Aminite DS is a process that optimizes nitride treatment and shot peening technologies to improve the heat checking resistance, the biggest issues concerning die casting molds. Compared to earlier processes, Aminite DS shall extend the life span of molds (twice as long or more compared to high-performance nitriding* and three times as long in the case of salt bath nitrocarburizing). Compared to earlier processes, Aminite DS shall extend the life span of molds (twice as long or more compared to high-performance nitriding* and three times as long in the case of salt bath nitrocarburizing).

We perform a range of nitriding treatments, but we have added radical nitriding treatment to our nitriding lineup. The features of radical nitriding treatment are a clean surface with minimal changes to the treated surface and the ability to nitride the base material surface before PVD treatment. Radical nitriding has broad applications including PVD base nitriding (duplex treatment name: Amicoat C) and plastic molds.

**Features of Radical Nitriding**
- Nitriding treatment without a compound layer.
- Surface condition is good with almost no change in the surface roughness (luster) before and after the nitriding treatment.
- Treatment is performed at low temperature (400°C to 500°C), so it can be applied to a wide range of steels and there is minimal change in dimensions from the radical treatment.
- By first performing radical nitriding of the base material, the difference in hardness of the PVD hardened coating is reduced, enhancing the effects of PVD treatment even further. (Amicoat C is a duplex PVD treatment that combines PVD treatment with optimal radical nitriding treatment.)

**Properties of Aminite DS**
- Duplex surface treatment that contributes to longer die casting mold life spans (heat checking resistance in particular is improved)

<table>
<thead>
<tr>
<th>Basic properties</th>
<th>In the case of SKD61 die material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface strength</td>
<td>1,100 HV (at 25 µm from the surface)</td>
</tr>
<tr>
<td>Residual stress</td>
<td>Hardened (no compound layer)</td>
</tr>
<tr>
<td>Surface roughness</td>
<td>High compression stress (1,300 MPa)</td>
</tr>
<tr>
<td></td>
<td>Roughness Ra: 1 µm or less</td>
</tr>
</tbody>
</table>

The high compression residual stress of the surface slows the occurrence of heat checking.

**Effects of Aminite DS**
- Improved heat checking resistance
- Loss ratio of die casting molds (after 5,000 casting cycles)

**Positioning of Aminite DS**
- Duplex surface treatment with high compression stress added.
- Improved heat checking resistance.
- Substantial improvement in die casting mold life spans.

**Features of Aminite DS**
- Anti-galling and anti-dissolved loss
- PS treatment (salt bath nitrocarburizing)
- Balanced type PSG treatment

**Radical Nitriding Equipment**
- Basic properties
  - Surface strength: 1,100 HV (at 25 µm from the surface)
  - Hardened (no compound layer)
  - High compression stress: 1,300 MPa
  - Roughness Ra: 1 µm or less
- For survey purposes
  - Ni plating
- DC53 microstructure (50 µm nitride layer target)
- No compound layer, approximately 50 µm nitride layer
- Cross section hardness distribution: see DC53 figure

**Effective dimensions:**
- 600 mm × 600 mm (H)
- Maximum processing mass: 300 kg

* Nitriding for the purpose of improving heat checking resistance.