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Americas Indexable

HRSA

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Types of HRSA

- Nickel based Super Alloys
  - 718+
  - IN100
  - ME16
  - RR1000
  - Inconel (625, 718)
  - Waspaloy
  - Rene (41, 88, 95, 103)
  - Udimet 720
  - GTD111
  - Haynes (242, 263)
- Titanium
  - Ti-6Al-4V (6-4)
  - Ti-5Al-5Mo-5V-3Cr (5-5-5-3, triple 5)
  - Ti-10V-2Fe-3Al (10-2-3)
- Cobalt based Super Alloys
  - Haynes (21, 25, 188, 556)
  - Stellite (6, 12, 20, 21, 25, F, 706, 712, Ultimet)
  - MAR-M (302, 509)
  - AiResist (213, 13)
- Iron based Super Alloys
  - A286
  - Incoloy (903, 907, 909)
  - Hastelloy (C276, X)
  - AerMet 100 (technically Martensitic Stainless)

Types of HRSA and how they machine


Lamellar chip flow

- Ni based Superalloys
  - Aerospace engine components
  - Power Generation (Land based gas turbines)
  - Deep water Oil & Gas
  - Most Inconel 718 (aged, 44-48HrC)

  - Dedicated PVD HRSA grades
  - Requires G tolerance or better for most finishing (aerospace)
  - Lamellar chipflow adding high stress on microgeometry requiring dedicated geometry
  - Highly susceptible to chemical wear (crater, notch), requires lead angles
  - Typical tool life 5-8 minutes
  - Low to Moderate speed
    - Inconel 718; 120-200SFM [35-60m]
    - Waspaloy; 100-180SFM [30-55m]

Types of HRSA and how they machine

- Co based Superalloys
  - Aerospace engine components
    - Hot section (blades, vanes) of turbine and combustor parts
  - Medical implants (ex. CoCr)
  - Most expensive of the ISO-S materials
  - Highest hot hardness
  - Haynes 188 most common

  - Dedicated PVD HRSA grades
  - Requires G tolerance or better for most finishing (aerospace)
  - Lamellar chipflow adding high stress on microgeometry requiring dedicated geometry. Select strongest possible geometry
  - Highly susceptible to chemical wear (crater, notch), requires lead angles
  - Typical tool life 5-6 minutes
  - Low to Moderate speed
    - Haynes 188; 100-180SFM [30-55m]

Types of HRSA and how they machine


Lamellar chip flow, MR YG214 SS304

- Fe based Superalloys (aka Iron-Nickel)
  - Lowest elevated temperature strength of the ISO-S
  - Relatively inexpensive material
  - A286 most common

  - Typically PVD HRSA grades, but CVD stainless grades may be considered
  - Requires larger chip area due to continous chipflow
  - Highly susceptible to chemical wear (crater, notch), requires lead angles
  - Typical tool life 8-15 minutes
  - Low to Moderate speed
    - A286; 180-300SFM [55-90m]

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