Objectives of reheating, quenching and tempering (Q&T) process:

Traditionally, the forging industry has relied on reheating, quenching, and tempering to attain the ideal microstructure for an optimal balance of strength and impact toughness in finished components.

What is driving the search for alternative process routes?

Eliminating energy-intensive steps in order to:

- **Reduce the energy consumption** of the process,
- **Reduce the time and complexity** of the process.

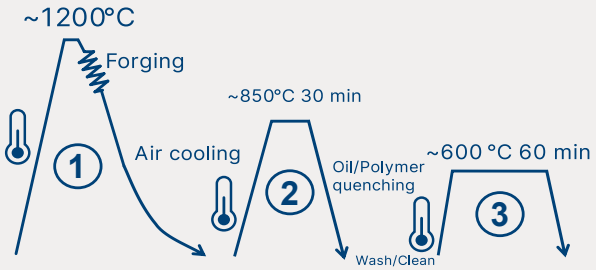
Challenges

Achieving properties requirements, especially in strength and toughness, **while avoiding multiple energy intensive reheating steps**.

The typical Q&T production route:

A three steps energy intensive route:

1. **Reheating:** makes the steel soft so it is easily molded,
2. **Quenching:** a rapid cooling process aim to create a hard steel microstructure,
3. **Tempering:** process in which quenched steel is reheated to a controlled intermediate temperature improving toughness and ensuring safe and reliable performance in service.

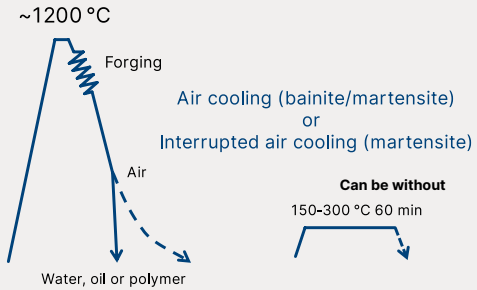


INNOVATIVE DIRECT-QUENCHING STEEL

HELPS THE FORGING INDUSTRYELIMINATE ENERGY INTENSIVE PROCESS STEPS

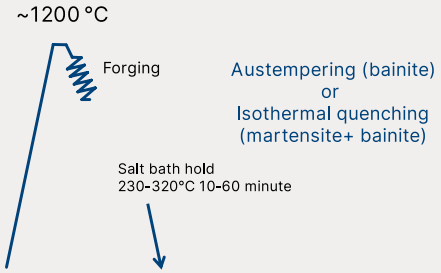
The innovative direct quenching routes available with Ovako products:

Interrupted water-cooling process



- **Good properties achieved for low-carbon steel**
- **Good suitability with existing forging plant**

Isothermal quenching in salt bath



- **Good properties achieved for low-mediumcarbon steel**
- **Adaptation of actual forging plants required**

Opportunities for forging companies

- **Energy savings**
- **Reduction of CO2 emissions**
  up to 140 kg CO2e/t of forged component produced
- **Shorter and simpler process**
  achieved with significantly lower alloying cost

Want to know more about this innovation?

Scan or click on the QR-codes

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