

NOC: Analysis and Modeling of Welding - Video course

COURSE OUTLINE

Welding is an important fabrication process in manufacturing industries. Complex parts fabricated using forming, machining and metal removal processes are assembled into a larger part using welding. The welding process involves a number of physical processes that play a role in determining the performance of the joint. With newer and dissimilar combinations required to be joined as the technological advances take place in the area of manufacturing, it is important for practicing engineers, graduate students and prospective researchers to understand welding to take advantage of the developments taking place. This course offers detailed analysis and modeling techniques that apply to the different physical phenomena that take place during welding.

COURSE DETAIL

| WeekNo. | Topics |
|---------|--|
| 1. | 1. Introduction to fusion welding processes\ 2. Heat sources 3. Heat removal |
| 2. | 4. Thermal modelling 5. Zones in a weldment 6. Phase change |
| 3. | 7. Fluid flow in the weld pool 8. Fusion zone 9. Conduction mode and Keyhole mode |
| 4. | 10. Introduction to microsegregation 11. Solute redistribution – Microscale 12. Microstructure evolution |
| 5. | 13. Solute transfer – Macroscale 14. Defects in fusion welds |
| 6. | 15. Effects of dilution 16. Weld Cladding |
| 7. | 17. Distortion in welding 18. Dissimilar welding 19. Solutions to Dissimilar welding |



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Metallurgy
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References:

1. Welding Metallurgy – Sindo Kou, Wiley Interscience 2nd Edition (2002)
2. Any textbook on transport phenomena
3. Contemporary Literature – will be listed on the course site.