**Drilling machinability**

- **DRM1**
- **Conventional steel**

![Drilling Machinability Graph](chart)

**Nitriding property**

- **DRM1**
- **Conventional steel**

![Nitriding Property Graph](chart)

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**Physical properties**

- **Coefficient of Thermal expansion**
  - 2%/%K: 26.2 (DRM1) 25.4 (Conventional steel)
  - 3%/%K: 26.2 (DRM1) 25.4 (Conventional steel)
  - 4%/%K: 26.2 (DRM1) 25.4 (Conventional steel)
  - 5%/%K: 26.2 (DRM1) 25.4 (Conventional steel)

- **Thermal Conductivity**
  - 25°C: 22.8 (DRM1) 22.8 (Conventional steel)
  - 25°C: 20.6 (DRM1) 20.6 (Conventional steel)
  - 25°C: 18.4 (DRM1) 18.4 (Conventional steel)
  - 25°C: 16.2 (DRM1) 16.2 (Conventional steel)

- **Specific Heat**
  - 25°C: 0.67 (DRM1) 0.67 (Conventional steel)
  - 25°C: 0.67 (DRM1) 0.67 (Conventional steel)
  - 25°C: 0.67 (DRM1) 0.67 (Conventional steel)
  - 25°C: 0.67 (DRM1) 0.67 (Conventional steel)

**Yield's modulus (210 Gpa)**
- Test piece condition: W:1140°C Q:1560°C AC:twice

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**Daido's Dream Series DRM1**

**Hot and Warm Forging Die Steel**

- **Features**
  - High toughness matrix type high speed tool steel
  - High hardness and high toughness matrix type high speed tool steel vastly surpassing hot work die steels. DRM1 improves hot and warm die life by its higher toughness than conventional grade.
  - Applicable with the maximum hardness of 58HRC
  - High hardness and tough grade with excellent heat checking resistance
  - Fine microstructure as that of hot work die steels resulting in higher toughness than conventional high speed tool steels
  - High softening resistance and hot hardness
  - Double melting results clean and homogeneous steel with less non-metallic inclusions

**Applications**

- Hot forging dies and punch
- Warm forging dies and punch

**Heat treatment**

<table>
<thead>
<tr>
<th>Reducing temperature</th>
<th>Heat treatment (°C)</th>
<th>Hardness</th>
</tr>
</thead>
<tbody>
<tr>
<td>800~880°C</td>
<td>Annealing</td>
<td>Q = 550~620 HRC</td>
</tr>
<tr>
<td>1100~1140°C</td>
<td>Quenching, AC twice</td>
<td>Q, AC twice</td>
</tr>
</tbody>
</table>

**Microstructure (As annealed)**

- Fine and uniform microstructure with less coarse carbides

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**Document Disclaimer**

- The product characteristics included in this brochure are the representative values based on the result of our measurements, and do not guarantee the performance in use of the product. Please inquire the latest information to our department in charge as the information of this brochure is updated without previous notice as needed.

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Characteristics

Tempering hardness

- Test piece: 15mm square
- Hardening: Oil quenching
- Tempering: Air cooling

Toughness

- Sampling: 100mm dia. Bar center
- Test piece: 10R notched
- Heat treatment: DRMI
- Heat treatment: Conventional steel

Heat checking resistance

- Test piece: 15mm dia. 10mm thick
- Heat treatment: DRMI
- Heat treatment: Conventional steel

Fatigue strength

- Sampling: 100mm dia. Bar center. L direction
- Heat treatment: DRMI
- Heat treatment: Conventional steel

Softening resistance

- Heat treatment: DRMI
- Heat treatment: Conventional steel

Hot hardness

- Heat treatment: DRMI
- Heat treatment: Conventional steel

Hardenability

- Equivalent diameter in 6 bar gas cooling (mm)

Dimensional change

- Sampling: 100mm dia. Bar center. Radial direction
- Heat treatment: H: 1140°C (200°C / min -> equal to OQ)

- Test piece: 100mm dia. × 60 mm
- Heat treatment H: 1140°C salt bath quenching