ratings (primarily on In-Plant lifts) as well as Axles load ratings (primarily on Dock lifts) are **STATIC** ratings. This means that the ratings are based on a raised scissors lift safely supporting the off-centered load while the lift is static (not raising or lowering) during load transfer only. These catalog load ratings are NOT intended to be applied to a lift that is dynamic (raising or lowering). The reason for this is that all industrial scissors lifts have rated lifting capacities which assume that the load is centered and/or evenly distributed during raising & lowering. Industrial scissors tables are therefore susceptible to premature component failure when exposed to repeated, uneven loading of the scissors assembly while the lift is moving. In more extreme cases, the scissors legs will not track straight – causing further wear or damage to the lift.

Off-center loads over the side (the edge parallel to the leg set) of a scissors mechanism are more problematic than off-center loads over the end (the edge that is perpendicular to the leg set) of a scissors mechanism. This is due to the fact that loads over either end are shared well between the two scissors pairs and place the legs in bending. Off-centered loads over either side, however, are not shared well between the scissors pairs and the unequal amounts of bending in the two scissors pairs causes twisting in the leg assembly – resulting in one or more of the following undesirable effects: premature bearing wear at all pivot points, permanent structural deformation of load-bearing components, side-loading of cylinders and accelerated piston/seal wear, side-loading of rollers and improper roller tracking, and the promotion of lift platform deflection and load instability.

To understand the effect of a given load size/distribution, it is important to locate the center of gravity (CG) of that load. Wherever possible, load CG's should be centered over the base frame of the scissors lift in both width and length. In fact, many times an off-center load can be "equalized" by the addition of one or more design features:

1. If possible, turn the scissors lift 90 degrees so that what was an eccentric load over the side is now over the end of the scissors
2. Install the platform off-center from the base frame in order to place the CG of the load which is on the platform over the center of the base
3. Add "stabilizing" scissors legs at the end(s) of the lift that run perpendicular to the lifting scissors legs, which help to support the eccentric load because the load is located over the ends of these added legs
4. Adding a counterweight to the opposite side of the platform where the eccentric load is occurring, effectively moving the location of the overall CG of the load over the center of the base frame
5. As a last resort – primarily because premature wear of critical components is merely postponed, not eliminated – specify a scissors lift model which has a rated lifting capacity that is much higher than required for the application

December 9, 2011

When eccentric loads are absolutely unavoidable, they must be limited to no more than what is shown in Fig. 1.

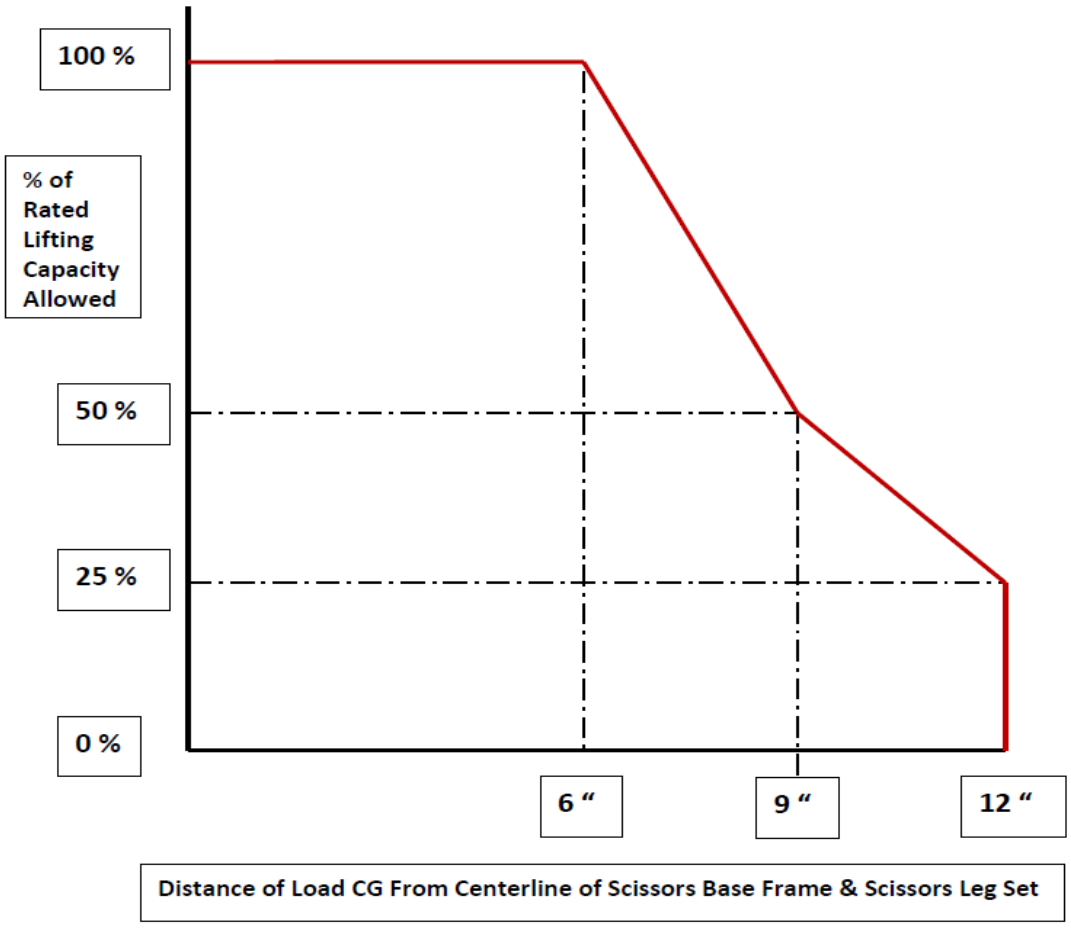

Figure 1

Although the exact effects of eccentric loading in dynamic lifts are difficult to quantify, adoption of the one or more of the design features above to counter these effects, and/or the adherence to the off-centered load limitation chart in Figure 1, will greatly reduce the impact of eccentric loading on the performance and longevity of the lift, as well as improving the stability of the load being supported by the lift.

NOTE: Autoquip should always be notified when eccentric loading in dynamic lifts is unavoidable, in order to recommend a design solution that is adequate for that application.