

1. Cutting Tools

1. What principles are the edged cutting tools based on to cut metals?
2. How can the cutting tools be classified? (3 kinds of classification.)
3. What types of the single-point tools do you know?
4. Why are the inserted tools (indexable throwaway inserts) widely used?
5. What types of the tool bits do you know?
6. What are the differences between the various types of metal-cutting tools?
7. What elements and surfaces of the cutting tools do you know? (Enumerate 9 elements and surfaces.) Describe them.
8. What is the true rake angle of a tool?
9. What is the toolholder angle?
10. The side-relief angle is
11. The main back angle is
12. The end-relief angle is
13. What are the working angles?
14. The grinding angle is
15. What is the side cutting edge angle?
16. What is the end cutting edge angle?
17. Why should only the required amount of end or side relief be used?
18. What are the end- and side-relief angles fairly standard for turning many common metals with high-speed steel tools?
19. What are the end- and side-relief angles used for turning many common metals with tungsten-carbide tools?
20. The back-rake angle is
21. What is the positive rake angle?
22. The side rake angle is
23. The main front angle is
24. The angle of keenness is
25. The main angle in the plan is
26. For what purpose are the chip breakers used?
27. What types of chip breakers do you know?
28. What do you know about the most important properties of cutting tool material?
29. What do you know about the advantages and disadvantages of a high-carbon tool steel?
30. What cutting tools are made of a high-carbon tool steel?
31. What do you know about the advantages and disadvantages of a high-speed steel?
32. What do you know about the types of high-speed steel?
33. What are the coated high-speed steel tools?
34. What cutting tools are made of a high-speed steel?
35. What are the cast alloys?
36. Where are the cast alloys used?

37. What are the advantages and disadvantages of the cast alloys in comparison with the high-speed steels?
38. What are the cemented carbides?
39. What are the two basic groups of carbide materials?
40. What are the advantages and disadvantages of the cemented carbides in comparison with the high-speed steels?
41. How does the amount of cobalt of the cemented carbides affect the hardness of a cutting tool?
42. What are the factors that influence the hardness, wear resistance, and impact toughness of the carbides and how?
43. What are the eight classifications used in grouping machining applications for cemented-carbide cutting tools according to the Carbide Industry Classification System?
44. What are the coated carbides?
45. What precautions should be executed when using the of cemented-carbide cutting tools?
46. What are the cermet cutting tools?
47. What are the ceramic cutting tools?
48. What are the advantages and disadvantages of the ceramic and cermet in comparison with the cemented-carbides?
49. What are the advantages and disadvantages of diamonds in comparison with the cemented-carbides?
50. What are the general rules which should be followed as a guide in selecting cutting speeds for cutting tools made of different materials?

2. Fundamentals of the Cutting Action

1. What is the depth of cut? What is the thickness of have being removed layer (a)?
2. What is the cutting speed?
3. What is the cutting feed?
4. What are the coarse and finer feeds?
5. What is the shear plane?
6. What is the shear angle? How do calculate it?
7. What do you know about the components of a cutting force for a lathe tool?
8. What do you know about the basic types of chips?
9. What are the advantages and disadvantages of the continuous chips?
10. What is the built-up edge?
11. What are the factors which tend to minimize the formation of chips with a built-up edge?
12. What are the factors which contribute to the formation of discontinuous type chips?
13. How does the built-up end influence the roughness of a processed surface?
14. How to calculate a cutting speed?
15. How to calculate the cutting force?

16. Where does the wear of cutting tool take place on the cutting edge?
17. How can the causes of wear be classified?
18. Draw the distribution of temperature in a cutting tool in the main cross section.
19. What do you know about the principal functions of cutting fluids?
20. What do you know about the basic types of cutting fluids?
21. What are the principal purposes of a cutting fluid at high speeds?
22. What are the components used for straight cutting oils?
23. Enumerate the useful properties of straight cutting oils.
24. What does the term "transparent oils" mean?
25. What are the advantages and disadvantages of the two basic types of mineral cutting oils?
26. What are the emulsifiable oils?
27. What are the advantages and disadvantages of the emulsifiable oils?
28. What can other types of cutting fluids and means beside the straight cutting oils, the emulsifiable oils, and the chemical or synthetic cutting fluids be used in machining metals?
29. Enumerate the principal factors which can be used as a guide in selecting a cutting fluid for a particular application?
30. How many classified groups of metals are there according to their approximate machinability ratings?
31. What do you know about the commonly used lathe tool bits and their applications?
32. What does the amount of relief angle depend on?
33. What are the average tool angles for single-point high-speed steel tools used for cutting medium-carbon steel?
34. What are the average tool angles for single-point high-speed steel tools used for cutting cast iron (hard)?
35. What are the average tool angles for single-point high-speed steel tools used for cutting aluminum?
36. What are the recommended angles for single-point carbide tools used for cutting aluminum?
37. What are the recommended angles for single-point carbide tools used for cutting carbone steels SAE 1025?
38. What are the recommended angles for single-point carbide tools used for cutting stainless steel, hardenable?
39. What are the recommended angles for single-point carbide tools used for cutting high-nickel alloys?
40. What are the recommended angles for single-point carbide tools used for cutting titanium alloys?
41. What are the recommended angles for the angular-shoulder chip breaker used for cutting carbone steels?
42. What are the recommended dimensions for the groove chip breaker used for cutting carbone steels?

43. What is the height at which a lathe tool should be set?
44. What precautions should be followed when using the carbide materials?
45. What is the shortening of a chip?
46. How to estimate the plastic deformation in the cutting?
47. Why is the actual main front (or side-rake) angle γ_a increased from cutting speed 5 to 35 mpm?
48. What are the disadvantages and advantages of the built-up end appearance?
49. What cutting speeds are used for cutting the medium-carbon steels with H.S.S. cutting tool?
50. What cutting speeds are used for cutting the medium-carbon steels with a carbide cutting tool?
51. What cutting speeds are used for cast iron cutting with a carbide cutting tool?
52. What is the main cause of cutting tool wear?
53. What is the tool life usually used?
54. Why are the cutting fluids used in grinding operations?
55. What color of steel chip is dangerous at cutting by HSS and why?
56. What color of steel chip is dangerous at cutting by carbide cutting tool and why?

Additional questions

1. Kinematics of cutting and geometry of an elementary edge.
2. Methods of research of deformational processes at cutting.
3. Average deformation in a shaving.
4. Distribution of deformations and pressure in a zone of cutting.
5. Forces on forward and back surfaces.
6. Work, capacity and specific work at cutting.
7. Sources of heat and thermal flows in a zone of cutting.
8. Temperature fields, their theoretical and experimental definition. Temperature of cutting and its measurement.
9. Temperature dependences at cutting.
10. The temperature-speed factor and its influence on chip making. Influence of geometrical parameters of an edge and elements of cross section.
11. Features of not free cutting. Angular cutting.
12. Laws of elementary chip making.
13. A roughness of the processed surface.
14. Hardening of a superficial layer.
15. Management of a chip direction.
16. Law of wear process and destruction of tools. Kinds of destruction.
17. A nature of wear.
18. Criterion of wear.
19. Influence of the temperature-speed factor for wear process.
20. Tool life dependence. Optimum geometry of an edge.

21. Criterion of an optimality of a mode. A mode of the greatest productivity. A mode of the least cost price of operation. Limiting functions. A mode of the given tool life.
22. Criterion of machinability.
23. Admitted speed of cutting. Influence of properties of a processable material.
24. Ways of machinability improvement.
25. Application of cutting fluids and means.
26. Methods of machinability definition and tests of tools.