McMaster-Carr Drive Shaft Guide

Things to consider first:
- Diameter
- Straightness tolerances: a tighter tolerance means more even distribution of load and more accuracy. The straighter the shaft the smoother the system.

Available Materials: Steel, Stainless Steel, and Aluminum
Range of Specs: Can be measured in either metric or inches.
- Diameter: 1/32” – 2 1/2” or 1mm – 50mm
- Length: 1 1/16” – 96” or 200mm – 2,500mm

Two main Types:
- Drive Shafts: ROTARY MOTION
  - Often used with rotary bearings or a system of gears, pulleys, or other power transmission components.
  - These shafts are often not hardened, which makes them easier to machine.
- Hardened Shafts: LINEAR MOTION
  - Used most commonly with liner ball bearings and linear sleeve bearings.
  - The kind of finish on these hardened shafts is important. Different surfaces generate different amounts of friction, which effects efficiency and the life of the bearings.
    - There are two measured components that determine a shaft’s hardness: micron value and case hardness. The smaller the micron value, the smoother the surface. The higher the case value, the harder the shaft.

Keyed: For a secure hold in higher-torque applications.
With Support Rail: Shaft and support rails in one easy to install unit. Use with open-style linear bearings.
Tapped/Threaded: To save time and avoid the hassle of machining.
D-Profile: Provides a flat surface area, which allows setscrews more surface area to hold. The flat surface width is equal to 50% of the diameter size.
Dual-Diameter: For mounting and connecting flexibility.
Tubular: Lighter than solid shafts, tubular shafts reduce your total system weight and allow you to run various media such as electrical wiring, compressed air tubing, coolants, or lubricants through the center.
Idler: There are two kinds. Thread-Mount Shafts—Mount in a tapped hole. A retaining-ring groove with included retaining ring and spacers position your bearing. Flange-Mount Shafts—For a more secure hold, these shafts include washers, a nut, and mounting screws to position your bearing.

Shaft Supports: There are two main types: End supports are generally used with closed style bearings for lighter loads where shaft misalignment is not critical. Support rails provide support over the length of an entire shaft. They are generally used with open style bearings for heavier loads.

Ordering Considerations: It is worthy of noting that there are also flexible drive shafts not included within this buying guide, but may be of interest for certain applications. Other objects worth looking into if you are researching different shaft applications: bearings, flanges, shaft collars, shaft couplers, and rotary seals.
McMaster-Carr Bearings Guide

General Information:
A Bearing allows for low friction motion between two surfaces. There are two typical types of motion for different bearing types. A **Radial load bearing** addresses a load that is perpendicular to the shaft. A **Thrust load bearing**, also known as axial or side load, addresses a load that is parallel to the shaft. **Flanged sleeve bearings** handle both radial and thrust loads. **Sleeve bearings** handle radial loads. **Thrust bearings** handle thrust loads.

**Sleeve Bearings:** Load is supported through the motion of to solid surfaces against each other. Come in plastic, bronze, graphalloy, or stainless steel.

**Ball and Roller Bearings:** Operates with less friction than Sleeve Bearings, these use balls or rollers to support the load. **Ball Bearings** are used in higher speed applications with lighter loads. **Roller Bearings** support higher loads because the rollers have more surface contact with the second material. Roller bearings can be spherical, cylindrical, or tapered shaped, each having their own advantages. Material options include steel, stainless steel, and delrin.

**Mounted Bearings:** A housing is included for easy installation. Comes as ball, needle-roller, spherical, and sleeve types.

**Thrust Bearings:** For handling thrust, or loads parallel to the shaft. These can also be called an axial or side load. Both plain and ball bearing designs.

**Turntables:** Ball bearings are contained in a circular fashion for easy revolving capabilities. Think Lazy Susan, but on vastly diverse scales. There are tiny ones and massive ones for industrial applications.

**Rod Ends:** These are used to build linkages and shaft connections. Options include rod ends, ball joint rod ends, clevises, and call joint swivel bearings.

**Linear Bearings:** Can be either linear plain or linear ball bearings. Allows for motion in a straight line.

**Linear Guide Blocks and Rails:** These generally offer larger load carrying capacity than linear bearings. They can also handle unbalanced and off centered loads more easily.

**Ball Bearing Types:**
- **open:** run cool and easy to lubricate.
- **flanged open**
  - flanged bearings are easy to install. The flange provides a stop for quick positioning.
- **double sealed:** have steel shields that block dirt
  - flanged double sealed
  - doubled sealed with retaining ring
  - double sealed with extended inner ring
  - double sealed with retaining ring and extended inner ring
- **double shielded:** have Buna-N seals (unless noted) that block out dirt, preserve lubricants, and reduce noise. They come greased.
  - double shielded with extended inner ring
  - flanged double shielded
  - flanged double shielded with extended inner ring