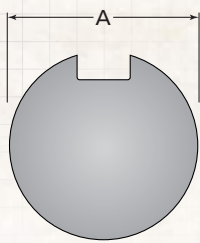


## SHAFT FEATURES

A shaft is part of an assembly used to transmit power from one part to another. Keyed shafts have a key way milled axially along the full length of the shaft that holds key stock or machine keys to assembled components in a non-permanent manner. Partial key ways and other materials are available, including turned and polished and medium carbon steel (suitable to heat treat).

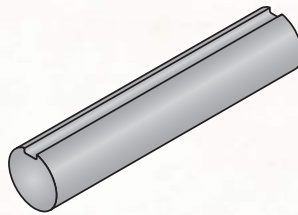
### DESIGN CONSIDERATIONS

#### DIAMETER



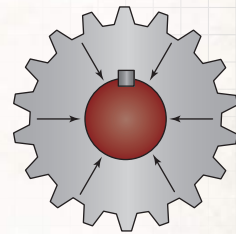
SHAFT SIZE IS DETERMINED BY THE TORQUE REQUIRED BY THE ASSEMBLY

#### KEY WAY



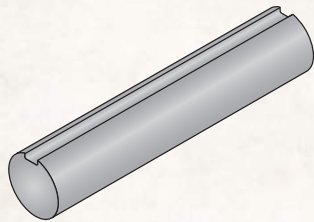
SHAFTS ARE KEYED TO ANSI STANDARDS

#### TOLERANCES



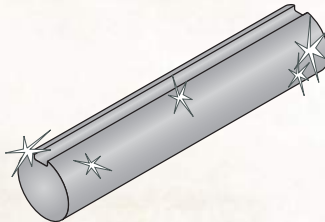
TIGHTER TOLERANCES ENSURE UNIFORM DISTRIBUTION OF LOADS

#### STRAIGHTNESS



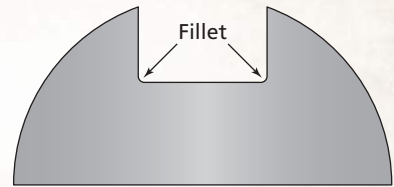
PRECISION STRAIGHTNESS WITH DECREASED RUN OUT IMPROVES ALIGNMENT OF COMPONENTS ALONG THE LENGTH OF THE SHAFT

#### SURFACE



STANDARD 125 RA SURFACE ROUGHNESS FEATURES MINIMAL SURFACE IRREGULARITIES AND WAVINESS

#### STRESS CONCENTRATION



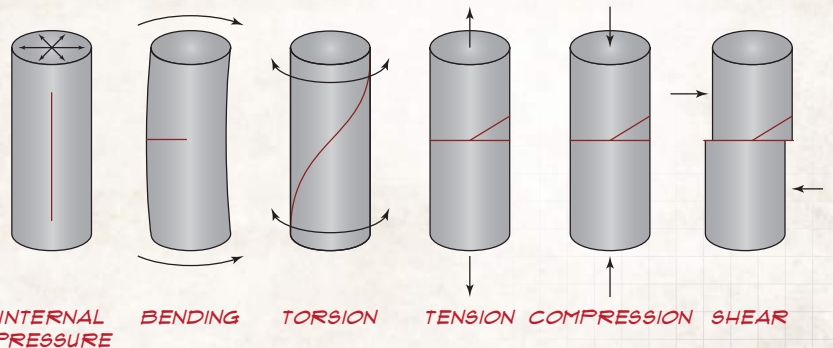
A FILLET RADIUS IN THE KEY WAY OF A SHAFT REDUCES STRESS CONCENTRATION

### MATERIAL FATIGUE

Material fatigue results from cyclical stress, a repetitive process of applying and then releasing a load from an object. These stresses can be reversals – where the force switches to the opposite direction and back again; fluctuations – where the magnitude of the force continually varies; or in combination.

In addition to stress, corrosion reduces the fatigue strength of materials. The extent of the damage depends on both the severity of the corrosion and the number of stress cycles. Eventually, cyclic stress produces cracks in the material that grow perpendicular to the plane of the encountered force.

Once cracks become visible to the naked eye they can be examined to determine the root cause by looking carefully at the point where the failure started to identify the source and direction of the force.



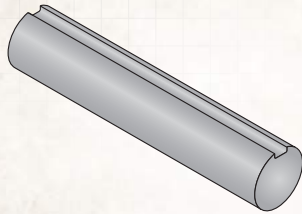
#### POTENTIAL FATIGUE FAILURES

Fracture planes caused by common fatigue forces. Some fractures occur in the same plane as the force, while others are perpendicular.

## SHAFT TYPES

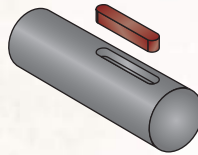
### KEYED

Keyed shafts are round shafting that have a key way cut into the material to mate with key stock or machine keys for assembly components.

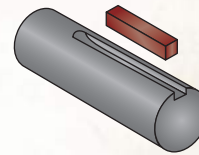


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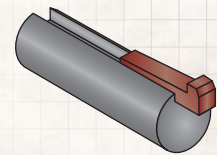
### KEYS & KEY WAYS



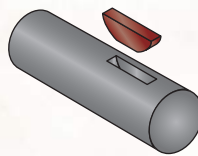
FORM A



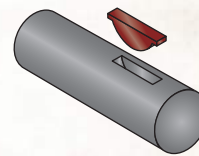
FORM B



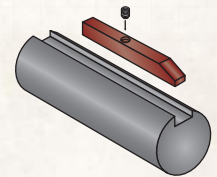
GIB HEAD



WOODRUFF



HI-PRO



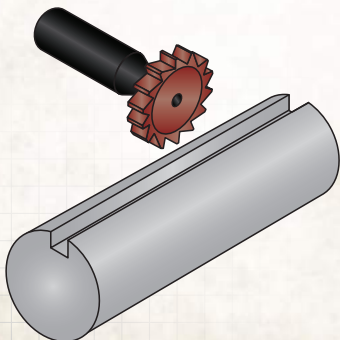
CUSTOM

## QUICK REFERENCE GUIDE

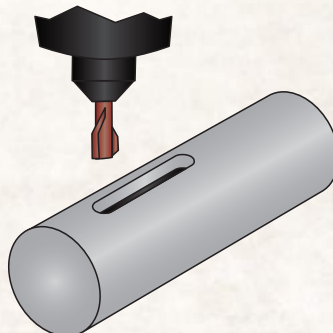
|       | COMMON NAMES                 | APPLICABLE STANDARDS | FABRICATION  | HOW TO IDENTIFY   | COMMON USES   | COMMENTS  |
|-------|------------------------------|----------------------|--|---|---|---|
| KEYED | Pre-keyed Shaft; Keyed Shaft | ANSI B17.1; BS 4235  | Shafts are formed by hot rolling and finished to size by cold drawing or turning and grinding. Key ways are machined into the shaft. | Diameter x length. The shaft diameter can be equal to or marginally less than nominal size. | Shafts, paired with key stock or machine keys, are used to transmit power from one part to another. | Depending on application, the shaft and key should be of comparable hardness. |

### MACHINING KEY WAYS

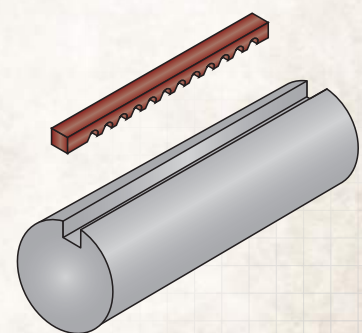
Key ways can be cut on a horizontal or vertical mill, a key seater, a vertical slotting machine, or a broach.



HORIZONTAL MILL



VERTICAL MILL



BROACH