The Fastener Without Threads

by Guy Avellon

Pins are a generic term for many products with unique applications. By knowing the differences, you can help your customer select the correct product for his application.

Pins are a mechanical device designed to hold parts that are not fixed, but may be subject to movement or other external force loads. This is in contrast to threaded fasteners which produce an adjustable compressive clamp load for heavy and thick materials; pins may only produce light radial loads.

Pins are generally made from steel wire or wire that has been flattened, then coiled or bent for specific applications. The steels vary in carbon composition and hardness. Pins may also be made from stainless steels, beryllium copper, brass or Monel™.

Categories for pins include; Clevis, Coiled, Cotter, Dowel, Grooved, Lynch, Slotted, Shear, Spring, Straight, and Taper.

Clevis Pins: Usually have a cold formed head on one end of a straight shank body. Close to the end of the shank, a hole is drilled through the body. The clevis pin is placed through other objects that do not necessarily have a receptor hole that is dimensionally toleranced to be close to the diameter of the pin, but is usually in a loose but not tight connection. To keep the clevis pin from falling out of the connection, a cotter pin is placed through the drilled hole at the end of the clevis pin. Clevis pins provide for shear resistance in all applications. Many will involve holding chains together. The materials are typically AISI 1010-1020 steel or 1211, which may be case hardened. (ANSI/ASME B18.8.1)

Cotter Pin: To be used with clevis pins and castle nuts, cotter pins are a flat folded wire that has a semi-circular cross section and is looped at the closed end to prevent the pin from falling through a hole. Some pins may have different shapes, such as an R Clip, which is shaped like the letter R and provides security from spring tension around the pin or cylindrical object. The length of one end of the cotter pin wire is slightly longer than the other to facilitate their opening and spreading. Once the two ends are through the hole of the clevis pin or drilled bolt, the ends are spread in opposite directions to prevent the cotter pin from falling out, or are wrapped around the castellated protrusions to prevent the castle nut from backing off the bolt. (ANSI/ASME B18.8.1).

Coiled Pins: In the genre of a spring pin, coiled pins, or spiral pins, are a straight, cylindrical pin manufactured from flat, hardenable materials that are coiled approximately 2 1/4 times to produce multiple walls. Designed to be press-fit into the holes of the several parts to be held together, the greater outwards spring tension produced by the multiple walls effectively prevent the pin from falling out of the hole. The coiled pins continually flex in service and minimize metal fatigue under dynamically loaded applications. Materials include, but not limited to; 1070-1095 carbon steel, 6150H hardenable alloy steel, 410-420 and 302 stainless steels and beryllium copper.

Coiled pins are available in three classes: ISO 8751, for light duty; ISO 8750 for standard duty; and ISO 8748 for heavy duty applications.

Applications include: locks, latches, hinge pins, gear shafts, axles, pump shafts, motors, automotive doors and handles, etc. (ANSI/ASME B18.8.2)

Dowel Pins: Designed for precision fit parts, the straight, solid shank is ground to close tolerances with both ends chamfered. Dowel pins are to be press-fit into the applications. Uses include tool and die machinery. The materials are to be from any steel or alloy capable of being hardened to a minimum of Rc 50, which shall produce a shear strength of 130 ksi minimum. Non-hardened dowel pins shall have a minimum hardness of Rc 32, with a shear strength of 64 ksi for steel and 40 ksi for brass. (ANSI/ASME B18.2.2)

Grooved Pins: These pins have solid, unground shanks. The shank is a straight cylinder with three or more equally spaced swaged (flared) or extruded longitudinal grooves. The function of the grooves is to force metal from the side walls of the hole into the grooves which imparts a metallic bond and locking effect with the hole and subsequent parts.

Materials may be low carbon, alloy or corrosion resistant steel, brass or Monel™. These pins may be supplied either headed or straight groove. (ANSI/ASME B18.8.2)

Lynch Pins: An assembly consisting of a straight pin with an integral hoop-like retaining ring. The lynch pin is placed through holes in cylindrical parts, such as a round shaft or axle, then secured over the parts by the spring retaining ring to prevent parts from sliding or moving off each other. Also called a hitch pin, it is commonly used on tractors. The hoop ring provides an easy handle for quick removal.

Slotted Pin: Similar to a coiled pin, the slotted pin is not coiled in multiple layers. It is manufactured from flat metal that is rolled to almost being closed or touching its other side. Also known as a roll pin or 'C' pin. The sides are straight and both ends are chamfered as they are designed to be driven into a hole to provide a light, spring pressure against the parts. Materials include, but not limited to; 1070-1095 carbon steel, 6150H hardenable alloy steel, 410-420 and 302 stainless steels and beryllium copper. (ANSI/ASME B18.8.2)

Shear Pin: A term used for a straight pin made of low carbon steel. It is used between worm gears, drive gears or shafts. Its purpose is to fail before the parts encounter a resistance sufficient enough to cause damage to the parts. By failing first, the inexpensive part saves the more expensive parts from breaking.

Spring Pins: A genre of pins that includes coiled pins and slotted pins. These pins have a cylindrical shape with straight sides. One or both ends are chamfered to facilitate insertion as the body diameter of the pins are slightly larger than the hole diameter. The pin will compress as it is fitted into the diameter of the hole. As the spring wants to return to its normal shape, it exerts a continuous pressure against the walls of the hole. These springs are considered as being a self-retaining fastener. (ANSI/ASME B18.8.2)

Straight Pins: Are made from cold drawn wire with unground cylindrical sides. The ends may or may not be chamfered. For inexpensive, general applications; to secure shafts. (ANSI/ASME B18.8.2)

Taper Pins: Similar to straight pins with the exception that one end is tapered. These pins are designed to be driven into a hole of slightly smaller diameter than the body of the non-tapered end. This essentially provides a press-fit retention of the pin that is not expected to be removed. (ANSI/ASME B18.8.2)