

Single Crystal Superalloys for Turbine Blade Applications

Further Reading Suggestions

The resources suggested in “Introduction to Superalloys and their Applications” are also relevant for this part of the course. The online educational resource page by Harry Bhadeshia contains some good explanations for the single crystal turbine blade topics, including an explanation of the creep rafting process. And Roger Reeds’ book contains a great deal more information to support the lecture material, on the processing of superalloys for turbine disks, and single-crystal superalloys for turbine blade applications, in Chapters 3 and 4, as well as more detail on the new coating technologies for Ni superalloys, in Chapter 5. Finally, there is a good review paper on the subject of improving the properties of wrought polycrystalline Ni-base superalloys, that tackles some of the complications we alluded to in the first lecture video. *Note, this paper isn’t on the properties of single crystal superalloys!* But, it does a good job of explaining the complexities and trade-offs involved in processing Ni-base superalloys and possible research avenues for the future.

- Book Chapter – Adrian P. Mouritz, Chapter 12 - Superalloys for gas turbine engines, in Introduction to Aerospace Materials, Woodhead Publishing, 2012, 251-267, <https://doi.org/10.1533/9780857095152.251>
- Online Document – H.K.D.H. Bhadeshia, Nickel Based Superalloys, 2021, <http://www.phase-trans.msm.cam.ac.uk/2003/Superalloys/superalloys.html>
- Book (*pdf copy available online*) – Roger C. Reed, The Superalloys: Fundamentals and Applications, Cambridge University Press, 2008.
- Review paper - Hardy, M.C., Detrois, M., McDevitt, E.T. *et al.* Solving Recent Challenges for Wrought Ni-Base Superalloys. *Metall Mater Trans A* **51**, 2626–2650 (2020). <https://doi-org.manchester.idm.oclc.org/10.1007/s11661-020-05773-6>