JOHNSONPLASTICS PLUS

Glossary of Rotary Engraving Terms

BRAILLE INSERTER: This is a device that, if equipped, can be installed into a special holder, usually located on the gantry containing the engraver spindle. When creating ADA signage, the braille inserter is used to automatically plunge braille spheres into holes that are first drilled into the sheet material. The holes are drilled using a specific braille drill tool.

CHIP REMOVAL SYSTEM: Vacuum system that is responsible for removing the excess engraved chips or pieces of the material during an engraving or cutting process. The hose of the system normally connects to a port on the side of the nose cone. Can be powered manually or powered automatically by the controller when an engraving or cutting job begins.

COLLET: A device that is normally installed inside the spindle that acts as a "spacer" to allow specific sized tools to fit perfectly into the engraving spindle. Some collets can be changed easily, while others may be permanently installed into a spindle. Due to the high-speed rotation of the tool in the spindle, collets are extremely important to ensure precise engraving results and prevent damage to the engraver.

CONTROLLER: Refers to the control box where the engraving table and all other components are plugged into. It is responsible for all movements of the engraver. The computer also plugs into the controller so that engraving jobs and tasks can be sent. Any buttons or touch screens that allow control of the engraver components are usually integrated into the controller, or can be a separate device, sometimes called a "pendant."

DWELL TIME/DELAY AFTER TOOL DOWN: Sometimes also referred to as "spindle down time" or simply "down time," it refers to the amount of time, typically listed in milliseconds (ms), that the engraving tool enters the substrate surface before the X and Y axis begin to move the engraving tool. This setting is important to allow adequate time for the engraving tool tip to enter the material surface and reach its maximum set depth so that the proper engraving depth is achieved for the entire toolpath movement.

EMERGENCY STOP: This is usually a large red button that is located on the engraver in an easy-to-reach location and will instantly stop any motion of the engraver when pressed in the event of an emergency. Sometimes it will also cut power to the entire system. Sometimes there can be more than one E-Stop button on the machine, depending on the model.

ENGRAVING BED: The platform which the engraving sheet material is attached to. Depending on the design of the engraver or CNC, the bed can be stationary (never moving) or can move forward and backward during engraving as the Y-axis of the machine.

ENGRAVING FONT: A typeface that is adapted specifically for rotary engraving. The strokes, serifs, ligatures, etc. of the letters are usually set up with tool paths so that the engraving tool can follow the lines, allowing for a simplified and significantly faster engraving process for the typeface. In contrast, other fonts that are not engraving fonts must usually have a fill applied for them to be engraved accurately. Applying a fill to the letters makes the engraver treat the letters as tiny complex shapes, which compounds engraving time drastically.

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FEED RATE/CUTTING RATE: Refers to the speed or rate at which the engraver is moving while an engraving or cutting task is currently running. Usually, the feed rate is gauged and set on the controller or the engraver software using in/sec. or mm/sec. Sometimes can also be a percentage or a number on a predetermined scale.

FILL: When setting up artwork for engraving, creating a fill refers to populating the inner area of a closed shape with the tool paths the engraver will use to engrave the space to create the shape on the engraving material. The fill can be adjusted to have the tool paths closer together or farther apart. Tool paths should be closer together for small-tipped tools such as 0.005”-0.015” width tools. Tool paths should usually be set slightly further apart using wider-tipped tools such as 0.030”-0.125” width tips. Tool paths that are closer together and use a smaller tipped tool can achieve more details and tighter corners but generally will have longer run time. Tool paths that are further apart and use wider tipped tools will have faster run times but may not produce fine details. Usually, the engraving software can generate a preview of the tool path while considering the width of the selected tool so that the engraved area can be previewed on screen before it is engraved.

FILL PATTERN: When creating a fill for a shape in the engraving software, different fill patterns can usually be selected. The fill pattern determines how the area of the shape will be engraved. Depending on the artwork, choosing the best fill pattern for the job can be very important to ensure a successful engraving and avoid issues such as pitting within the engraved area. Some common fill patterns include:

Spiral: The engraving path begins along the outer edge of the shape and works its way into the center of the shape in a spiral pattern.

Reverse Spiral: The engraving path begins in the center of the shape and works its way outward the edges of the shape in a spiral pattern.

Sweep: The tool “traces” the edges of the shape and then “sweeps” left and right to engrave out the area within the shape. The tool lifts out of the material surface at the end of a sweep and plunges in again at the beginning of the next sweep.

S-Sweep: The tool “traces” the edges of the shape and then “sweeps” left and right to engrave out the area within the shape but does not lift and plunge again at the end of a sweep. Instead, the bit stays plunged into the material and simply moves down to the next sweep, creating an “S” pattern. This sweep pattern is more efficient than sweep alone and eliminates run time.

Island: The fill pattern follows the edges of the shape and creates “traces” of the shapes edges that gradually get smaller from one to the next as they work their way towards the center of the shape until the pattern has no more room to continue.

Reverse Island: This fill pattern follows the same principle as “Island” but instead begins engraving in the middle of the shape and works its way out, ending at the edges of the shape.

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MANUAL DEPTH: Relies on a manual depth setting, normally set within the engraver controller or the engraving software setup. When running manual depth, the proximity/auto depth sensor is turned off. The Z axis stops plunging at a predetermined point or depth setting without the assistance of the proximity/auto depth sensor. Also, the micrometer setting does not normally control the engraving/cutting depth when using manual depth settings.

MICROMETER: Dial device located on the bottom of the spindle that adjusts the tool depth (or amount that the tool tip is exposed), usually 0.001" increments (one click equals +/- 0.001").

NOSE CONE: Device that attaches to the bottom of the micrometer that contacts the surface of the substrate or material on the engraving bed during the engraving or cutting process.

ORIGIN/ZERO POINT: Refers to the point at which the engraving area begins. Ruler or guide measurements also often start at the origin or zero point. An origin/zero point can be set to be a different location on the bed, however the default location for origin/zero point is usually the top left corner of the engraving bed.

PLATE SIZE: Adjusts the layout space available in the software for laying out artwork for engraving or cutting. Adjusting the layout space can be helpful by simplifying the placement of artwork within an engraving or within the boundaries of a sign substrate.

PLUNGE RATE: Refers to the rate at which the Z axis (spindle containing the engraving tool) travels down to the surface of a material or substrate on a rotary engraver or CNC router.

PROXIMITY/AUTO DEPTH: Refers to a sensor that allows the spindle to plunge the engraving tool into the surface of the engraving sheet, then automatically stops plunging once the sensor is triggered. The depth setting on the micrometer determines the engraving or cutting depth when using proximity/auto depth.

PUMP/MISTING SYSTEM: An optional system that can be added to many engravers or CNC routers that will automatically spray or mist a cooling liquid onto the engraving area during the engraving or cutting process. It is most commonly used for cutting and engraving hard metals, such as steel and stainless steel. It is not commonly used for soft metals such as brass and aluminum. It is not needed for other soft materials such as plastics and other organic materials.

SPINDLE: Device mounted to the gantry (Z axis) of the rotary engraver. The engraving tool is installed into this. Depending on the spindle type, the tool is loaded either from the top of the spindle (requires long engraving tools- 4.5-6" in length), or the bottom (requires short engraving tools of approximately 2" in length).

SPINDLE MOTOR: Refers to the high-speed motor that is responsible for the rotation of the spindle and tool. The spindle motor normally attaches to the spindle using a band that is able to travel up and down the spindle sprocket during engraving, enabling the Z axis to move up and own freely during engraving while spinning the tool at high speed.

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SPINDLE SPEED: Refers to the rate of rotation of the engraver spindle during an engraving or cutting job. The speed is usually defined by RPM (revolutions per minute) and is set either in the engraver controller or within the tool settings of the engraver software.

TACKY MAT/SEKLEMA MAT: This is a double-sided tacky mat that can be used on the engraver bed to hold non-porous sheet material securely in place for engraving and cutting. The mat is durable and self-healing when used properly. It can be cleaned and reused many times. JPPlus recommends the Seklema mat.

TABLE GUIDES: Guide bars are usually located at the top and left or right sides of the engraving bed that allow for precise placement of sheet material or objects at the edges of the engraving bed. Usually, the guides can be raised and lowered so that they do not interfere with the engraving process. The guides often meet at the origin or "zero point" of the engraving bed.

TOOL: Term commonly used for the engraving or cutting "bit." Can also be referred to as a "cutter."

TOOL PATH: This can also be thought of as the "engraving path", or the path that the tool will travel when running the engraving or cut job. The path is defined by lines in the engraving software. Paths can simply be the edges of a shape such as when cutting the shape out or can be populated within the shape to engrave the shape (see fill and fill pattern definitions). There are numerous ways to control the tool path. Some common tool path types include:

- **Outline:** The tool tip is traced exactly on top of the line of the shape a shown in the engraving software artwork setup.
- **Male:** The tool tip is offset to the outer edge of the line of the shape to preserve the exact dimensions of the original shape. The offset is set automatically based on the tip width of the selected tool.
- **Female:** The tool tip is offset to the inner edge of the line of the shape. The offset is set automatically based on the tip width of the selected tool.
- **Fill:** Tool paths are generated within the inner area of the shape and are populated based on the selected tool and the selected fill pattern. (See fill and fill pattern definitions below)
- **ADA Profile:** This tool path is specifically designed to cut out tactile shapes and lettering for ADA sign creation. It is similar to the Male path but is optimized for the tactile letter creation step for ADA sign making.

X AXIS: When viewing the front of the engraver, the X axis refers to the movement of the engraver spindle in the left and right directions. The gantry that contains the spindle normally travels left and right on a track or bar.

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Y AXIS: When viewing the front of the engraver, the Y axis refers to the movement of the engraver spindle in the forward and back directions. Depending on the engraver design, the Y axis may refer to the motion of the X axis track or bar moving forward and backward over a stationary engraving bed, or the engraving bed may travel forward and backward for the Y axis motion while the X axis track/bar is stationary.

Z AXIS: When viewing the front of the engraver, the Z axis refers to the movements of the engraver spindle in the up and down directions (movement closer or further away from the surface of the engraving bed).