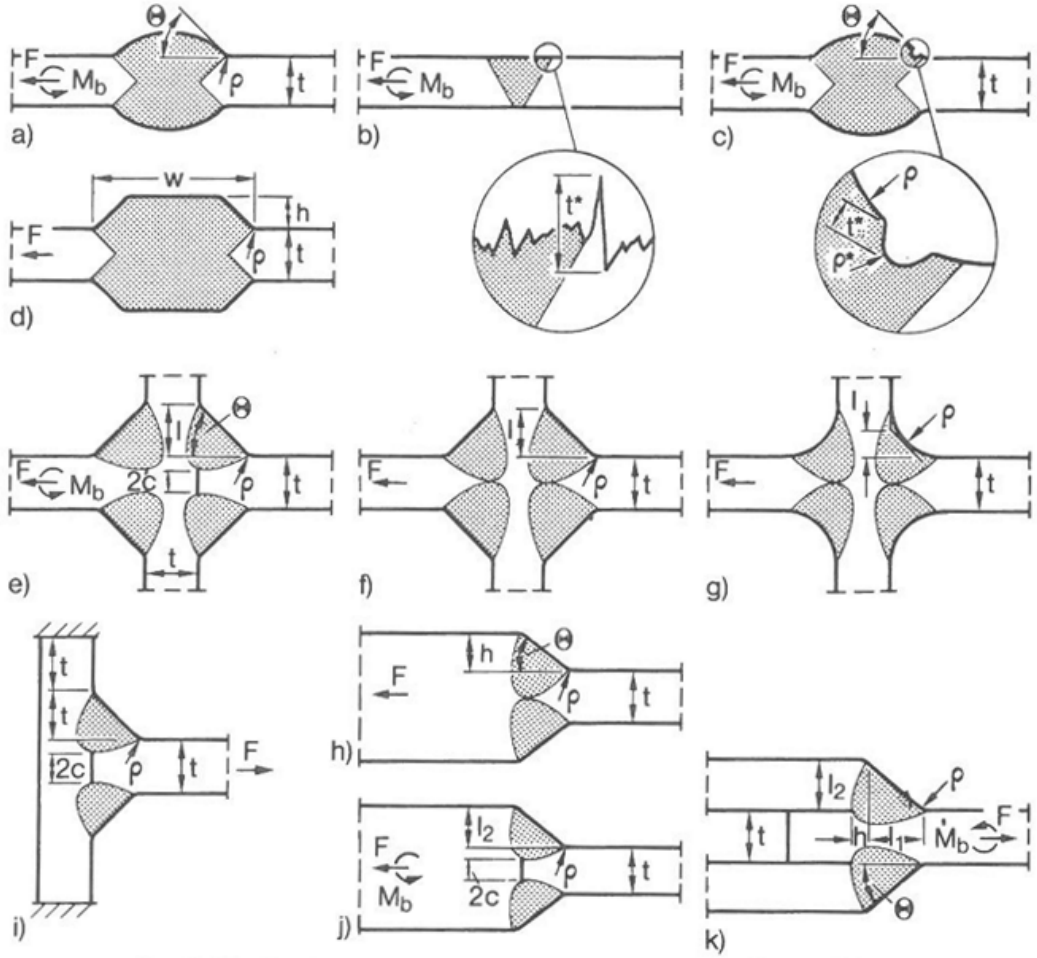

Fig. 5.15. Variants of welded joints under tensile and bending load reviewed by Lawrence[297] in respect of notch stress concentration (see Table 5.2): butt joint (a), machined butt joint with surface defect (b), butt joint with undercut notch (c), butt joint with fillet welds (d), cruciform joint with root gap (e), without root gap (f) and with concave fillets (g), T-joint with root gap (i), shoulder-notched bar without root gap (h) and with root gap (j), overlap joint (k)

Table 5.2. Stress concentration factors of welded joints; after Lawrence[297]

Welded joint type[a]	Site	Stress concentration factor	Loading
Butt welds (a)	Toe	$1 + 0.27(\tan\theta)^{1/4}(t/\rho)^{1/2}$	Tension
	Toe	$1 + 0.165(\tan\theta)^{1/6}(t/\rho)^{1/2}$	Bending
Cruciform joints (e)	Toe	$1 + 0.35(\tan\theta)^{1/4}[1 + 1.1(c/l)^{5/3}]^{1/2}(t/\rho)^{1/2}$	Tension
	Toe	$1 + 0.21(\tan\theta)^{1/6}(t/\rho)^{1/2}$	Bending
	Root	$1 + 1.15(\tan\theta)^{-1/5}(c/l)^{1/2}(t/\rho)^{1/2}$	Tension
	Root	$1 + 3.22(c/t)^{1/8}(t/\rho)^{1/2}$	Bending
Overlap joints (k)	Toe	$1 + 0.6(\tan\theta)^{1/4}(t/l_1)^{1/2}(t/\rho)^{1/2}$	Tension
	Toe	$1 + 0.24(\tan\theta)^{1/6}(t/\rho)^{1/2}$	Bending
	Root	$1 + 0.50(\tan\theta)^{1/8}(t/\rho)^{1/2}$	Tension

[a]Lettering according to Fig. 5.15.

297 Yung J Y and Lawrence F V, 'Analytical and graphical aids for the fatigue design of weldments', *Fatigue Fract Eng Mater Struct*, 1985, **8** (3), 223–241.

FATIGUE ASSESSMENT OF WELDED JOINTS BY LOCAL APPROACHES

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