

# Alloy Manufacturer Perspective Special Metals/PCC Forged Products

NETL-EPRI Workshop on Heat Exchangers for Supercritical  
CO<sub>2</sub> Power Cycles

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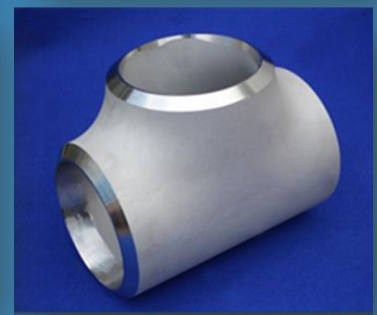
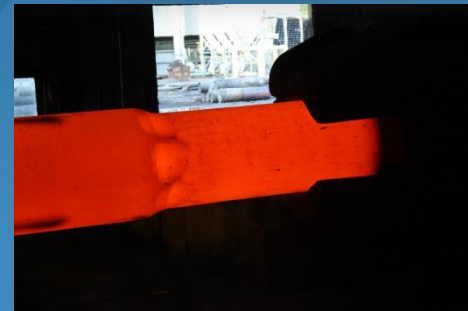
Thursday, October 15, 2015



# INCONEL® alloy 740H®

- 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



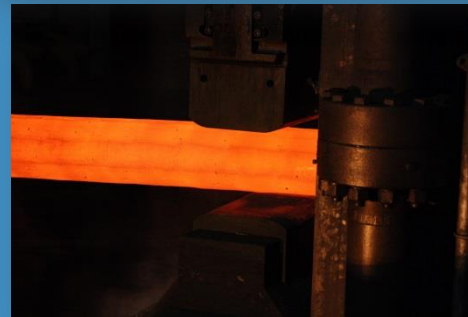
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- Cost Considerations
  - Intrinsic metals value (minor contributor within the wrought nickel-base superalloy category)
  - Manufacturing route
    - Process yield
      - Alloy and product form dependent
      - Affected by operations such as end 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



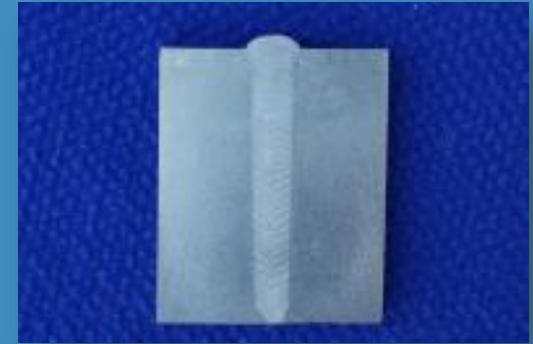
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- Production challenges
  - Development of capability to produce the required range of fittings, valves and other hardware required for plant installations.
  - Fielding the range of product configurations and quantities required for complex plant 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

