Contents

1 Mechanics of the Cutting Process ........................................... 1
   1.1 Definitions and Notations ........................................ 2
   1.2 Mechanics of Cutting ............................................. 4
      1.2.1 Force and Stress Relations .................................... 5
      1.2.2 The Cutting Force ........................................... 8
      1.2.3 Chip Deformation ........................................... 10
      1.2.4 Chip Deformation with Plastic Flow ......................... 12
      1.2.5 The Radial Cutting Force ................................... 14
   1.3 Mechanics of Oblique Cutting ...................................... 17
   1.4 Mechanics of Bundle Clipper ...................................... 22
   1.5 Mechanics of the Pressure Bar ................................... 24
   References ................................................................... 29

2 Thermal Loading in Cutting Tools ......................................... 31
   2.1 Heat Generation in the Contact Surfaces ......................... 31
   2.2 Boundary Conditions ............................................... 34
   2.3 The Temperature of the Tool in Different Operating Conditions ........................................... 37
   References ................................................................... 44

3 Operating Parameters of Wood Cutting Tools ......................... 45
   3.1 The Bandsaw ......................................................... 45
   3.2 The Frame Saw ..................................................... 48
   3.3 The Circular Saw ................................................... 53
   3.4 Milling and Planing Machines ..................................... 55
   3.5 Drills ................................................................... 61
   3.6 Veneer Cutting and Peeling ....................................... 65
   3.7 Sanding .................................................................. 67
   References ................................................................... 73
4 The Energy Requirement of Cutting

4.1 Theoretical Considerations

4.2 The Energy Requirements of Bandsaw

4.3 The Energy Requirements of Frame-Saw

4.4 The Energy Requirements for Planing and Milling

4.5 Energy Requirements of Circular Saws

References

5 Vibration of the Tools and Workpieces

5.1 Band Saw Vibration

5.2 The Vibrations of Circular Saws

5.3 Washboarding

5.4 The Vibrations of the Workpiece

5.5 Pneumatic Clamping of a Workpiece

References

6 The Stability of Wood Working Tools

6.1 Cutting Accuracy

6.2 Blade Tensioning

6.3 The Stability of the Band Saw

6.4 Band Saw Tracking Stability

6.5 Stability of Circular Saws

6.6 Frame Saw Stability

References

7 Tool Wear

7.1 Edge Profile and Change in Cutting Force

7.2 The Major Tool Wear Mechanisms

7.3 Factors Affecting Wear

References

8 Surface Roughness

8.1 Parameters of Surface Roughness

8.2 The Internal Structure of Wood

8.3 The Origin of Surface Roughness

8.4 The Effects of Machining Process on Surface Roughness

8.5 Internal Relationships Between Roughness Parameters

8.6 The Use of Structure Number

8.7 Effects of Tool Wear on the Surface Roughness

8.8 Scattering of Roughness Data

References

Index
Mechanics of Wood Machining
Csanády, E.; Magoss, E.
2013, X, 202 p., Hardcover
ISBN: 978-3-642-29954-4