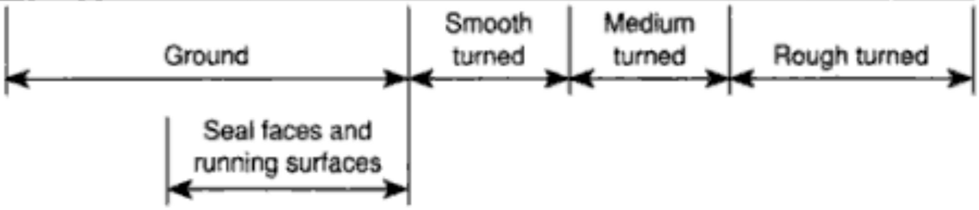
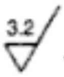
R_a μm BS 1134	0.025	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.3	12.5	25	50
N-grade DIN ISO 1302	N1	N2	N3	N4	N5	N6	N7	N8	N9	N10	N11	N12





– This symbol specifies a machined surface of 3.2 μm R_a

Figure 6.9 Surface finish

(remember this terminology?) – the remainder of the dimensions will not be critical. There are two ways to deal with this: first, an engineering drawing or sketch can be annotated to specify that a *general tolerance* should apply to features where no specific tolerance is mentioned. This is often expressed as ±0.5 mm. Alternatively, the drawing can make reference to a 'general tolerance' standard such as BS EN 22768 (ref. 5) – it gives typical tolerances for linear dimensions as shown in Table 6.1.

Table 6.1

Dimension	*Tolerance*
0.6 mm – 6.0 mm	±0.1 mm
6 mm – 36 mm	±0.2 mm
36 mm – 120 mm	±0.3 mm
120 mm – 315 mm	±0.5 mm
315 mm – 1000 mm	±0.8 mm

It is easy, once you have become familiar with these detailed technical aspects, to lose sight of the overall objective of the basic engineering design phase of engineering design, and to want to apply these techniques of tolerancing and fine metrology to every part of a machine or mechanism. The skill lies in *selection*; good design is about taking pains to use these systems when they are needed but not to use them excessively, or to think that they are somehow a substitute for innovative design thinking.