PRODUCTION ENGINEERING – I

LABORATORY MANUAL

MECHANICAL ENGINEERING DEPARTMENT

(ISO 9001:2008 Certified)

MES COLLEGE OF ENGINEERING, KUTTIPPURAM

Production Engineering –I Laboratory Manual

MECHANICAL ENGINEERING DEPARTMENT

Revision	Date	Prepared by			Approved by		
		Name	Designation	Signature	Name	Designation	Signature
Rev1.0					Dr.Rahmathunza. I	Prof. & HoD ME Dept.	

VISION

To develop the Department into a premier destination of international level for advanced learning in Mechanical Engineering and to mould quality engineers to serve the society through creative solutions.

MISSION

- To mould engineers who would be able to apply the basic science and mathematics with confidence in professional activities for the benefit of all.
- To make our graduates experts in practical problem solving with abstract thinking skills.
- To make our students life-long learners capable of building their careers upon a solid foundation of knowledge and competent in communicating technical materials and concepts in individual group situations

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

After 3-4 years of graduation, our students will be able to

- Demonstrate their skills in technical profession and/or higher education by using the acquired knowledge in Mathematics, Science and Engineering fundamentals.
- Analyze the real life problems and propose sustainable design solutions for specific needs through applications of Engineering principles.
- Recognize the ethical responsibility as engineers and judiciously serve their peers, employers & society for the benefit of all.
- Practice life-long learning by continuing up gradation of possessed skills.

PROGRAM SPECIFIC OUTCOMES (PSOs)

At the end of four year programme the students (graduates) will be able to:

- Demonstrate basic knowledge in mathematics, science and engineering.
- Design, manufacture and analyze a Mechanical system using modern engineering software tools and measurement systems.
- Cognize concepts involved in thermal and fluid energy systems.
- Utilize self education to develop lifelong learning to appraise and adapt global and societal contexts to propose Engineering solutions.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analy**sis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and

write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Course Outcomes (CO's)

Course Outcomes (COs)

ME09 308(P): PRODUCTION ENGINEERING LAB – I (C208)	
C208.1	Able to demonstrate the working of center lathe and CNC lathes
C208.2	Able to model different shapes using basic machining operations on center lathe or CNC lathe.

ME14 408(P): PRODUCTION ENGINEERING LAB – I (C216)	
C216.1	Able to demonstrate the working of center lathe and CNC lathes
C216.2	Able to model different shapes using basic machining operations on center lathe or CNC lathe.

MODEL NO:1

FACING AND PLAIN TURNING

AIM

To construct the model given in the figure using the given MS rod.

MATERIALS REQUIRED

MS rod of size 25 mm dia & 150 mm length.

TOOLS REQUIRED

1. "V" nose tool
2. Square nose tool
3. Vernier caliper

LIST OF OPERATIONS

1. Facing
2. Rough turning
3. Finish turning

PROCEDURE

1. Copied the given drawing in the record.
2. Collected the tools and the work piece.
3. Checked the suitability of the given work piece.
4. Gripped the work piece in the 3 jaw chuck.
5. Centered the cutting tool.
6. Performed facing operation.
7. Mark the total length of the work.
8. Performed the plain turning, finish turning are carried out, up to the required diameter and length.
9. Dimensions were checked and found correct.

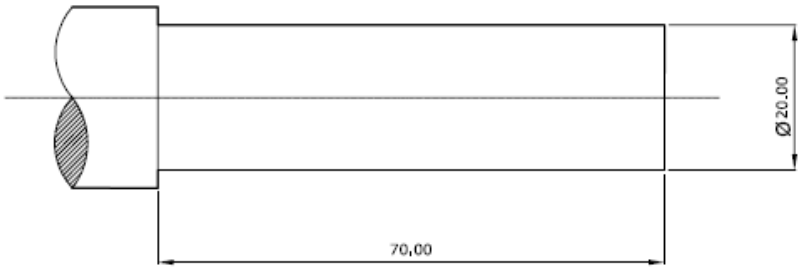
RESULT:-

Facing and plane turning done on the work piece as per the given drawing keeping the tolerance +_ 0.02mm.

PRODUCTION ENGINEERING LAB. 1

Model No:1

FACING AND PLANE TURNING



SCALE 1:1

Tolerence ± 0.02 mm
All dimensions are in mm

MODEL NO:2

STEP TURNING

AIM

To construct the model given in the figure using the given MS rod.

MATERIALS REQUIRED

MS rod of size 25 mm dia & 150 mm length.

TOOLS REQUIRED

1. “V” nose tool
2. Square nose tool
3. Vernier caliper

LIST OF OPERATIONS

1. Facing
2. Rough turning
3. Finish turning
4. Step turning

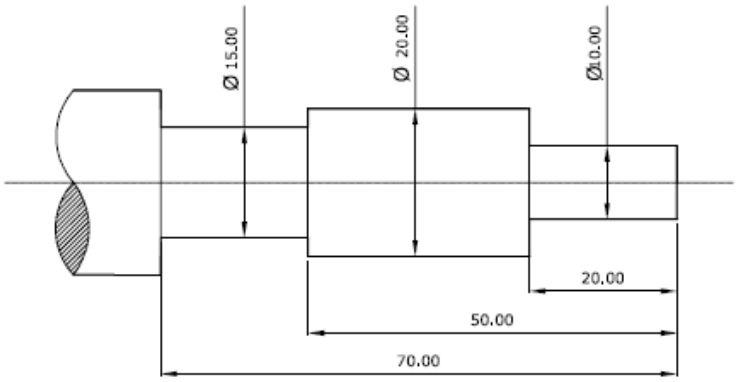
PROCEDURE

1. Copied the given drawing in the record.
2. Collected the tools and the work piece.
3. Checked the suitability of the given work piece.
4. Gripped the work piece in the 3 jaw chuck.
5. Centered the cutting tool.
6. Performed facing operation.
7. Mark the total length of the work.
8. Performed the plane turning operation and checked the diameter.
9. Marked the step length from the faced end.
10. Performed step turning operation.
11. Dimensions were checked and found correct.

RESULT:-

Step turning done on the work piece as per the drawing, keeping the tolerance +_ 0.02mm.

STEP TURNING



SCALE 1:1

Tolerence ± 0.02 mm
All dimensions are in mm

MODEL NO:3

TAPER TURNING

AIM

To construct the model given in the figure using the given MS rod.

MATERIALS REQUIRED

MS rod of size 25 mm dia & 150 mm length.

TOOLS REQUIRED

1. "V" nose tool
2. Square nose tool
3. Vernier caliper

LIST OF OPERATIONS

1. Facing
2. Plane turning
3. Step turning
4. Taper turning

PROCEDURE

1. Copied the given drawing in the record.
2. Collected the tools and the work piece.
3. Checked the suitability of the given work piece.
4. Gripped the work piece in the 3 jaw chuck.
5. Centered the cutting tool.
6. Performed facing operation.
7. Mark the total length of the work.
8. Performed the plane turning operation and checked the diameter.
9. Marked the step length from the faced end.
10. Performed step turning operation.

11. Calculated the taper angle from the given dimensions.

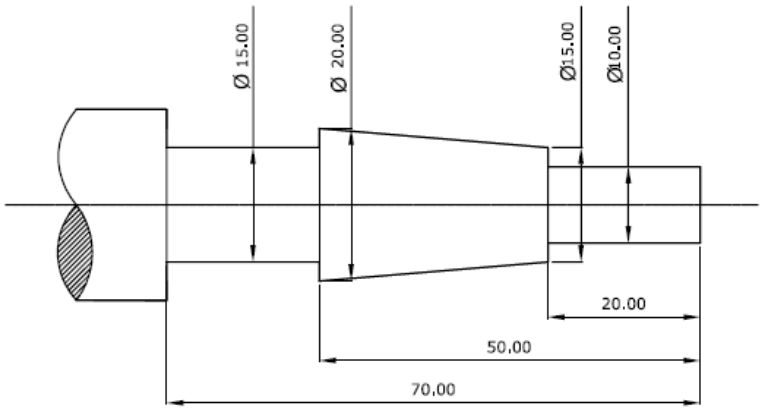
12. Adjusted the compound rest to the taper angle. 13. Performed the taper turning operation by turning the compound rest hand wheel.

14. Dimensions were checked and found correct.

RESULT - Taper turning done on the work piece using compound rest method ,as per the drawing, keeping the tolerance +_ 0.02mm.

Model No:3

TAPER TURNING



SCALE 1:1

Tolerence ± 0.02 mm
All dimensions are in mm

MODEL NO:4

THREAD CUTTING
(SINGLE START "V" THREAD)

AIM

To construct the model given in the figure using the given MS rod.

MATERIALS REQUIRED

MS rod of size 25 mm dia & 150 mm length.

TOOLS REQUIRED

1. "V" nose tool
2. Square nose tool
3. Vernier caliper
4. Screw pitch gauge.

LIST OF OPERATIONS

1. Facing
2. Plane turning
3. Step turning
4. Thread cutting.

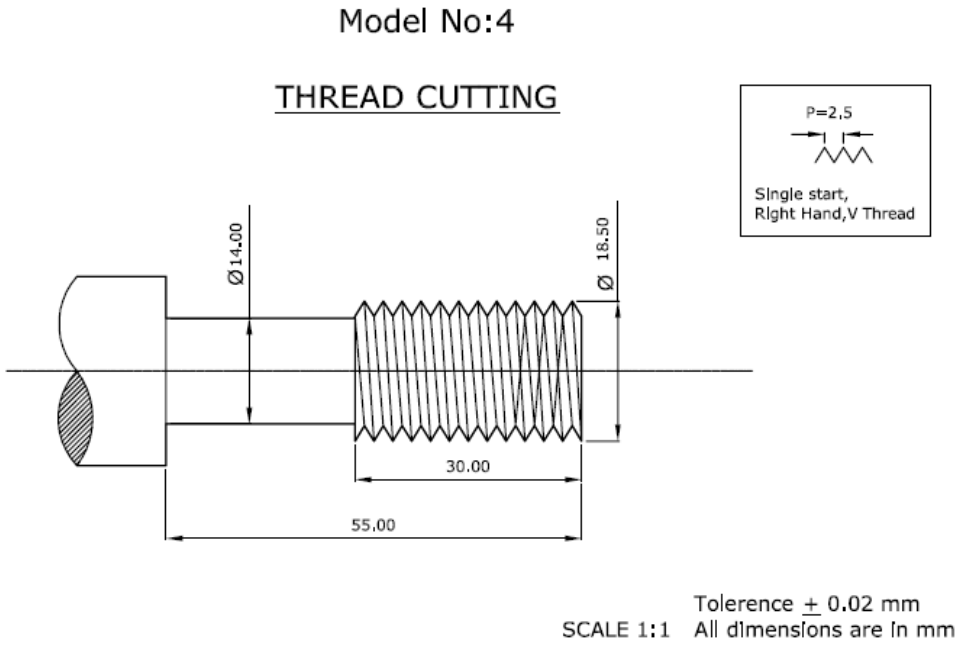
PROCEDURE

1. Copied the given drawing in the record.
2. Collected the tools and the work piece.
3. Checked the suitability of the given work piece.
4. Gripped the work piece in the 3 jaw chuck.
5. Centered the cutting tool.
6. Performed facing operation.
7. Mark the total length of the work.
8. Performed the plane turning operation and checked the diameter.
9. Marked the step length from the faced end.
10. Performed step turning operation.

11. Gear train adjusted as per the pitch of thread.
12. Adjusted the spindle speed to the lowest.
13. Fixed thread cutting tool on the tool post.
14. Engaged the half nut mechanism.
15. Performed thread cutting operation.
16. Checked the dimensions and found correct.

RESULT :-

Realized the technique of thread cutting, and practiced on the work piece as per the drawing, keeping the tolerance +_ 0.02mm.



MODEL NO:4

THREAD CUTTING
(DOUBLE START "V" THREAD)

AIM

To construct the model given in the figure using the given MS rod.

MATERIALS REQUIRED

MS rod of size 25 mm dia & 150 mm length.

TOOLS REQUIRED

1. "V" nose tool
2. Square nose tool
3. Vernier caliper
4. Screw pitch gauge.

LIST OF OPERATIONS

1. Facing
2. Plane turning
3. Step turning
4. Thread cutting.

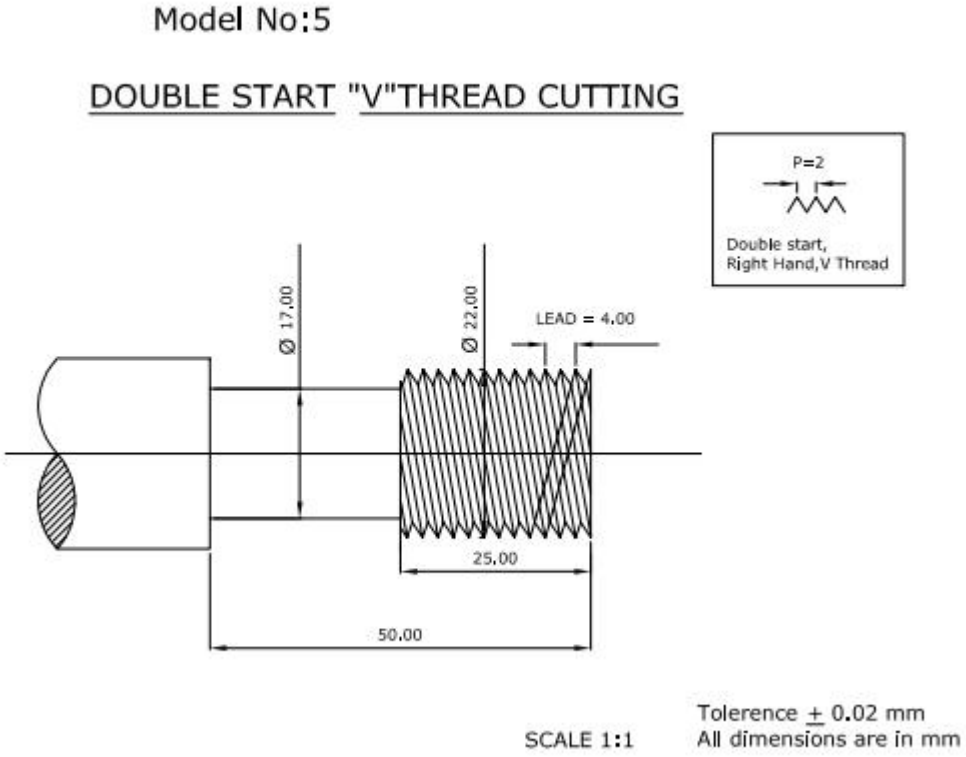
PROCEDURE

1. Copied the given drawing in the record.
2. Collected the tools and the work piece.
3. Checked the suitability of the given work piece.
4. Gripped the work piece in the 3 jaw chuck.
5. Centered the cutting tool.
6. Performed facing operation.
7. Mark the total length of the work.
8. Performed the plane turning operation and checked the diameter.
9. Marked the step length from the faced end.

10. Performed step turning operation.
11. Gear train adjusted as per the pitch of thread.
12. Adjusted the spindle speed to the lowest.
13. Fixed thread cutting tool on the tool post.
14. Set the compound rest dial to zero position.
15. Engaged the half nut mechanism.
16. Performed thread cutting operation.
17. After completing the first thread, moved the compound rest to one pitch length, keeping the half nut being engaged.
18. Performed thread cutting operation again to get the second thread.
19. Checked the dimensions and found correct.

RESULT :-

Realized the technique of double start “v” thread cutting, and practiced on the work piece as per the drawing, keeping the tolerance +_ 0.02mm.



MODEL NO:6

THREAD CUTTING
(TRIPPLE START "V" THREAD)

AIM

To construct the model given in the figure using the given MS rod.

MATERIALS REQUIRED

MS rod of size 25 mm dia & 150 mm length.

TOOLS REQUIRED

1. "V" nose tool
2. Square nose tool
3. Vernier caliper
4. Screw pitch gauge.

LIST OF OPERATIONS

1. Facing
2. Plane turning
3. Step turning
4. Thread cutting.

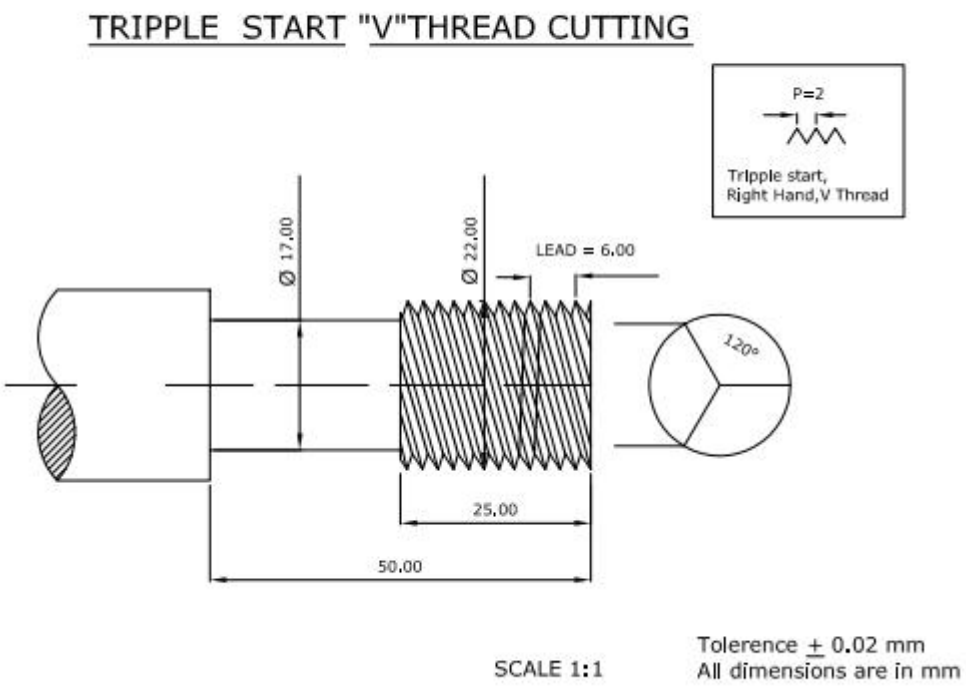
PROCEDURE

1. Copied the given drawing in the record.
2. Collected the tools and the work piece.
3. Checked the suitability of the given work piece.
4. Gripped the work piece in the 3 jaw chuck.
5. Centered the cutting tool.
6. Performed facing operation.
7. Mark the total length of the work.
8. Performed the plane turning operation and checked the diameter.

9. Marked the step length from the faced end.
10. Performed step turning operation.
11. Gear train adjusted as per the pitch of thread.
12. Adjusted the spindle speed to the lowest.
13. Fixed thread cutting tool on the tool post.
14. Set the compound rest dial to zero position.
15. Engaged the half nut mechanism.
16. Performed thread cutting operation.
17. After completing the first thread, moved the compound rest to one pitch length, keeping the half nut being engaged.
18. Performed thread cutting operation again to get the second thread.
19. Again moved the compound rest to the pitch length, and repeated thread cutting operation for the third thread.
20. Checked the dimensions and found correct.

RESULT :-

Realized the technique of triple start thread cutting, and practiced on the work piece as per the drawing, keeping the tolerance +_ 0.02mm.



MODEL NO:7

THREAD CUTTING
(SQUARE THREAD)

AIM

To construct the model given in the figure using the given MS rod.

MATERIALS REQUIRED

MS rod of size 25 mm dia & 150 mm length.

TOOLS REQUIRED

1. "V" nose tool
2. Square nose tool
3. Vernier caliper
4. Screw pitch gauge.

LIST OF OPERATIONS

1. Facing
2. Plane turning
3. Step turning
4. Thread cutting.

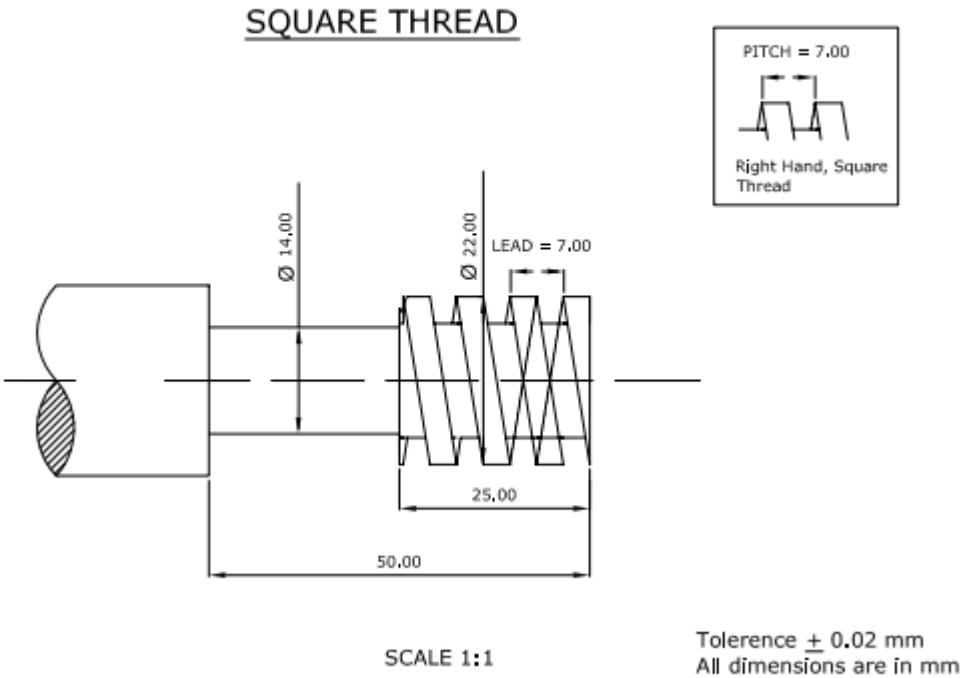
PROCEDURE

1. Copied the given drawing in the record.
2. Collected the tools and the work piece.
3. Checked the suitability of the given work piece.
4. Gripped the work piece in the 3 jaw chuck.
5. Centered the cutting tool.
6. Performed facing operation.
7. Mark the total length of the work.
8. Performed the plane turning operation and checked the diameter.

9. Marked the step length from the faced end.
10. Performed step turning operation.
11. Gear train adjusted as per the pitch of thread.
12. Adjusted the spindle speed to the lowest.
13. Fixed thread cutting tool on the tool post.
14. Set the compound rest dial to zero position.
15. Engaged the half nut mechanism.
16. Performed thread cutting operation in number of passes till the required depth is obtained.
17. Removed the "v" tool and placed the square nose tool on the tool post.
18. Finished the square threading operation.
19. Checked the dimensions and found correct.

RESULT :-

Realized the technique of square thread cutting, and practiced on the work piece as per the drawing, keeping the tolerance +_ 0.02mm.



MODEL NO:8

PROFILE TURNING
(BALL TURNING)

AIM

To construct the model given in the figure using the given MS rod.

MATERIALS REQUIRED

MS rod of size 25 mm dia & 150 mm length.

TOOLS REQUIRED

1. "V" nose tool
2. Square nose tool
3. Vernier caliper

LIST OF OPERATIONS

1. Facing
2. Plane turning
3. Step turning
4. Ball turning

PROCEDURE

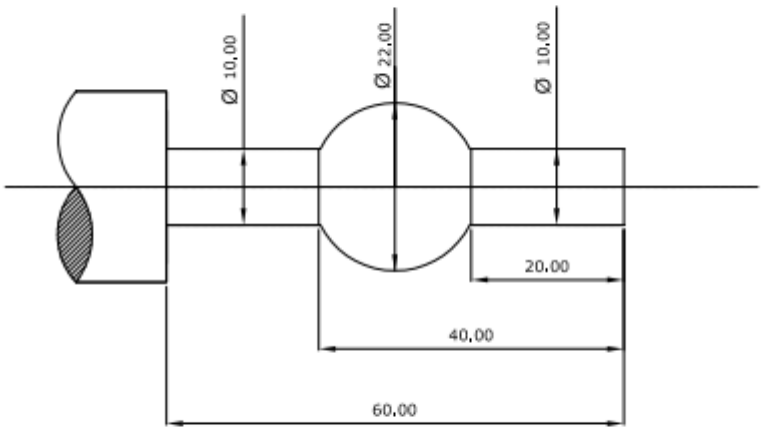
1. Copied the given drawing in the record.
2. Collected the tools and the work piece.
3. Checked the suitability of the given work piece.
4. Gripped the work piece in the 3 jaw chuck.
5. Centered the cutting tool.
6. Performed facing operation.
7. Mark the total length of the work.
8. Performed the plane turning operation and checked the diameter.
9. Marked the step length from the faced end.

10. Performed step turning operation.
11. Performed the ball turning operation by combined feed method
12. Cheched the dimensions and found correct.

RESULT:-

Practiced profile turning by combine feed method on the work piece as per the drawing, keeping the tolerance +_ 0.02mm.

BALL TURNING



SCALE 1:1

Tolerence ± 0.02 mm
All dimensions are in mm