POLITECNICO MILANO 1863

Laser cutter: file preparation

Labora model making

Contents

Allowed materials

Paper from 160 to 700 gr/mq

Cardboard up to a thickness of 2,5 mm

Rigid plastic up to a thickness of 5 mm*

* Be careful: **not all rigid plastics are laserable.**

Buy materials such as extruded and cast methacrylate (PMMA, Perspex, Plexiglas) and ask for confirmation that the sheet you purchase can be laser cut.

Forbidden materials

Laminated, painted or glued cardboard

Polycarbonate and **PVC** such as vinyl and forex

HDPE thermoplastic polymer and **polystyrene**

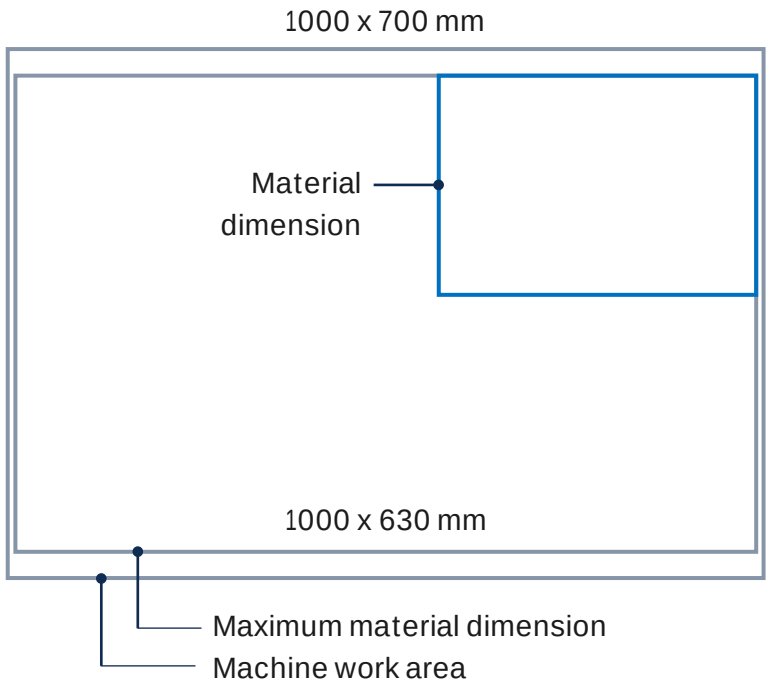
Soft plastic such as **polypropylene** or **acetate**

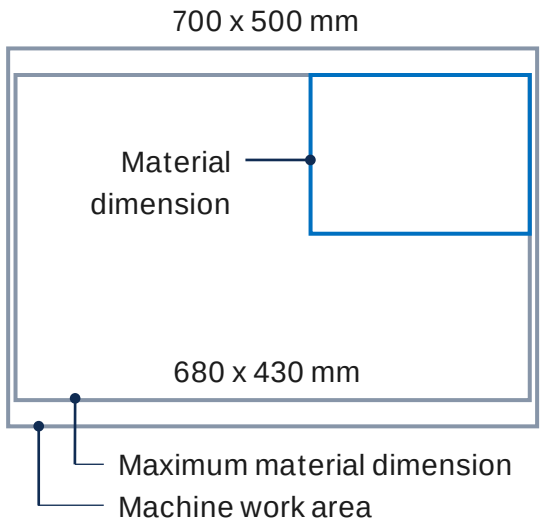
Metal materials

Dimensions

To draw the pieces correctly you need to think as if you were cutting them manually: it is necessary to draw the geometries with the **real life measurements** already reduced to **the scale of the model** and **in millimeter units of measurement**.

The pieces to be cut must be placed at **least 10 mm from the edge of the material** and **inside two frames with the following measurements.**
In order not to produce pieces that are too fragile or unusable, there must be no elements with dimensions or relative distances **smaller than 0.7 mm**.





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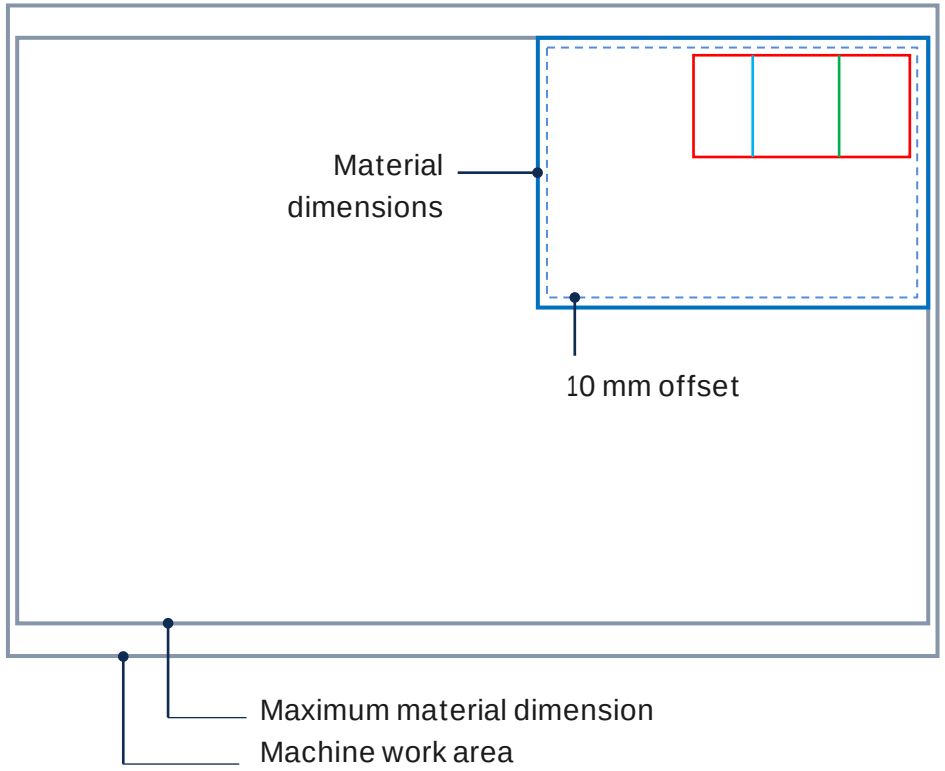
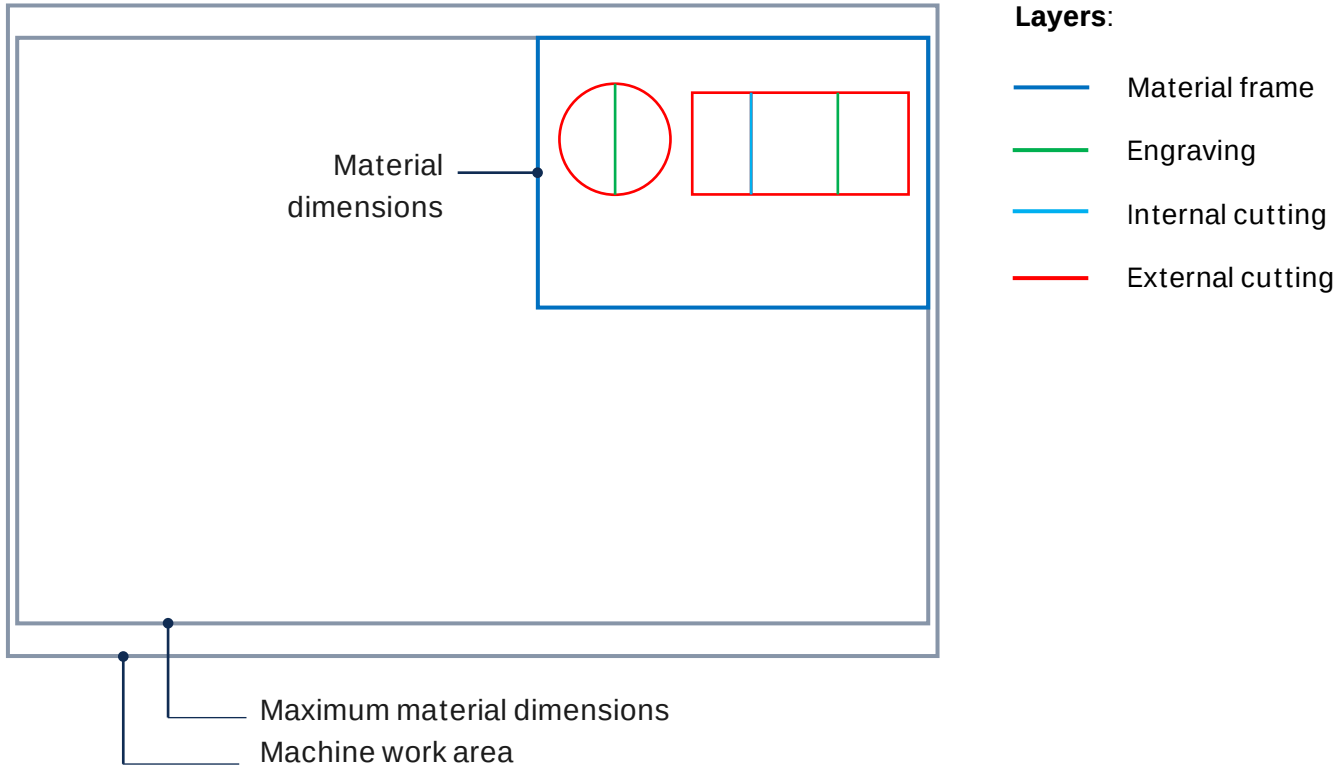


Layers

To draw the pieces correctly you need to think as if you were cutting them manually: it is necessary to draw the geometries with the **real life measurements** already reduced to **the scale of the model and in millimeter units of measurement**.

Differentiate the **frames**, the elements **to engrave**, **internal cuts** and **external cuts** by assigning a different layer for each process.



Please note

Overlapping lines

Before exporting, make sure there are **no overlapping lines**, which could ruin the the outcome of the process.

Use command *_overkill,* if the file was prepared in AutoCAD, to delete duplicate lines.

Complex geometries

Make sure the file is drawn with simple drawing elements, namely **lines, polylines, arcs**. We recommend using the *_join* command, so you can merge the lines.

In case splines are present, turn them into polylines through the *_pedit* (AutoCAD) command.

Complex entities such as **groups, series and blocks must be exploded**, as they are not recognized by the software.

Exporting

The file must contain **only the pieces to be made, the frames and the corresponding layers**. Clear all unused, turned off or frozen layers.

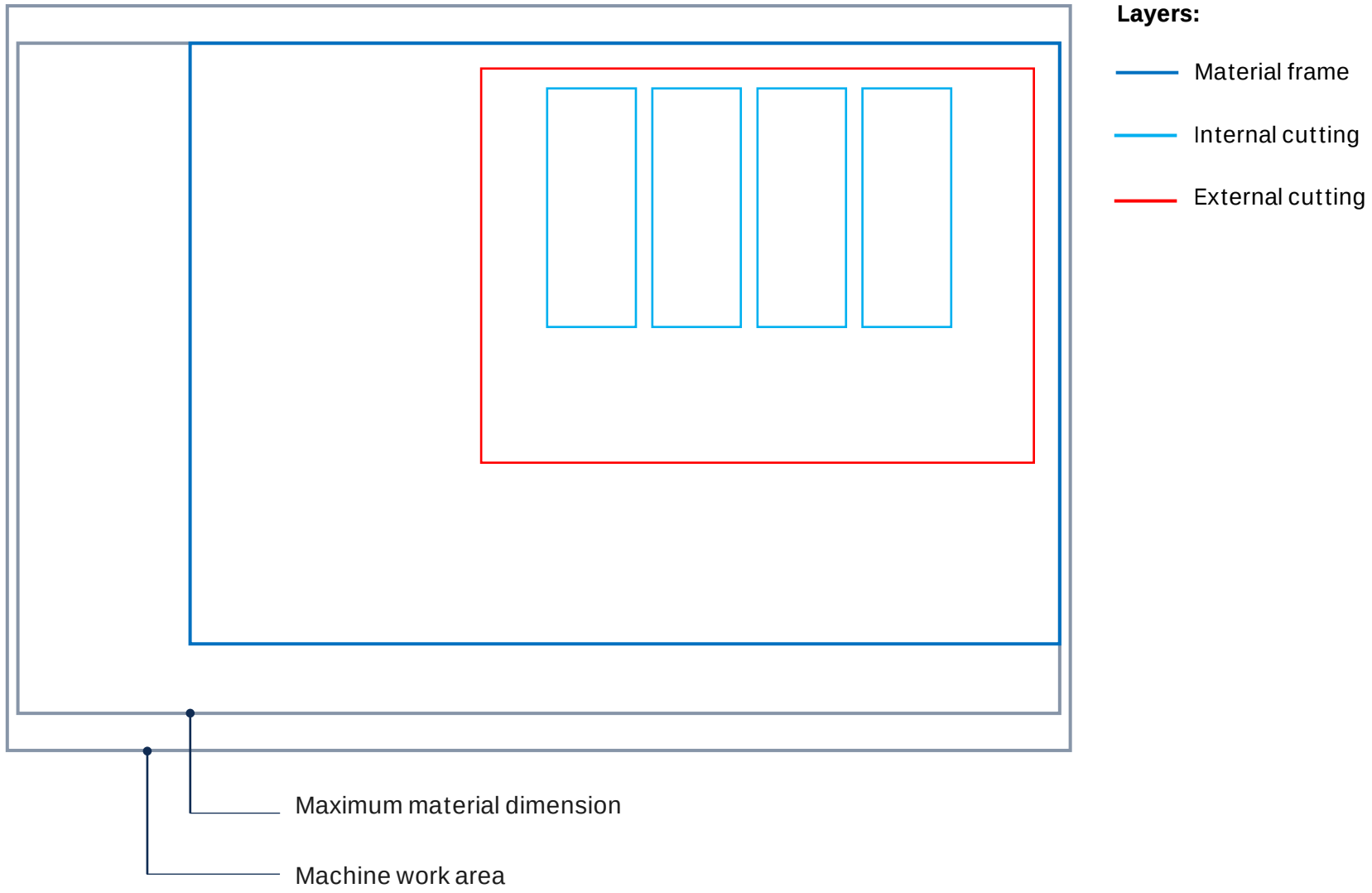
Export the file in **.dxf 2000 format** and save it to USB stick.

To cut multiple sheets of material, you need to arrange an equivalent number of files.

Internal cutting

If the pieces to be cut are perforated, such as windowed facades, **assign a different color to the internal cuts.**

In this way we can ensure that the machine cuts the **holes first** and **then the perimeters**, preventing the piece from moving before the process is completed.

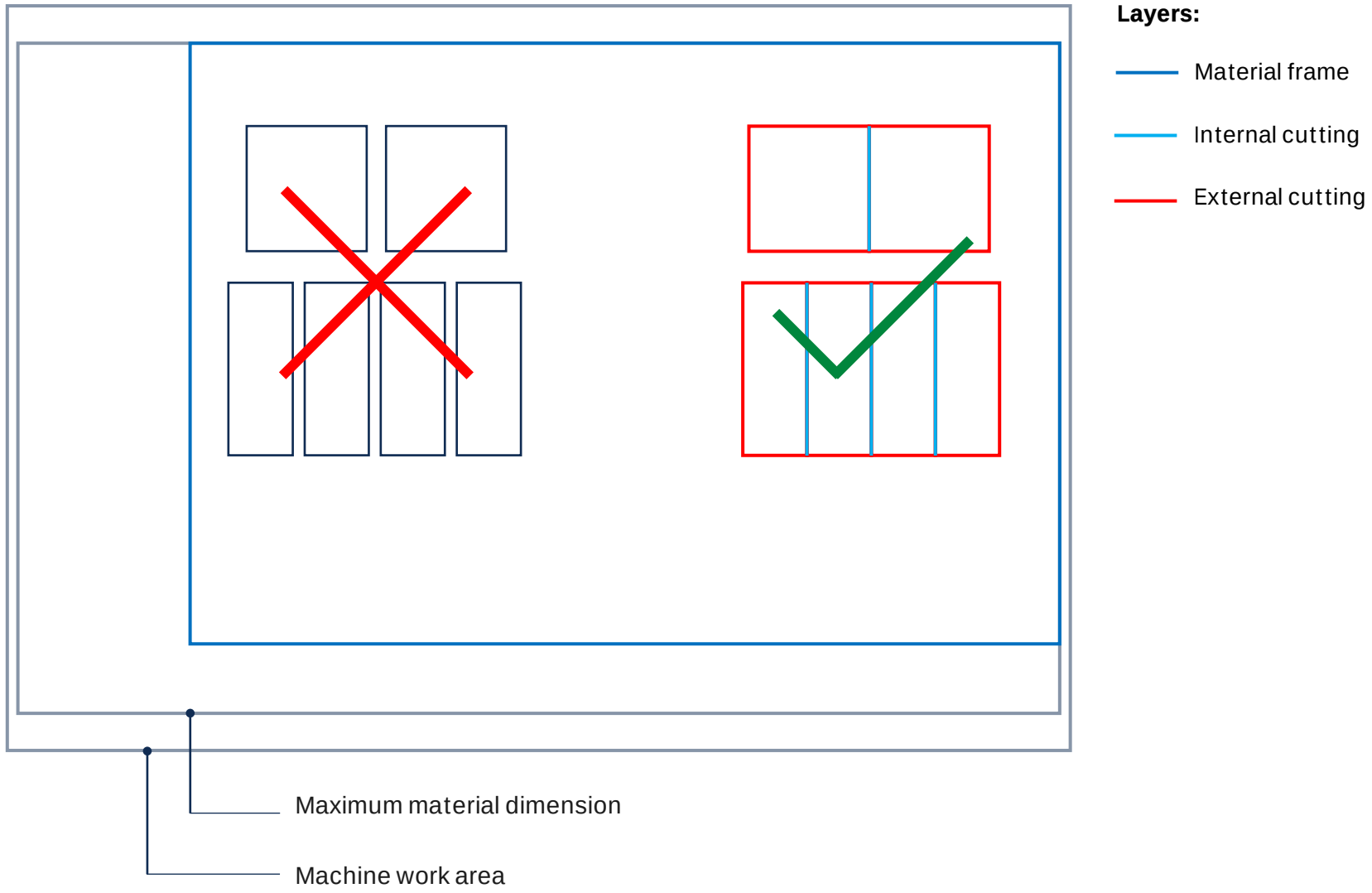


Rectangular shapes

If the pieces to be cut have simple and straight shapes, as in the case of rectangles, **the pieces must be joined** to reduce cutting times.

In this case, the lines that separate one piece from another count as an internal cut, and they should be assigned a layer of a different color.

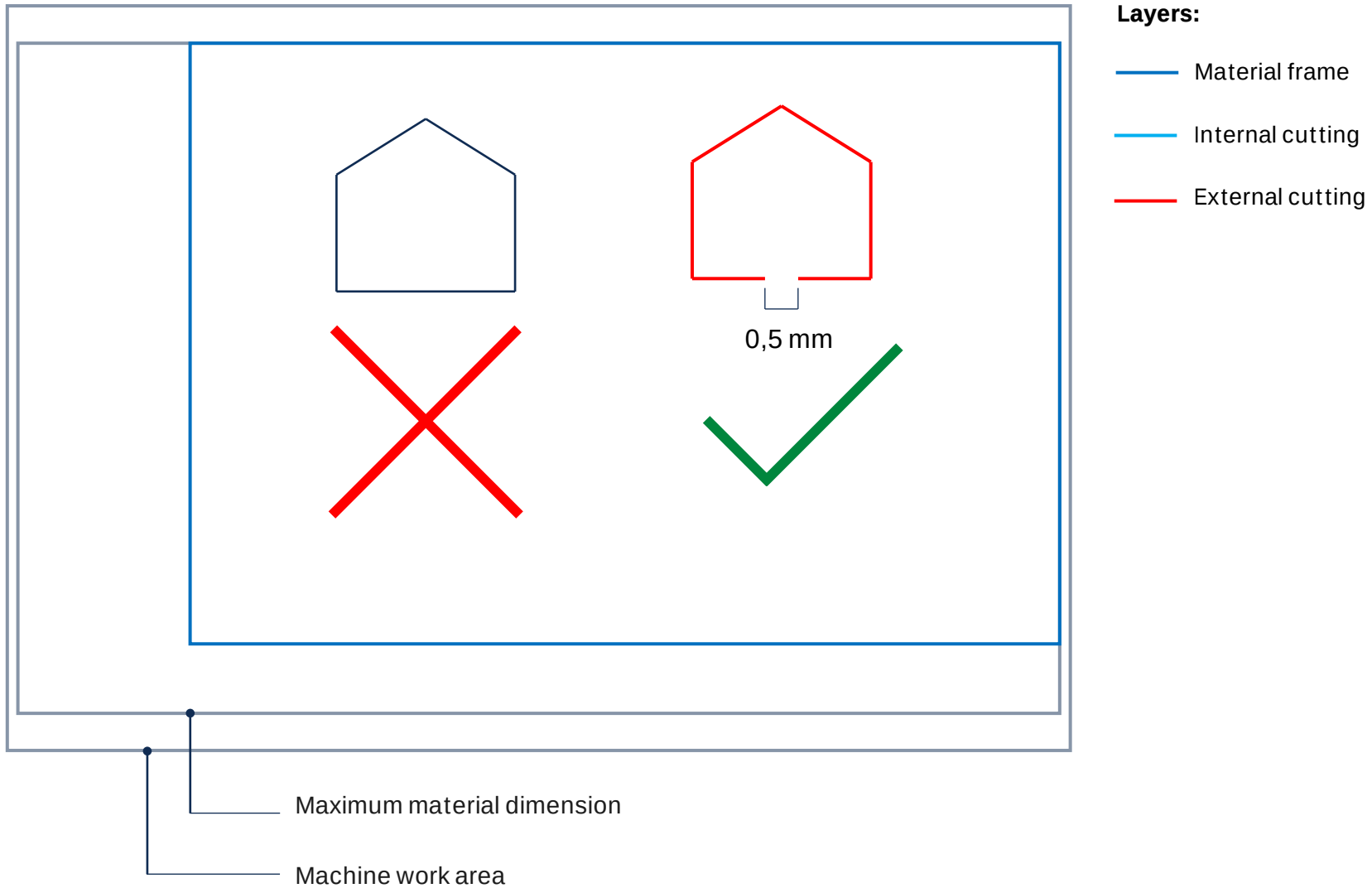
Remember to **erase overlapping lines.**



Very small pieces

The laser works with a stream of air to cool the material. In the case of very small elements, these risk moving and getting lost.

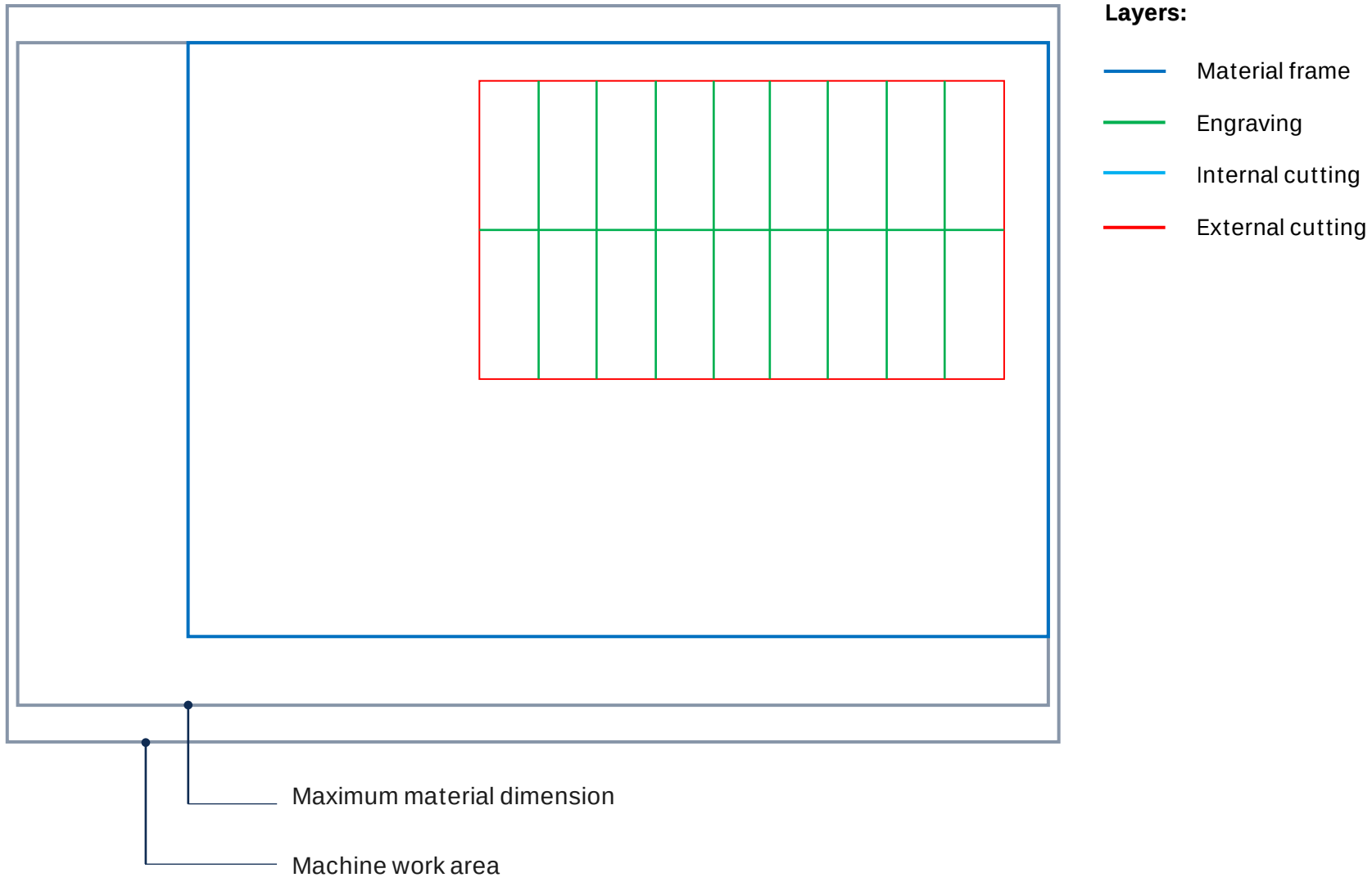
It is therefore advisable to **not completely close the cutting perimeter**, so that the shape remains attached to the sheet and can later be separated by manual cutting.



Engraving

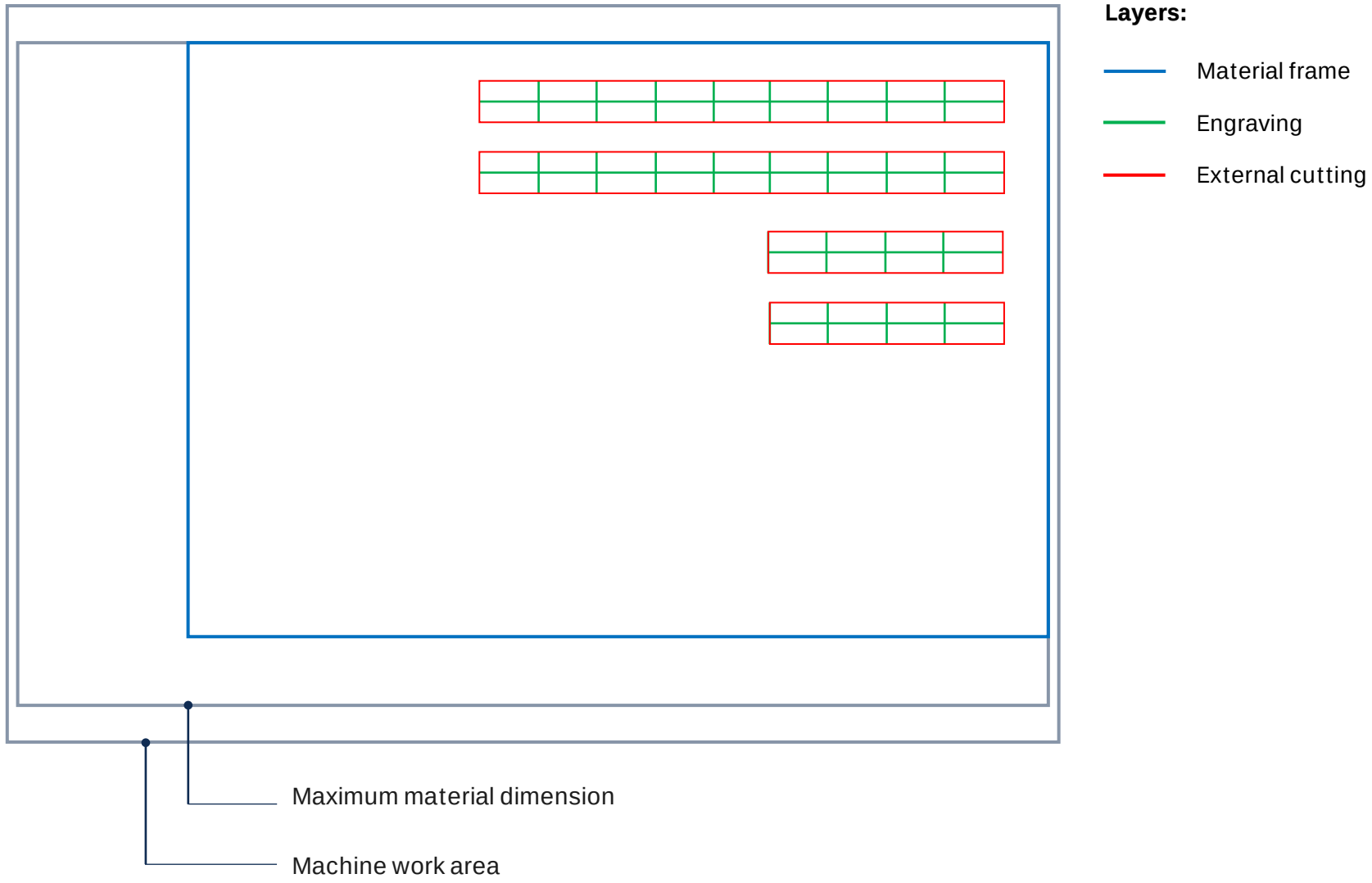
The laser plotter **can make engravings**, burning the material only on the surface. In the case of methacrylate, the result is a white line: in this way the partitions of glass facades can be obtained.

In the case of cardboard, **we recommend not making engravings**, as they are difficult to control. For a better and more appropriate result, we suggest printing on paper.



Methacrylate

When you need to cut methacrylate, remember to **orient the pieces horizontally** compared to the template (especially if the pieces are narrow). This precaution is used to prevent the pieces from **falling below the support structure** of the material and consequently being ruined.



You can download the file template at this link.

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