

Glossary of Common Terms Used in the EMC Documents

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A listing of terms and what they mean. Some terms have a general meaning and several additional meanings for users, installers, and developers.

Acme Screw A type of lead-screw that uses an acme thread form. Acme threads have somewhat lower friction and wear than simple triangular threads, but ball-screws are lower yet. Most manual machine tools use acme lead-screws.

Axis One of the computer control movable parts of the machine. For a typical vertical mill, the table is the X axis, the saddle is the Y axis, and the quill or knee is the Z axis. Additional linear axes parallel to X, Y, and Z are called U, V, and W respectively. Angular axes like rotary tables are referred to as A, B, and C.

Backlash The amount of play or slop in a lead-screw .

Ball-screw A type of lead-screw that uses small hardened steel balls between the nut and screw to reduce friction. Ball-screws have very low friction and backlash , but are usually quite expensive.

Ball-nut A special nut designed for use with a ball-screw. It contains an internal passage to re-circulate the balls from one end of the screw to the other.

bridgeportio An I/O task designed to work with a Bridgeport milling machine, having a variable speed spindle , coolant, and lube pumps, and some other stuff.

CNC Computer Numerical Control. The general term used to refer to computer control of machinery. Instead of a human operator turning cranks to move a cutting tool, CNC uses a computer and motors to move the tool, based on a part program .

EMC The Enhanced Machine Controller. Initially a NIST project. EMC is able to run a wide range of motion devices.

EMCIO The module within EMC that handles general purpose I/O, unrelated to the actual motion of the axes. A couple examples are bridgeportio and minimillio .

EMCMOT The module within EMC that handles the actual motion of the cutting tool. It runs as a real-time program and directly controls the motors.

Encoder

Feed Relatively slow, controlled motion of the tool used when making a cut.

Feedback

Feed-rate Override A manual, operator controlled change in the rate at which the tool moves while cutting. Often used to allow the operator to adjust for tools that are a little dull, or anything else that requires the feed rate to be "tweaked".

G-Code The generic term used to refer to the most common part programming language. There are several dialects of G-code, EMC uses RS274/NGC .

GUI Graphical User Interface.

General A type of interface that allows communications between a computer and human (in most cases) via the manipulation of icons and other elements (widgets) on a computer screen.

EMC An application that presents a graphical screen to the machine operator allowing manipulation of machine and the corresponding controlling program.

Home A specific location in the machine's work envelope that is used to make sure the computer and the actual machine both agree on the tool position.

ini file A text file that contains most of the information that configures EMC for a particular machine

Jog Manually moving an axis of a machine. Jogging either moves the axis a fixed amount for each key-press, or moves the axis at a constant speed as long as you hold down the key.

kernel-space

Kinematics

Lead-screw An screw that is rotated by a motor to move a table or other part of a machine. Lead-screws are usually either ball-screws or acme screws, although conventional triangular threaded screws may be used where accuracy and long life are not as important as low cost.

MDI Manual Data Input. This is a mode of operation where the controller executes single lines of G-code as they are typed by the operator.

minimillio An I/O task designed to work with small table-top mills.

NIST National Institute of Standards and Technology. An agency of the Department of Commerce in the United States.

Offsets

Part Program A description of a part, in a language that the controller can understand. For EMC, that language is RS-274/NGC, commonly known as G-code.

Rapid Fast, possibly less precise motion of the tool, commonly used to move between cuts. If the tool meets the material during a rapid, it is probably a bad thing!

Real-time Software that is intended to meet very strict timing deadlines. Under Linux, in order to meet these requirements it is necessary to install RTAI or RTLINUX and build the software to run in those special environments. For this reason real-time software runs in kernel-space.

RTAI Real Time Application Interface, see <http://www.aero.polimi.it/rtai/> <http://www.aero.polimi.it/~rtai/>, one of two real-time extensions for Linux that EMC can use to achieve real-time performance.

RTLINUX See <http://www.rtlinux.org> <http://www.rtlinux.org>, one of two real-time extensions for Linux that EMC can use to achieve real-time performance.

RS-274/NGC The formal name for the language used by EMC part programs .

Servo Motor

Servo Loop

Spindle On a mill or drill, the spindle holds the cutting tool. On a lathe, the spindle holds the workpiece.

Stepper Motor A type of motor that turns in fixed steps. By counting steps, it is possible to determine how far the motor has turned. If the load exceeds the torque capability of the motor, it will skip one or more steps, causing position errors.

TASK The module within EMC that coordinates the overall execution and interprets the part program.

Tcl/Tk A scripting language and graphical widget toolkit with which EMC's most popular GUI's were written.