# PLASTIC DEFORMATION THEORY

**23MOT201- Manufacturing and Measurement Techniques**
**Unit -2 Metal Forming and Metal Cutting Processes**
**II Year /III Semester**
**Mechanical and Mechatronics Engineering**

# PLASTIC DEFORMATION THEORY

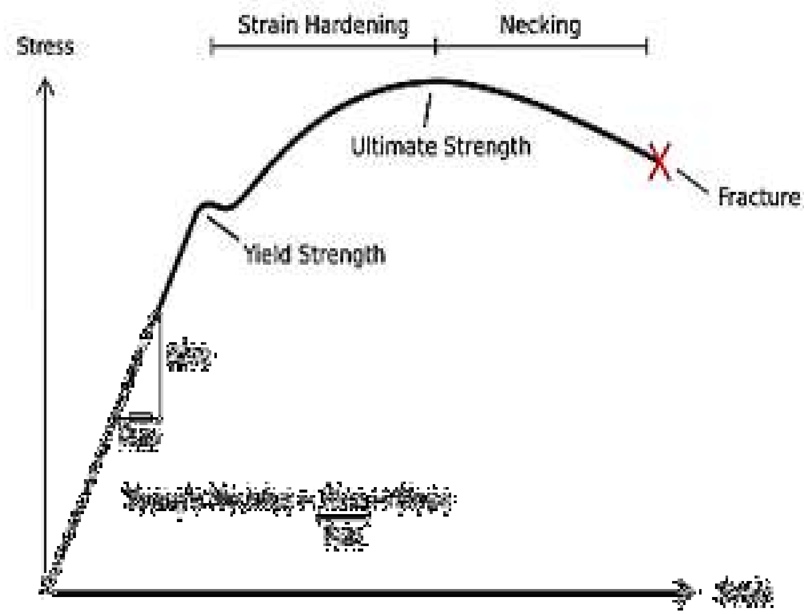
- Deformation often referred to strain, is the change in the size and shape of an object due to the change in temperature or an applied force.
- Based on these factors, deformation is classified into the following:

**Elastic Deformation**

- The deformation caused is reversible, and the deformation disappears after the removal of applied forces.
- A classic example of elastic deformation is the stretching of a rubber band.

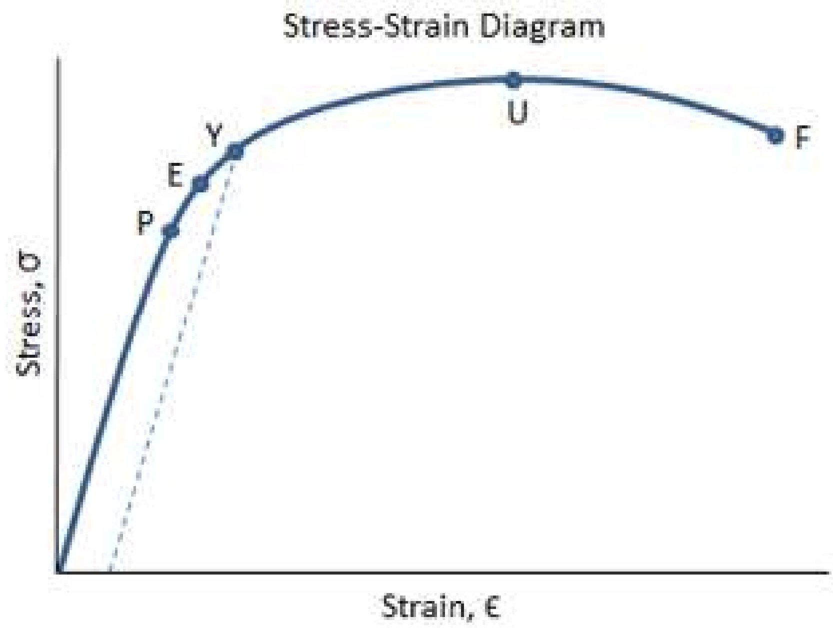
**Plastic Deformation**

- The deformation is irreversible and it stays even after the removal of the applied forces.
- Example, bending of steel rods.



# STRESS- STRAIN CURVE FOR MILD STEEL

- The relationship between stress and strain in a material is determined by subjecting a material specimen to a tension or compression test.
- In this test, a steadily increasing axial force is applied to a test specimen, and the deflection is measured as the load is increased.
- These values can be plotted as a load-deflection curve.
- The deflection in the test specimen is dependent on both the material's elastic modulus as well as the geometry of the specimen (area and length).

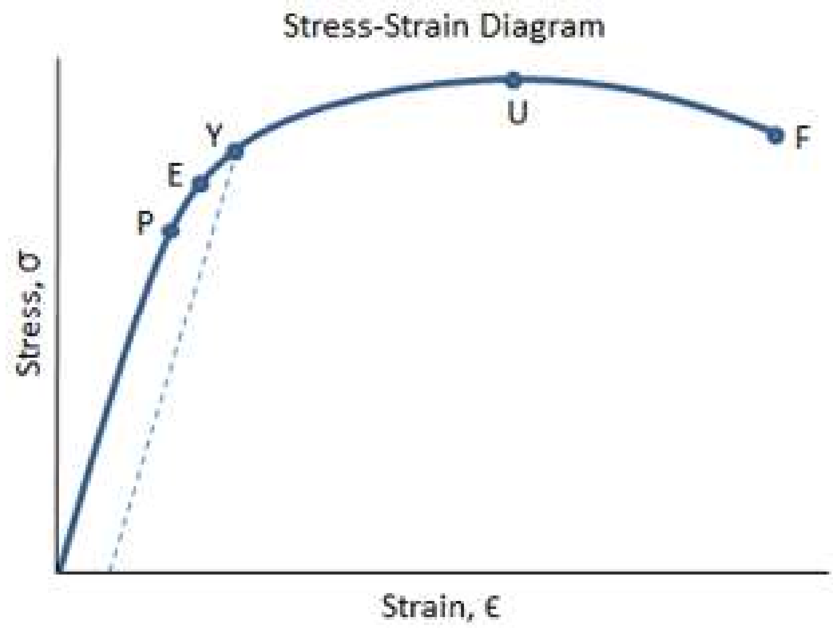


# STRESS- STRAIN CURVE FOR MILD STEEL

**P**: This is the *proportionality limit*, which represents the maximum value of stress at which the stress-strain curve is linear.

**E**: This is the *elastic limit*, the material is still elastic in this region and if the load is removed at or below this point the specimen will return to its original length.

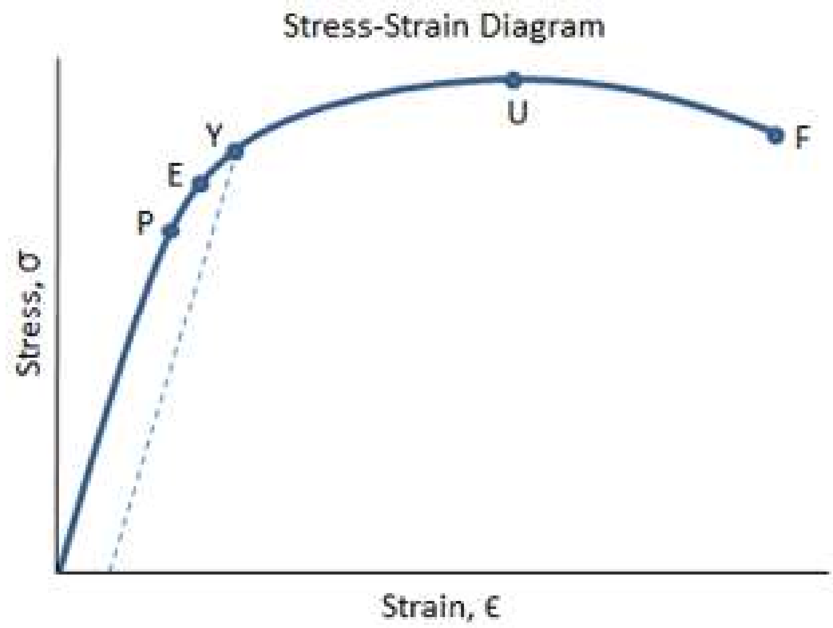
**Y**: This is the *yield point*, which represents the value of stress above which the strain will begin to increase rapidly.



# STRESS- STRAIN CURVE FOR MILD STEEL

**U**: This point corresponds to the *ultimate strength*, which is the maximum value of stress on the stress-strain diagram. The ultimate strength is also referred to as the *tensile strength*. After reaching the ultimate stress, specimens of ductile materials will exhibit *necking*, in which the cross-sectional area in a localized region of the specimen reduces significantly.

**F**: This is the *fracture point* or the *break point*, which is the point at which the material fails and separates into two pieces.



# REFERENCES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