Alloy Manufacturer Perspective
Special Metals/PCC Forged Products

NETL-EPRI Workshop on Heat Exchangers for Supercritical CO₂ Power Cycles

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- ASME Section 1 Code Case 2702 Covering the Following Wrought Product Forms:
  - Seamless Pipe and Tube
  - Rod
  - Forgings
  - Fittings
  - Sheet and Plate

- ASME B31.1 Piping Code Case 190
  - Same Rules as in Code Case 2702
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• **Cost Considerations**
  • Intrinsic metals value (minor contributor within the wrought nickel-base superalloy category)

• ** Manufacturing route**
  • Process yield
    - Alloy and product form dependent
    - Affected by operations such as end cropping, intermediate grinding, billet trepanning, etc.

• **Product configuration considerations**
  • Small OD tubing, very thin sheets, requiring multiple annealing and cold working sessions
  • OD/wall ratios at either extreme can impose more costly manufacturing routes

• **Ordered quantities**
  • Modest quantities may also dictate more costly manufacturing routes
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- Production challenges
  - Development of capability to produce the required range of fittings, valves and other hardware required for plant installations.
  - Fielding the range of product configurations and quantities required for complex plant installations.
  - Development of large-section forged product capability in an age-hardenable superalloy.
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• Production challenges

• Completion of large plant-scale projects

• Myriad range of components required

  ▪ Additional welding sequence allowances may be needed long-term in code case for flexibility in fabrication of needed large-scale components

  ▪ Welding in solution annealed condition

  ▪ Allowance for solution annealing after welding
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• Information Needed from OEMs/Designers/Fabricators

  • Knowledge of specific material requirements can be slow to ‘trickle down’ from fabricators after projects are initiated; material manufacturer needs to see the ‘big picture’ to produce in the most efficient manner possible

  • Numerous subordinate component fabricators may be involved, and may need guidance/educating regarding material forming characteristics; up-front identification of these subordinate fabricators is needed