

Aircraft ULD Offset Load Comparison

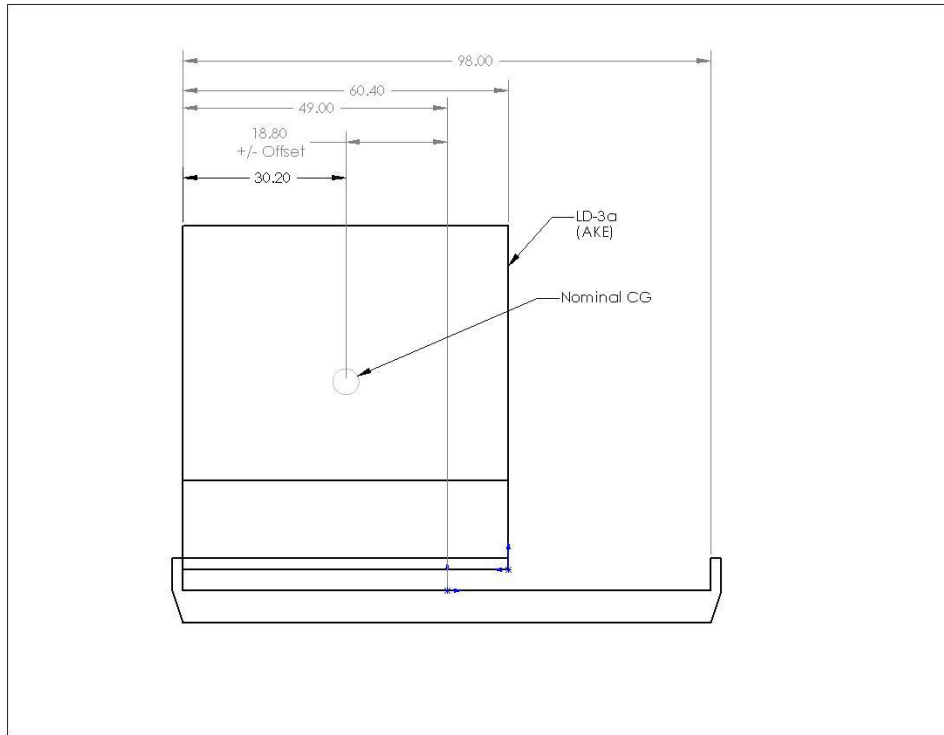


Figure 1
LD-3a ULD on 98" Platform

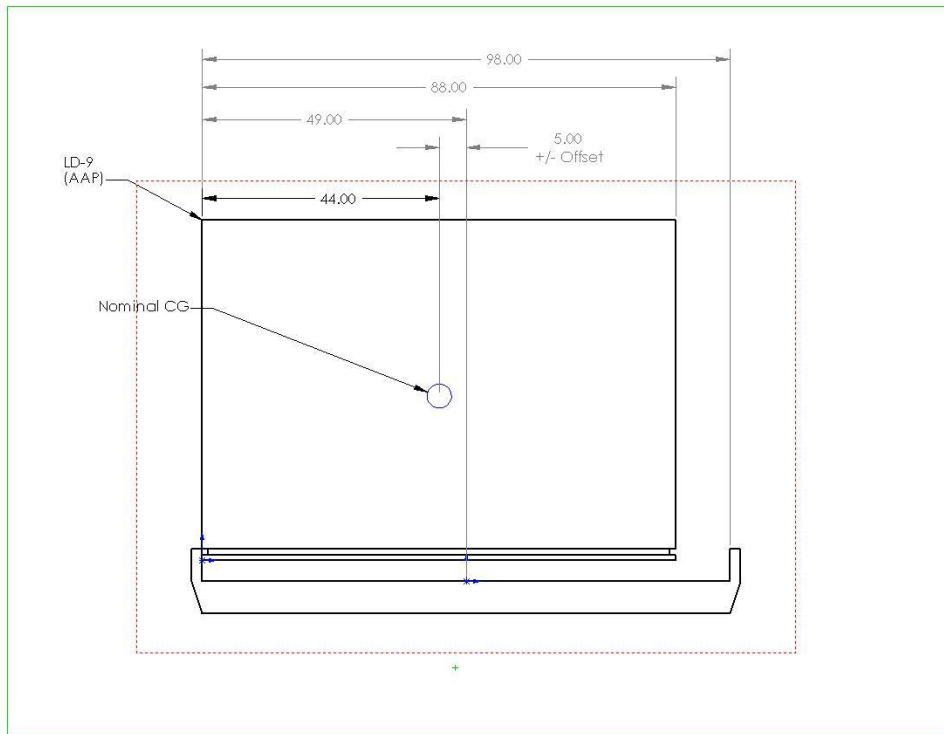


Figure 2
LD-9 ULD on 98" Platform

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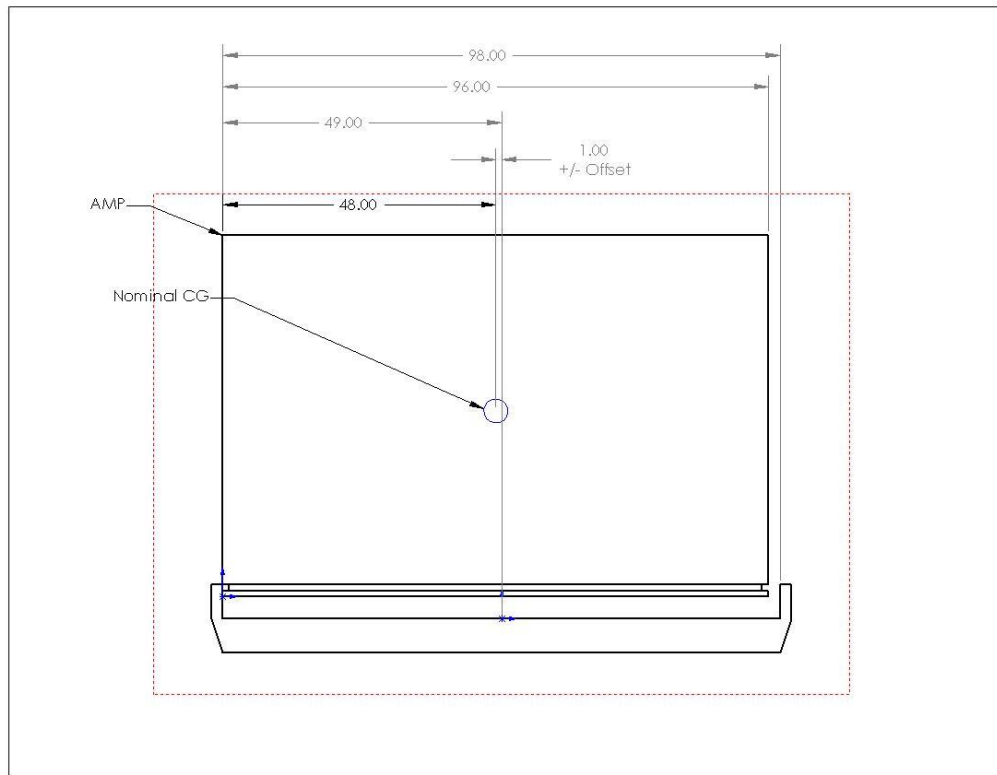


Figure 3
AMP ULD on 98" Platform

Figures 1-3 show typical ULD widths situated on a 98" wide platform, with the ULD's shifted to one side; this configuration would be for a cargo door that accommodates the 88" or 96" width ULD's.

For cargo doors that accommodate only the 60.4" width ULD's, the container location could be centered on the platform or shifted to one side. This depends upon the manufacturer and the model of the loader.

If the platform were 128" wide, this accommodates 125" wide ULD's and cargo doors. Figures 1-3 would change in the platform width and a significant increase in the CG offset from the platform centerline.

Aircraft ULD Offset Load Comparison

Platform Width	Aircraft ULD							Moment		Moment Comparison Maximum Load and AMP Nominal CG Offset		Moment Comparison Maximum Load and AMP Maximum CG Offset	
	Designation	Width	10% of Width	Max Gross Weight	Nominal CG Offset	Maximum CG Offset	No. of ULD's on Platform	Nominal CG Offset	Maximum CG Offset	Nominal CG Offset	Maximum CG Offset	Nominal CG Offset	Maximum CG Offset
		(in)	(in)	(LB)	(in)	(in)		(LB-in)	(LB-in)				
98	LD-3a	60.4	6.04	3,500	18.8	24.84	1	65,800	86,940	4.4	5.8	0.4	0.5
98	LD-3a	60.4	6.04	3,500	18.8	24.84	2	131,600	173,880	8.8	11.6	0.8	1.1
98	LD-6	60.4	6.04	7,000	18.8	24.84	1	131,600	173,880	8.8	11.6	0.8	1.1
98	LD-9	88	8.8	13,300	5	13.8	1	66,500	183,540	4.4	12.2	0.4	1.2
98	AMP	96	9.6	15,000	1	10.6	1	15,000	159,000	1.0	10.6	0.1	1.0
128	LD-3a	60.4	6.04	3,500	33.8	39.84	1	118,300	139,440	5.3	6.2	0.6	0.7
128	LD-3a	60.4	6.04	3,500	33.8	39.84	2	236,600	278,880	10.5	12.4	1.1	1.3
128	LD-6	60.4	6.04	7,000	33.8	39.84	1	236,600	278,880	10.5	12.4	1.1	1.3
128	LD-9	88	8.8	13,300	20	28.8	1	266,000	383,040	11.8	17.0	1.3	1.8
128	LD-9	125	12.5	13,300	1.5	14	1	19,950	186,200	0.9	8.3	0.1	0.9
128	AMP	96	9.6	15,000	16	25.6	1	240,000	384,000	10.7	17.1	1.1	1.8
128	AMP	125	12.5	15,000	1.5	14	1	22500	210000	1.0	9.3	0.1	1.0

10% of Width (in) - Location Tolerance of the CG on either side of the nominal location.

Nominal CG Offset (in) = 0.50*Platform Width - 0.50*Width

Maximum CG Offset (in) = Nominal CG Offset + 10% of Width

Moment - Nominal CG Offset (LB-in) = Max Gross Weight * Nominal CG Offset

Moment - Maximum CG Offset (LB-in) = Max Gross Weight * Maximum CG Offset

Table 1
ULD Offset Comparison

Table 1 quantifies a brief comparison of the center of gravity offsets for four typical ULD's on two platform widths (98" and 128"). The ULD's were selected based upon their base dimensions (60.4" width, 88" width and the 96" x 125" base).

For the purpose of the comparisons, I chose to use the 15,000 LB rated AMP ULD as the reference. Also, I presented separate comparisons based upon the nominal CG locations and the maximum CG locations.

The moment due to the offset load was always greater with the lighter loads. For example,

1. 98" platform
2. LD-3a ULD, single
3. Nominal CG
4. The moment comparison is 4.4 times that for the AMP ULD.

A second example is,

1. 128" platform
2. LD-9 ULD
3. Maximum CG
4. The moment comparison is 1.8 times that for the AMP ULD.

These offset loads significantly affect the structural stress and the deflection of the platform support. Thus, the design of the structure that supports the platform should include the offset loading from the lighter ULD's.