



TECH TIP: CASE HARDENING VS. THROUGH HARDENING

WHAT'S THE DIFFERENCE?

Bearing components must have hardened rolling surfaces in order to provide long life. In general, there are two ways to harden steel to the required level: through hardening and case hardening.

THROUGH HARDENING

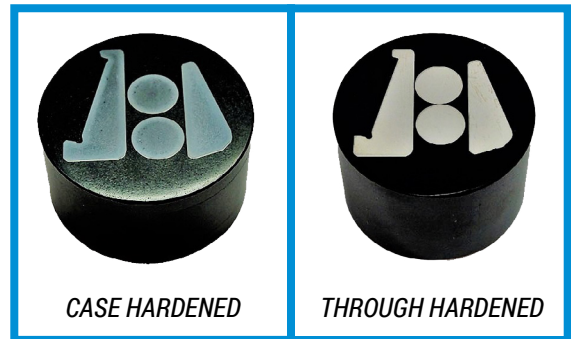
In order to harden steel, the iron mix must contain a certain amount of carbon. Carbon dissolves in molten iron just as sugar dissolves in coffee. In through hardening steel, there is a high level of carbon added to the iron mix. When the component is heat treated, it becomes hard all the way through from the surface to the core, hence the term "through hardened". Through-hardened steel components are relatively brittle and can fracture under impact or shock loads.

CASE HARDENING

Case-hardened steel was developed when the tapered roller bearing was introduced. Makers of tapered roller bearings recognized the need to lessen the problem of brittleness and possible fracture. Case hardening is the process of hardening just the surface of the part. It is also known as carburizing.

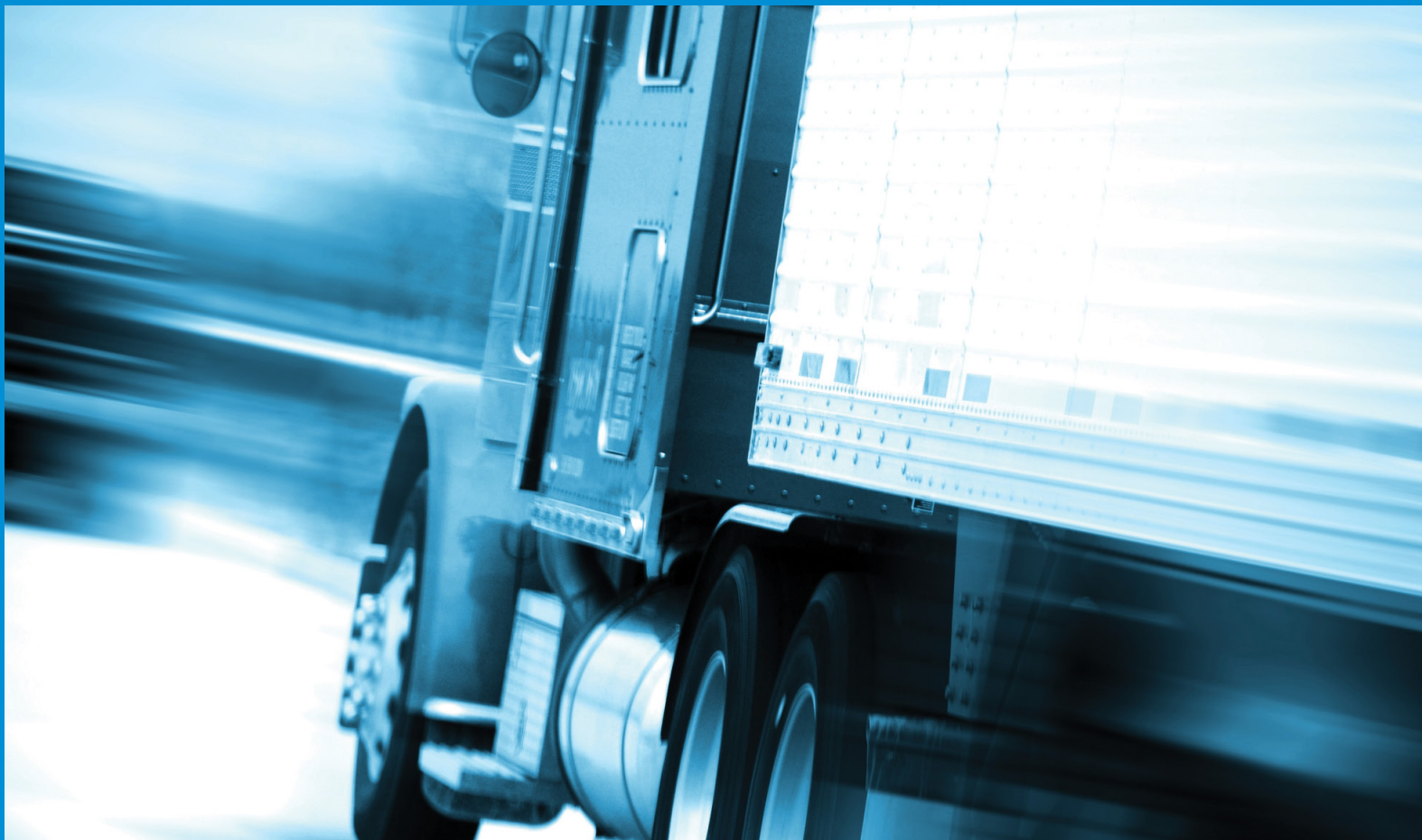
In the carburizing process, the low carbon component is placed in a furnace which contains a carefully controlled carbon atmosphere. It remains there for a period of time so the carbon soaks into the part's surfaces to a predetermined depth. When the part is heat treated, the high carbon surface layer becomes hard while the low carbon core remains comparatively soft.

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ADVANTAGES OF CASE HARDENING

- The combination of a hard surface layer and a relatively pliable inner core gives case-hardened steel superior crack and fracture resistance under shock loads
- Case-hardened steel offers 40% longer life than through-hardened steel
- The ductile core is advantageous under misalignment conditions
- Case-hardened steel is the recognized standard for tapered roller bearings



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