

Shafts + shaft components: materials

018

1/1

Most shafts are made of **steel**.

Most steels have similar moduli of rigidity E ,
and **E governs a shaft's deflection**,
therefore, a shaft's **deflection is determined
primarily by the shaft's geometry**.

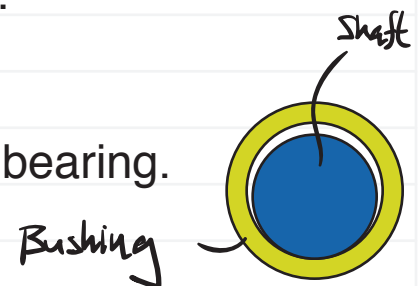
Many shafts are made from
low carbon, cold-drawn or hot-rolled steel,
such as AISI 1020-1050 steels. (Budynas)

Strengthening by heat-treatment and high alloy content
is often unnecessary.

Shafts typically fail in fatigue,
which is improved only moderately by greater strength.

It's recommended to start with a low- or medium-carbon steel,
and if strength turns out to be more significant than deflection,
choose a higher-strength steel
and reduce the size until
deflection considerations become significant.

Shafts rarely need surface-hardening because
they are typically not acting as a journal in a bearing.



When using **cold-drawn steel**, there is no need
to machine (turn) all surfaces of the shaft.

When using, **hot-rolled steel**,
all surfaces of the shaft should be turned.

Typically, shafts can be purchased off-the-shelf and turned to size.