

Assessment of surface texture —

Part 1: Methods and instrumentation

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Foreword

This Part of BS 1134 has been prepared under the direction of the General Mechanical Engineering Standards Committee and is a revision of BS 1134-1:1972, which is withdrawn.

The definitions given in this Part of BS 1134 supersede those given in BS 6741-1 and BS 6741-2. BS 6741-1 and BS 6741-2 are accordingly withdrawn.

BS 1134 was first issued in 1950 and revised in 1961 and 1972. This revision takes account of the 1982 edition of ISO 468 "*Surface roughness — Parameters, their values and general rules for specifying requirements*" published by the International Organization for Standardization.

BS 1134-1:1972 dealt with two parameters, R_a and R_z , whereas this edition covers the additional parameters R_y , S_m , S and t_p .

Additional parameters may be found in ISO 4287-1:1984 "*Surface roughness — Terminology — Part 1: Surface and its parameters*" and in ISO 4287-2:1984 "*Surface roughness — Terminology — Part 2: Measurement of surface roughness parameters*".

BS 1134-2 gives general information and guidance.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 26, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1 Scope

This Part of BS 1134 describes methods for the assessment of surface texture of machined, self-finished and other surfaces and describes the characteristics and parameters standardized for use in industry.

It embraces the following.

- a) The terminology to be employed in statements relating to surface texture and measurement of surface texture.
- b) Preferred values for the grading of surface texture (see Appendix A).
- c) Sampling lengths and cut-off values to be used in graphical procedures and instrument construction.
- d) The graphical determination of the following parameters:
 - 1) R_a , arithmetical mean deviation of the profile;
 - 2) R_z , ten point height of irregularities;
 - 3) R_y , maximum height of the profile;
 - 4) S_m , mean spacing of profile irregularities;
 - 5) S , mean spacing of local peaks of the profile;
 - 6) t_p , profile bearing length ratio.
- e) The determination of parameter values by instrumental means.
- f) The essential instrument requirements to ensure repeatability of performance.
- g) The information to be given in statements relating to surface texture requirements.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 1134 the following definitions apply.

2.1 Terms relating to the surface, profile and datum

2.1.1

real surface

the surface limiting the body, separating it from surrounding space

2.1.2

real profile

the profile that results from the intersection of the real surface by a plane conventionally defined with respect to the geometrical surface (see Figure 1)

2.1.3

geometrical surface

the surface determined by the design, and defined by the drawing and/or other technical document, neglecting errors of form and surface roughness (see Figure 1)

2.1.4

geometrical profile

the profile that results from the intersection of the geometrical surface by a plane conventionally defined with respect to this surface (see Figure 1)

2.1.5

effective surface

the close representation of a real surface obtained by instrumental means (see Figure 1)

2.1.6

effective profile

the profile that results from the intersection of the effective surface by a plane conventionally defined with respect to the geometrical surface (see Figure 1)

2.1.7
profile transformation

an action (operation) that results intentionally or unintentionally in the transformation of a profile at any stage in the process of measurement, e.g. traversing with a stylus, filtering, recording

2.1.8
transformed profile

a profile produced as a result of transformation

2.1.9
intentional profile transformation

a profile transformation that is made in order that measurements are performed in accordance with the specified requirements for a given measurement

NOTE The following are examples of intentional profile transformations.

- a) Transformation of the surface profile into an electric signal to make it possible to use electronic measuring instruments.
- b) Transformation of the effective profile by defined filter means of suppressing those undulations of the real profile that are not or are not fully to be included in the measured roughness parameters of the surface.

2.1.10
unintentional profile transformation

a profile transformation arising from the imperfection of the measuring instrument or of its separate parts and usually seen as distortions of the information about the profile

NOTE An example of an unintentional profile transformation is the distortion of the information about the profile when traversing it with a stylus having a finite tip radius.

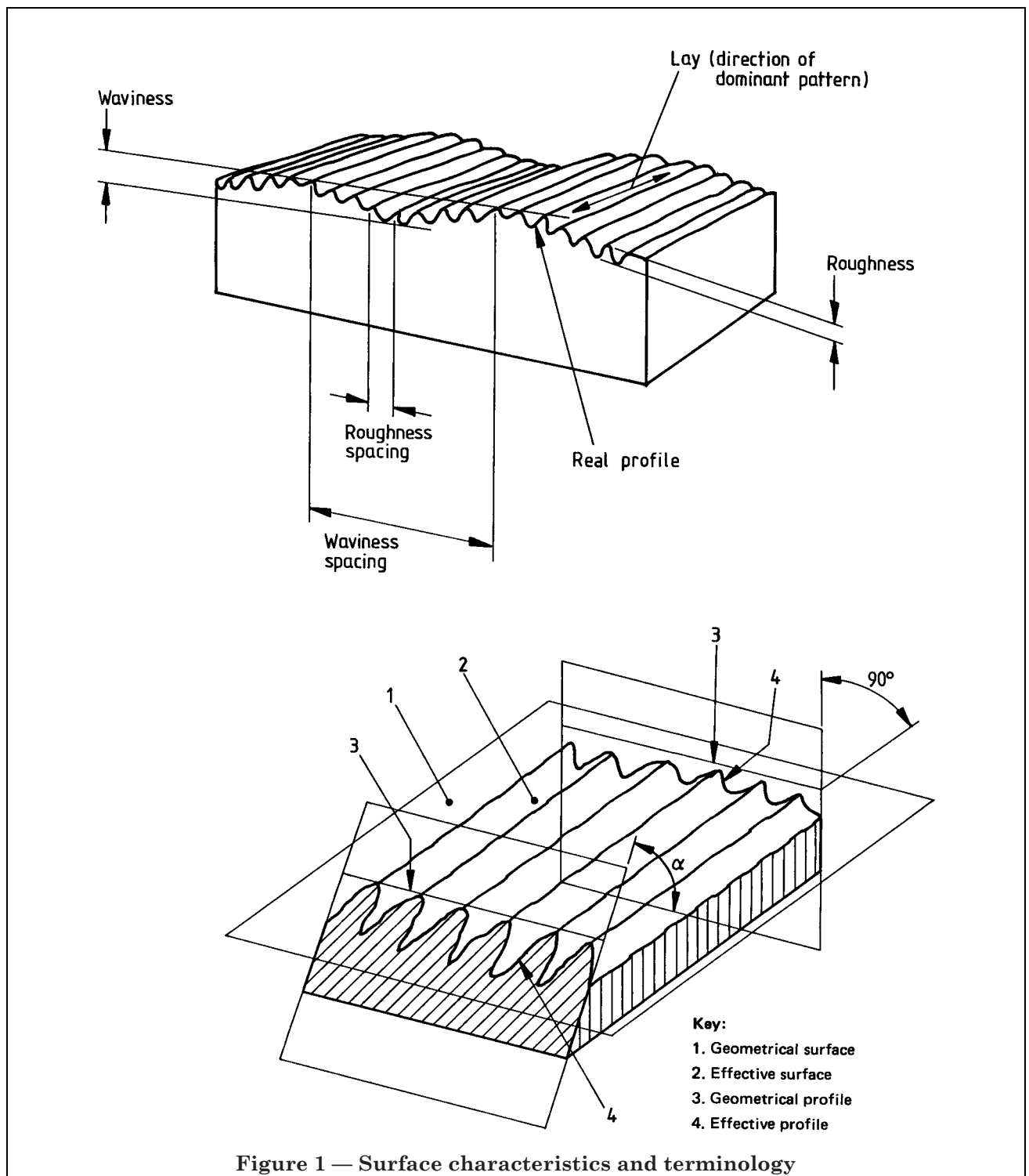
2.1.11
surface texture

those irregularities with regular or irregular spacing that tend to form a pattern or texture on the surface

NOTE This texture may contain components of roughness (see 2.1.12) and waviness (see 2.1.13).

2.1.12
roughness

the irregularities in the surface texture that are inherent in the production process but excluding waviness and errors of form (see Figure 1)



2.1.13**waviness**

that component of surface texture upon which roughness is superimposed (see Figure 1)

NOTE Waviness may result from such factors as machine or work deflections, vibrations, chatter, heat treatment or warping strains.

2.1.14**lay**

the direction of the predominant surface pattern, ordinarily determined by the production method used (see Figure 1)

2.1.15**traversed length**

the complete length of the pick-up movement along the surface being measured (see Figure 2)

2.1.16**reference line**

the line chosen by convention as a reference to serve for the quantitative evaluation of the roughness of the effective profile (see Figure 2)

2.1.17**sampling length, l**

the length of the reference line used for identifying the irregularities characterizing the surface roughness (see Figure 2). The sampling length is measured in the general direction of the profile

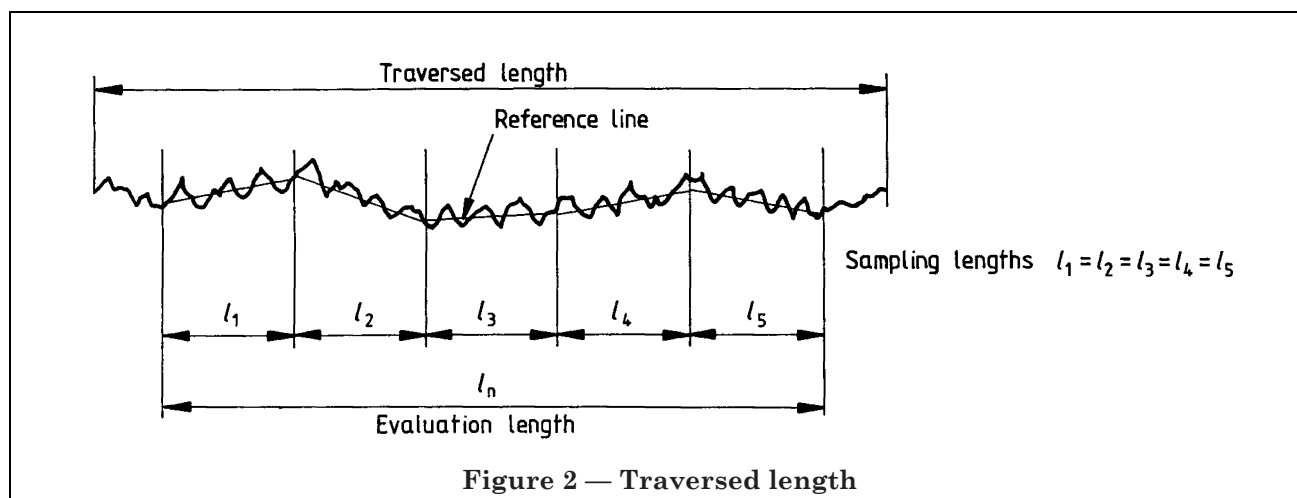


Figure 2 — Traversed length

2.1.18**evaluation length, l_n**

the length over which the profile is assessed. It may contain one or more sampling lengths (see Figure 2)

2.1.19**profile departure, y**

the distance between a profile point and the reference line in the direction of measurement (see Figure 3)

2.1.20**mean line system, system M**

the calculation system used for the profile evaluation in which a mean line is taken as a reference line

2.1.21**least-squares mean line of the profile**

a reference line having the form of the geometrical profile and dividing the profile so that, within the sampling length, the sum of the squares of the profile departures from this line is the minimum

2.1.22**centre arithmetical mean line of the profile**

a reference line representing the form of the geometrical profile and parallel to the general direction of the profile throughout the sampling length, such that the sums of the areas contained between it and those parts of the profile that lie on each side of it are equal

NOTE The centre line (centre arithmetical mean line) is defined and used for graphical convenience. When the centre line has a distinguishable periodicity and its general direction is therefore determinate, the “equal area” centre line is unique. When the profile is irregular, the assessment of the general direction becomes uncertain over a certain range. Within this range a family of “equal area” centre lines can be drawn, one of which will be identical with the least-squares mean line.

2.1.23**electrical mean line**

in an electrical instrument, a reference line that is established by the circuits determining the meter cut-off and which divides equally those parts of the transformed profile lying above and below it

2.1.24**local peak of the profile**

a part of the profile between two adjacent minima of the profile (see Figure 4)

