

CONTENTS

CHAP.	PAGE
Preface	iii
1. APPARATUS AND METHODS	1
Accuracy of measurement—Care of equipment—Effect of temperature—Effect of supports—Errors of alignment—Contact pressure—Optical principles—Optical instruments—Interference—Recording of experimental results.	
2. MEASUREMENT OF LENGTH	21
Standards of length—The Imperial Standard Yard and International Prototype Metre—End standards—Slip gauges—Measurement of gap gauge—Diameter of plug gauge—Diameter of a spigot—Measurement of end gauge—Using optical flats—Comparison of end bar and line standard—Diameter of large bore—Diameter of small hole—Using four balls for diameter measurements.	
3. RADIUS MEASUREMENTS	46
Radial arm apparatus—Using surface plate and rollers—Fixed roller instrument—Vee plate instrument—Tilting bar and autocollimator—Dynamical methods—The co-ordinate method.	
4. STRAIGHTNESS AND FLATNESS	65
Definitions—Estimation by light gap—Wedge method—Level method—Autocollimator method—Beam comparator—Comparison with liquid surface—Flatness of surface table—Optical flats—Liquid wedge method.	
5. MEASUREMENT OF ANGLES.	83
Appreciation of angular sizes—Resolving power—Vernier acuity—Sine bar—Angle gauges—Using three discs—Sine bar and dial gauge—Sine bar and level—Dividing head—Toolroom microscope—Autocollimator—Squareness testing by dial gauge and by tilting bar—Optical square—Checking internal right angle.	
6. MEASUREMENT OF TAPERS.	104
Checking plug and ring gauges—Angle of Morse taper shank—Full check of taper plug gauge—using toolroom microscope—Ring gauge measurement by balls and slip gauges and by unequal balls—Balls and cylinders for internal taper—Attachment for Toolroom Microscope—Sine bar and dial gauge—Measuring small end diameter of plug gauge—Checking squareness of ends and axis of ring gauge.	
7. SCREW THREADS	121
Elements of a thread—Errors and their effects—Virtual effective diameter—Diameters of plug screw gauge—Corrections for rake and compression—Measurement of pitch errors—Measurement of flank angles—Checking form of internal thread—Checking a tap.	

CHAP.	PAGE
8. MACHINE TOOL TESTING	141
Geometric and practical tests—Lathe tests—Milling machine tests—Radial drill tests—Tests on shaping machines, vertical milling machines, and surface grinders—True running of spindles—Using spirit level—Optical methods.	
9. SURFACE TEXTURE	161
Importance of surface condition—Meaning of surface roughness—The surface profile—Methods of numerical assessment—Effect of sampling length—Specification of texture—Measuring instruments—Fidelity of record—The Tomlinson instrument—The "Talysurf"—The Profilometer—The Microtest—The Topograph—Later developments.	
10. MISCELLANEOUS MEASUREMENTS AND THE TESTING OF MEASURING INSTRUMENTS	176
Measuring out-of-roundness—Measuring a plate gauge—Angle between centre lines of holes—Measurement of splines—Gear tooth measurement—Testing a try-square—Checking micrometer measuring faces—Calibration of micrometer screw—Checking an autocollimator—Testing an optical square—Calibration of a polygon—Calibrating a circular table.	
11. DESIGN AND MANUFACTURE OF GAUGES AND INSTRUMENTS	209
Taylor's principle—Lobing of circular sections—Receiver gauges—Kinematic design—Principle of alignment—Rotation of graduated circles—Rigidity—Adjustments—Methods of amplification—Materials for gauges and instruments—Spot grinding—Lapping—Manufacture of slip gauges—Manufacture of end bars—Generating a straightedge—Generation of circular arcs.	
<i>Tables</i>	242
<i>Bibliography</i>	244
<i>Selection of British Standard Specifications</i>	246
<i>Index</i>	247