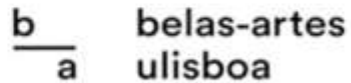


**2D & 3D Digital Techniques  
in Art: Recent Developments  
from within the VICARTE  
Research Unit at Faculdade  
de Ciências e Tecnologia  
UNL , Campus de Caparica**

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# VICARTE on the FCT Campus de Caparica



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- A new way of thinking about Glass Art and Science



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How are these areas of study the same? How do they differ?



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- What happens when we try to think of these areas of study together? What new developments are possible?



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- Some things seem very similar.



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- While others are quite different



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- A range of technologies and tools are available for students to work to answer these questions.





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- These range from delicate to industrial.



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- And include many traditional tools in art and science.



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a  
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- So, how do these developments happen? Answer: Lectures, experiments, visiting artists and scientists, and by combining the old with the new.



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- So what does all of this mean? Are there any results?



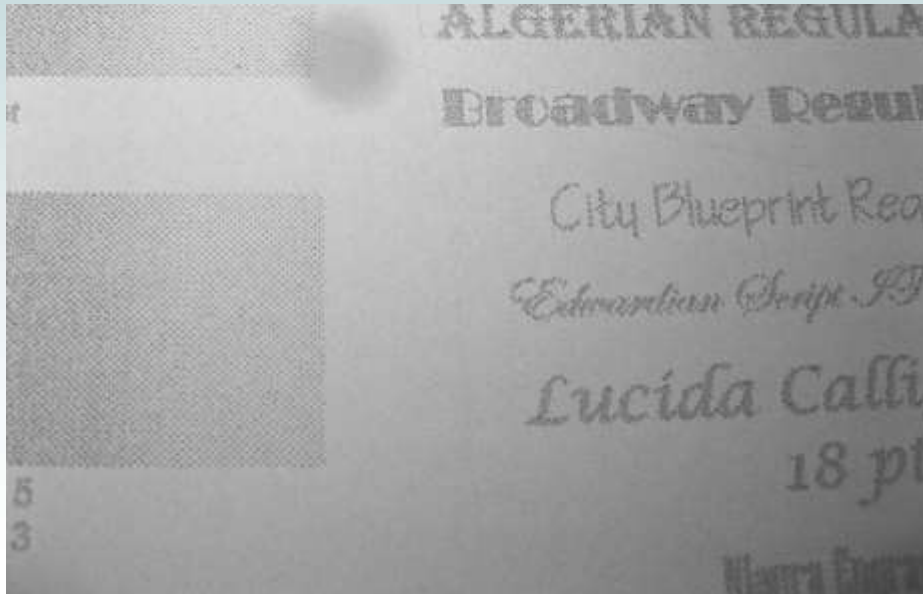
One interesting combination includes using 2D digital technology in combination with traditional glass making techniques.

In particular, CO<sub>2</sub> laser engraving on glass for use in art making is yielding some very promising results.



# Early Attempts

Initial problems encountered with the laser engraving process were gradients, image visibility, and the engraver/image file interface.



# Response to Initial Problems



Early attempts to account for deficiencies in the image included adding materials behind the glass and the application of glass enamels to the surface. Standard float glass was used during most of early tests.

# Changing the shape



Other experiments were made to see what might be possible using hand made glass, and also included encasing the engraved imagery in molten glass and forming the engraved glass with heat.



# Encasing the Imagery



Encasing the engraved imagery in molten glass and forming the engraved glass with heat allows for quite new and original production in glass art. This area is one that is open for more experimentation and promises many new possibilities in glass decoration.

# Engraving Through Fired Glass Enamel



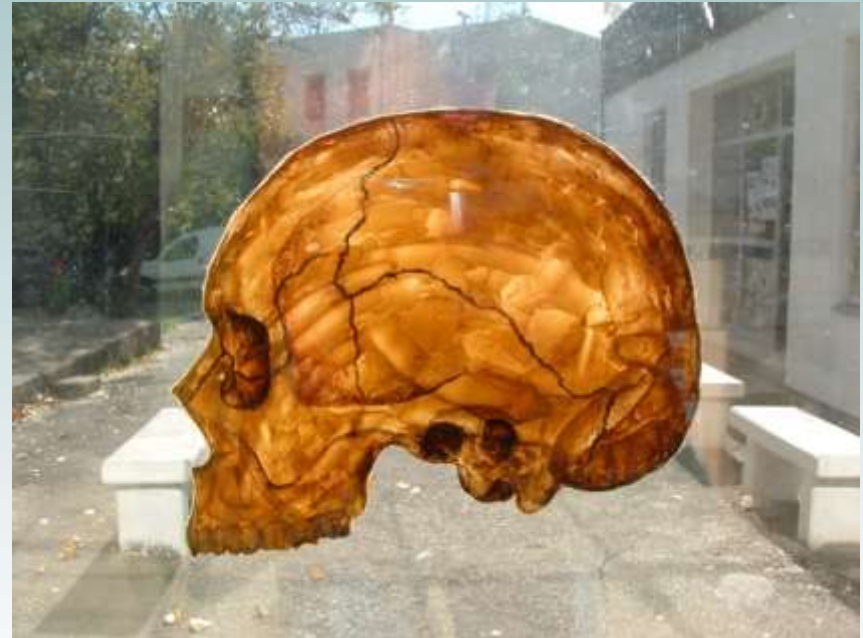
Hand painted flash glass was made in order to create more visible contrasts and gradients and revealed highly detailed imagery by combining glass enamels with laser engraving.

# Making Digital Images Real



Many of the images engraved on the laser result from carefully created digital files made in order produce desired gradients and contrast.

# Engraving as Under Painting



The laser engraver has also proven useful in creating outlines and under painting for more traditional glass enamel applications.

# Engraving Unfired Enamel



Digital file can be taken directly from a camera and engraved onto glass enamels before later being fired in a kiln.

# Engraving and post-forming results



**Another interesting combination involves using 3D printing in combination with traditional lost wax casting.**

**By combining 3D printing, several novel developments promise to save time, material, and offer new ways of forming glass**



# Engraving Unfired Enamel



Utilizing 3D printing, complicated and time consuming wax positives can be replaced by printing fully vented and gated assemblies.





# Engraving Unfired Enamel



Silicone molds are then taken from the 3D printed positive in order to create multiples for production processes in art making.

# Engraving Unfired Enamel

Finally, the glass is cast from the lost wax. This way of working holds the promise of more complex forms that cannot be made from traditional lost wax casting. This work is currently in development at VICARTE.



If you would like to learn more, please feel free to visit our website at [www.vicarte.org](http://www.vicarte.org), or stop in for a visit at FCT



Thank You