

Precision Gears & Shafts in Case-Hardening Alloy Steel

V&T; Machining Company · vtmachining.com/solutions/precision-gears-alloy-steel

[Home](#) / [Solutions](#) / Precision Gears & Shafts in Case-Hardening Alloy Steel

This solution looks at how VT machining manufactures **precision spur, helical and shaft gears for gearboxes and automation drivetrains** for the industrial & automation sector, and how process and material choices combine to hit demanding requirements. It is written as a starting point for your own design discussion — every part is ultimately quoted and engineered to your drawing.

The natural first choice for this kind of component is [8620 Alloy Steel](#). 8620 is a case-hardening (carburising) alloy steel that gives a hard, wear-resistant tooth surface over a tough core — the classic combination for durable gears.

Why 8620 Alloy Steel?

8620 Alloy Steel is specified here because of how its properties match the duty of precision spur, helical and shaft gears for gearboxes and automation drivetrains. We confirm the exact grade, temper or heat-treat condition with you before machining, and can supply material certificates for traceability. See our dedicated [CNC Gear Hobbing 8620 Alloy Steel](#) capability page for process-and-grade detail.

Material Alternatives & Substitutions

Depending on cost, corrosion, strength or weight priorities, several alloys can substitute for 8620 Alloy Steel. Each links to its machining capability page:

Alternative	When to choose it
4140 Alloy Steel	through-hardening for shafts and medium-duty gears
9310 Alloy Steel	aerospace-grade carburising steel for high-load gears
20CrMnTi Steel	common automotive carburising gear steel
4340 Alloy Steel	high strength and toughness for heavily loaded shafts

Recommended Process Routes

For precision spur, helical and shaft gears for gearboxes and automation drivetrains, the core shaping operations are usually:

- [CNC Gear Hobbing](#) — primary shaping of the main geometry.
- [CNC Gear Cutting](#) — primary shaping of the main geometry.
- [CNC Turning](#) — primary shaping of the main geometry.

High-Tolerance Process Combination

Where the drawing calls for a defined DIN/AGMA gear accuracy class, ground journals and controlled case depth after heat treatment, a single operation is rarely enough. We recommend combining processes in sequence so each stage refines the last:

1. [CNC Gear Hobbing](#) — rough and semi-finish the part close to net shape, leaving controlled stock for finishing.
2. [CNC Gear Grinding](#) — bring critical features to final size and geometry with a precision finishing pass.
3. [CNC Cylindrical Grinding](#) — produce the tightest features or hardened-material details that cannot be cut conventionally.
4. [CNC Deburring](#) — achieve the final surface finish, edge condition and cosmetic quality.

Sequencing the work this way isolates roughing distortion from the finishing stages, which is how tight tolerances are held repeatably in production. We plan the exact route from your tolerance scheme and first-article results.

Feature & Secondary Operations

Additional features and finishing are added with:

- [CNC Milling](#)
- [CNC Broaching](#)
- [CNC Drilling](#)
- [CNC Honing](#)

Related Applications

This solution supports the following application areas — each shows the broader range of parts and materials we make for that industry:

- [Industrial Machinery](#)
- [Automotive Parts](#)

Standards & References

Relevant standards for this kind of work include ISO 1328 (gear accuracy), AGMA 2000 / 2015, SAE J404 (alloy steel). These are cited for guidance only; we work to the standards and revisions named on your drawing.

Authoritative public references used in preparing this overview:

- [Gear geometry and accuracy fundamentals](#)
- [Case-hardening / carburising overview](#)

Frequently Asked Questions

What is the best material for precision spur, helical and shaft gears for gearboxes and automation drivetrains?

8620 Alloy Steel is the usual first choice because 8620 is a case-hardening (carburising) alloy steel that gives a hard, wear-resistant tooth surface over a tough core — the classic combination for durable gears. Alternatives such as 4140 Alloy Steel, 9310 Alloy Steel, 20CrMnTi Steel are used when cost, corrosion or weight priorities differ.

Which processes hold the tightest tolerances for precision spur, helical and shaft gears for gearboxes and automation drivetrains? We combine processes in sequence — typically CNC Gear Hobbing, CNC Gear Grinding, CNC Cylindrical Grinding, CNC Deburring — so roughing distortion is separated from finishing and the critical features are produced last.

Can you machine 8620 Alloy Steel to my drawing?

Yes. Send your CAD or 2D drawing, the grade and condition, the quantity and any finish or inspection requirements, and our engineers will confirm feasibility, pricing and lead time — usually within one business day.

What quality documentation can you provide?

Material certificates, dimensional inspection reports and first-article documentation are available on request, aligned to the standards named on your drawing.

Need precision spur, helical and shaft gears for gearboxes and automation drivetrains manufactured to your spec? Send your drawing and quantity for a fast quotation.

[Request a Quote](#)