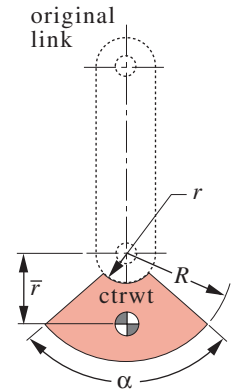


TABLE P12-4 Data for Problem 12-40 Lengths in mm.

Row	L_1	L_2	L_3	L_4	r	e	d	t	Material
a	375	100	300	200	13	13	6	4	Steel
b	150	75	250	300	12	15	6	4	Steel
c	50	125	375	350	15	15	8	6	Aluminum
d	250	150	475	400	20	20	10	3	Titanium
e	225	50	200	175	15	16	8	6	Aluminum
f	475	175	625	250	25	30	12	5	Steel

†12-40 Table P12-4 gives the geometry and kinematic data for several fourbar linkages similar to that shown in Figure P12-11 (p. 657). For the row(s) assigned in Table P12-4, design counterweights of the type shown in Figure P12-15 for links 2 and 4 to completely force-balance the linkage by the method of Berkof and Lowen. The square ends of link 3 extend a distance e from the hole center. The other links' ends are full round with a radius r about the hole center. All pin holes have the same diameter d , and all links have the same width, $2r$, and thickness t . The hole-to-hole link lengths are L_1 , L_2 , L_3 , and L_4 . The counterweight will be integrally machined with the link and will have the same thickness as the link.



$$\bar{r} = \frac{2}{3} \frac{(R^3 - r^3)}{(R^2 - r^2)}$$

$$A = \frac{\alpha}{2} (R^2 - r^2)$$

FIGURE P12-15

Problem 12-40

† These problems are suited to solution using *Mathcad*, *Matlab*, or *TKSolver* equation solver programs.