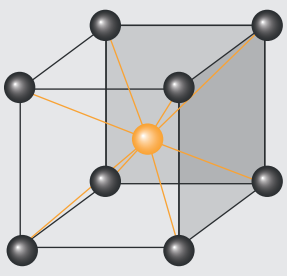
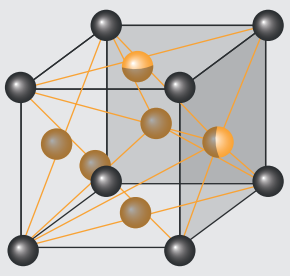
Steel parts are ‘soft’ (enough to be shaped by machining). After the manufacturing process, they must be heat treated **improve their mechanical properties**:

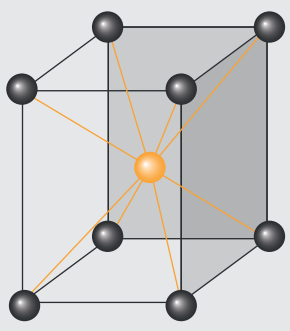
INCREASE WEAR RESISTANCE
Strength
Toughness

AVOID ADHESIVE / ABRASIVE WEAR
Overall load bearing capability and Capacity to avoid crack formation.

Which path to take?







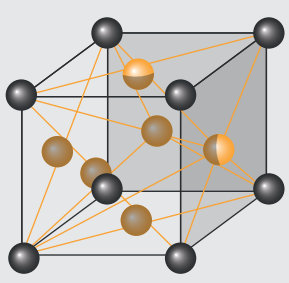
Heat treatment is a process of heating and cooling a material, typically a metal or alloy. Thermal shock produces a phase change in atom structure:

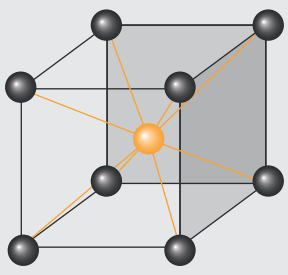
FERRITE	AUSTENITE	MARTENSITE
Body-centered cubic crystalline structure.	**Face-centered cubic crystal structure**	**Body-centered tetragonal structure.**
Soft and magnetic	**Soft and ductile**	**Extremely hard but brittle**
Used in applications requiring magnetization or corrosion resistance: such as antennas and electronic devices.	Common in stainless steel alloys and carbon steels with high manganese content. As food and/or surgical tools.	Useful in applications requiring high hardness, such as cutters, blades, bearings and tools.
Recrystallization and stress relieving annealing.	Annealing and austenitization.	Quenching and martempering.

HEAT Treatments

THERMOCHEMICAL Treatments

Thermochemical treatments are based on the diffusion of atoms across the surface of the steel: To form hard alloys/ compounds and introduce mass and internal stressed.





CARBURIZING AND CARBONITRIDING

Carburizing is considered an austenitic process

Principle: high temperature

Process in which **carbon** is introduced into the surface of a material, typically steel, to increase its hardness and strength.

Phase transformation occurs, thus creating deformation.

NITRIDING AND NITROCARBURIZING

These are considered ferritic processes

Ion bombardment / Compound and diffusion layer
Process in which **nitrogen** is diffused into the surface of a material, improving their 'tailor-made' mechanical properties (combined properties).

Phase transformation DOES NOT occur, so nearly zero dimensional changes occur.