FastCAM®
The World Standard in Profiling Software

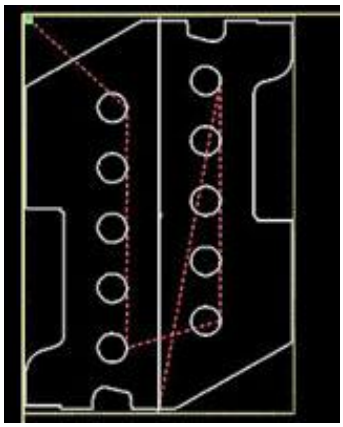
05/2010

New FastNEST® Features Discussion Paper

Methods to Improve Speed & Reduce Piercing/Waste

Customers tell us they want savings in all 3 areas; time, plate and piercing. The following nesting options can help you achieve a result based on the varying criteria of each job. These new features are included in the latest version of FastCAM® Professional System (which includes the FastNEST® nesting module).

Common Cutting – Traditional Pairs.



Common cutting has obvious benefits such as reduced piercing, less cut distance and tighter nesting. Common cut pairs can reduce the cutting and halve the piercing. It is used most often in shipbuilding as it is common to encounter left and right hand pairs.

For customers who have very simple needs, Common Cut Pairs is ideal. Whether a job requires 10 parts or a 100 parts, the common cutting saving derived from cutting two geometry in a single pass are estimated to be between 10 and 25%, depending on the type of part, distance etc.

Common Cutting – Nests.

Common cutting traditionally uses a single straight side for common cuts. This can save some cutting but not piercing. As piercing can be up to 80% of cutting time and much slower than cutting itself and even more expensive in consumables and plate, what is wanted is common cutting which does not involve additional piercing. The one of greatest interest has been where the part separation in nesting is exactly one cut width. As with all cutting, there are multiple considerations as to what is most important;

- Part movement
- Part marking during cutting
- Part dimensional accuracy
- Cutting time
- Piercing time
- Scrap.

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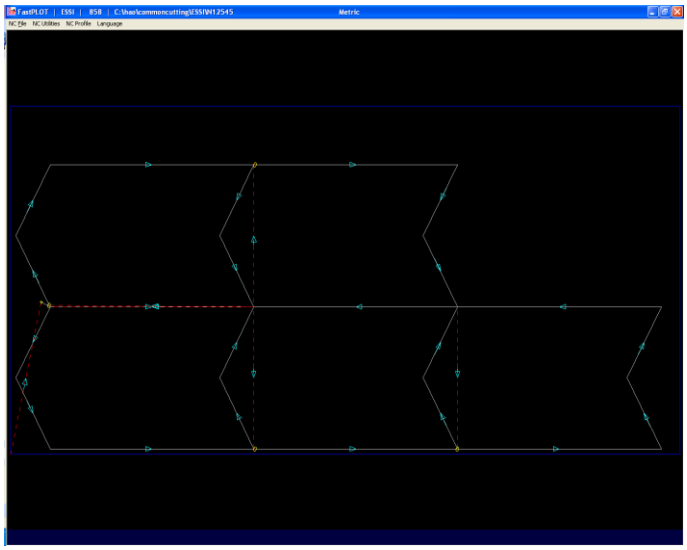
Common Cutting – Nests. Dramatic savings in Plate & Piercing.

In the latest version of FastNEST®, we have introduced the ability to completely common cut a nest. Compared with traditional nesting of separate parts each with their own external entry and exit, Common Cut Nest gives you the ability to set the part spacing to exactly the cut width before nesting.

You can achieve 'zero gap' common cutting by cutting entire nests using our patented EdgeSmart™ technology - start on (part) edge approach (explained in more detail later). In many nests this will usually eliminate piercing time and halve cutting time. Intelligent strong/weak analysis logic is built into the software to minimize part movement however there is the potential for slightly damaged parts so part quality is a consideration. There is also the potential of damage to the part if an edge start command is not present in the NC control. However it offers the possibility of many common cuts in a nest of largely rectilinear parts where quality is not the main concern. It is dramatically faster with far less piercing.

Like any technology, there are advantages and disadvantages depending on the application. The NC programmer can quickly weigh up the pro's and con's on a job by job basis. Certainly if you're cutting barbeque plates or similar then the efficiencies using the new Common Cut Nest feature can be remarkable.



For rectilinear parts such as nests of rectangles, the saving in piercing can be 5x. The saving in cutting can be 2x, yielding gains of 10x in total processing speed!

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Multi Pass Cutting–Checks for Patterns or Arrays to improve speed

"Multi Pass" cutting is varying multi torch cutting (as opposed to a fixed number of torches in a single pass at a fixed spacing). While our traditional multiple strip cutting is still available, there are occasional economies from multi torch cutting on non structured nests. These are nests where you get maximum plate efficiency by nesting for a single torch but use a multiple torch machine to speed everything where and if this is possible. To do so, you have a trade off in setup time against speed of cutting and piercing. This is more valuable as cutting speed slows, as with oxy on heavy plate. Traditionally oxy machines are multi torch for use on heavy plate.

Operationally you nest as for single torch and then ask FastNEST® to look for patterns or arrays. The down side is that the spacing of the torches is generally not automatic and you have to get the operator to set up the right number of torches at the right spacing between each pass. It is also worth noting that this works fine on odd shape remnant plate and does not affect plate trim. We have found that this feature is attractive to some of our customers who do get a saving by multiple simultaneous pierces!

Bridging- More Control over Fast, Continuous Cutting

Bridging has always been possible in the FastCAM® drawing editor working on a whole nest drawing however FastNEST® offers more types of moveable bridges.

- 1) **(Traditional) Bridging.** A simple positive bridge is where parts are connected together linked by two parallel cuts (bridge). Bridges allow continuous cutting and are traditional in many shipbuilding applications. The result is much faster cutting. Parts are left joined, but this can be an advantage in some circumstances. These include making assemblies, moving the parts as a group and minimizing part movement (appropriate for lighter materials or thinner materials).
- 2) **Overcut or Negative Bridging** allows for continuous cutting with the immediate separation of parts. This is a FastCAM® invention that has the advantages of bridging but cuts out the bridge on the return. Selecting this function will deliver a speed increase on many nests and result in a reduction in piercing making it a feature of interest to a wider range of customers.
- 3) **Skip Bridging.** Here you have additional piercing and the parts are held together by a bridge but the bridge is not cut. This can be used for routing aluminium, as it prevents vibration but does involve piercing on the edge, which is fine for routing. You actually do much more piercing and save nothing on cutting, so it is a device mainly to prevent vibration and movement. A simple gap bridge forms much the same function for lighter materials where the resultant tabs can be broken manually. In this case, additional pierces are required rather than fewer. (This function is aimed at aluminium routers but can be used in any instance where the programmer does not want the bridge to be cut).
- 4) **Skip with Entries.** As with Skip Bridging, but pierces are away from the part edge.

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EdgeSmart™ (Start on Part Edge) Patented Technology.

- Edge starting is a technique that uses the edge of the material to begin the cutting process. By avoiding long pre-heat times especially on heavy materials productivity increases dramatically.
    - Kerf Start - places the torch on a previous cut edge allowing rapid starts within the body of the nest.
    - Box Start - creates 'opportunities' or strategic torch entry points within a nest. Whilst cutting the torch moves away from the cut path creating a small void, the torch then returns to the cut path. The resulting box created is used for the next pierce point. As well as increasing productivity these boxes reduce potential damage to cut parts from the piercing process.
    - Auto plate breakup before part removal - for convenience and improved safety in skeleton removal.
    - Plate edge starts for zero pierce nests - Edge Starting begins each cutting job on the plate edge, when combined with kerf and or box starts it is possible to create zero pierce nests.
    - Dual kerf cutting to minimize movement - This balanced cutting technique minimizes part movement by cutting first one way and then the other, typically used to cut long rectangular parts. By using two start points the thermal movement is balanced resulting in higher accuracy.
    - Entries automatically positioned to minimize movement for a given cut sequence - Intelligent placement of pierce points within a nest has multiple benefits; reduces head travel between parts, avoids previously cut components and potential head crashes improves productivity generally.

Refer to the FastCAM® System Comparison Chart for details on other functions, including nesting.

If you have questions please email fastcam@fastcam.com (USA/World) or fastcam@fastcam.com.au (AUS/ASIA PACIFIC).

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