Workholding
Glossary of Terms

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Foreword

The following glossary of terms is provided by the Workholding Product Group of AMT – The Association For Manufacturing Technology to assist in the use and understanding of workholding devices and components. The brief definitions contained in this document are recommended descriptions of terms and may not be the only definition associated with any listed term.

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Terms

Arbor

A workholding device that locates or grips on an internal diameter or feature.

Center(s)

A device that supports a workpiece on a common axis by one or two ends.

Note: A center that rotates is called a *live* center, one that does not rotate is called a *dead* center.

Centrifugal Force

The force generated by rotation that tends to move all rotating parts away radially from the axis of rotation.

Chuck

Universal holding device capable of OD and/or ID clamping. A chuck may be actuated manually, pneumatically, hydraulically or electrically.

Chuck Adapter

The interface between the machine and the chuck. It can be a separate component or integral to the chuck body.

Chuck Body

The part of the chuck that encloses the operating mechanism for actuating the movable jaw(s).

Clamping Cylinder (Actuator)

A device that actuates the chuck through the aid of pneumatic or hydraulic energy.

Clamping Force

The algebraic sum of the individual radial forces applied by the top jaws on the workpiece - see Top Jaw -

Clamping Torque

The product of the clamping force, clamping radius and the coefficient of friction between the top jaw(s) and the workpiece.

Collet

A split sleeve which when expanded or contracted, grips the workpiece.

Dead Length

The action of gripping a workpiece without changing its axial position.

Dynamic Clamping Force

The actual clamping force when the workholding device is rotating.

Expanding Mandrel

- see Arbor -

Face Driver

A unit having part driving chisels that penetrate the part face of a workpiece when pressure is applied.

Fixture

A device used to locate or support material, workpiece(s), or tool(s) during machining operations. Usually custom designed to hold a specific workpiece.

Hard Jaws

Top Jaws that are made to final size of hardened steel. They are not intended to be machined in use - see Top Jaw; Soft Jaw -

Hysteresis

The change in static clamping force after the chuck has been rotated at working rotational speed with a constant input force - see Input Force -

Indicating Band

A diameter on the chuck body designated for measuring runout of a chuck.

Input Force

The force acting on the chuck, applied from an external energy source that actuates the chuck's mechanism.

Input Torque

The torque acting on the chuck, applied from an external energy source that actuates the chuck's mechanism.

Mandrel - solid

Cylindrical or symmetric shaft, sometimes tapered, that locates on an internal diameter or feature of the workpiece.

Master Jaw (Base Jaw)

A radial moving part within the chuck body to which the Top Jaw is mounted.

Maximum Actuating Force

The maximum input force allowed.

Maximum Rotational Speed

The maximum rotational speed in RPM specified by the manufacturer for a chuck with standard jaws in compliance with the manufacturer's instructions.

Maximum Static Clamping

The maximum clamping force obtained when the maximum permissible input force (or maximum input torque) is applied to a particular chuck.

Moment of Inertia

The moment of inertia with respect to a given axis is the limit of the sum of the products of each of the elemental particles in which the body may be conceived to be divided and the square of their distance from the given axis.

Pull Back

The action of gripping a workpiece while simultaneously pulling in an axial direction usually against a fixed locator.

Rotational Balance

The equilibrium of all masses around the axis of rotation (any difference(s) between the axis of rotation and the center of gravity will cause imbalance).

Soft Jaw

Top Jaw blank that can be machined to specific dimensions that are mounted to a Master Jaw – see Hard Jaw; see Master Jaw (Base Jaw) -

Spindle Liner

A sleeve, which is inserted in a spindle to reduce the internal size.

Static Clamping Force

The clamping force of the chuck when the chuck is not rotating.

Tooling Column

A device used in association with clamping device to hold workpiece in position (horizontal or vertical).

Top Jaw

The component that clamps the workpiece and is mounted on a Master Jaw.

V-block

A positioning device.

Vise

A stationary workholding device having one or more moveable jaws that is used to clamp a workpiece.

Workholding Chuck

A clamping device with moveable jaws or a collet to hold a workpiece, designated hereinafter by "chuck."

Working Rotational Speed (n_w)

The rotational speed in RPM under machining conditions ($n_w <= n_{max}$).

Types of Chucks

Collet Chuck

A workholding device utilizing a collet.

Combination Chuck

A manual chuck in which is combined the features of both the independent and self-centering chucks.

Compensating Chuck

A chuck in which jaw(s) move to or away from the workpiece without altering the position of the workpiece.

Countercentrifugal Chuck

A chuck in which there is a system that permits compensation for the loss of clamping force due to centrifugal force.

Crankshaft Chuck

A chuck capable of gripping and positioning a crankshaft on an off-center for turning and grinding operations.

Diaphragm Chuck

A chuck that uses the deformation of a flexible material to grip a workpiece commonly operated by a clamping cylinder.

Self-Contained Chuck

A power chuck having a built-in actuating mechanism. See Power Chuck.

Independent Chuck

A chuck in which each individual workholding jaw is moved to or from the workpiece without disturbing the position of any other jaw.

Index Chuck

A chuck with an internal system that enables the indexing of work parts with intersecting axis, without releasing the workpiece.

Magnetic Chuck

A chuck typically used on surface grinders and milling machines for holding ferrous parts with large, flat sides. Holding power may be provided by permanent magnets or by an electromagnetic system.

Manual Chuck

A chuck that is actuated by hand with the aid of human energy (e.g. by means of a wrench or key).

Power Chuck

A chuck that is actuated by means of pneumatic, hydraulic, electrical energy, etc.

Pull-Back Chuck

A chuck that grips a workpiece while simultaneously pulling in the axial direction against a fixed locator.

Retractable Jaw Chuck

A chuck having ability to grip long shafts for turning their complete length by retracting jaws into the chuck face to allow the area previously being gripped to be machined.

Note: Either a face driver or expanding mandrel is used for the torque transfer when machining area previously gripped by chuck jaws.

Scroll Chuck

A chuck manually operated by a key which fits into a pinion gear which rotates a ring gear that has a face thread (scroll) that engages mating thread in jaws to radially move in or out.

Self-Centering Chuck

A chuck in which all jaws move to or away from the workpiece and maintain one common center.

Vacuum Chuck

A workholding device, which clamps the workpiece using vacuum.

Types of Fixtures

Custom Milling Fixture

A design made specifically from print. Any non-standard offering that is manufactured for a custom workholding requirement such as angle plates, columns, tombstones, location plates, special hydraulic fixtures, etc.

Modular Fixture

A system in which fixtures are constructed from standardized, reusable components. Fixtures are assembled and disassembled quickly. Basic styles are subplate, dowel-pin, and T-slot.

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