

Reproduction of 16th Century Multi-Colour Chiaroscuro Woodblock Prints using Digital Technologies

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Inspired by 16th century multi colour Chiaroscuro Woodblock Prints, we have sought to develop methods to recreate blocks from existing onscreen images or from printed facsimiles, by measuring colours and colour separation methods to create individual layers. We used different methods to create printing blocks including additive layer printing, CNC milling, laser cutting. The resulting prints have involved and demonstrated a trade off between the parameters and limitations of each of the processes, tools and materials, for example: the ability to maintain detail and clean edges, versus speed or machining cost.



Figure 1: Illustrations of Sibyl Reading, “Lighted by Child with a Torch.”
From left to right: source image, laser cut, CNC milled, and 2.5D print.

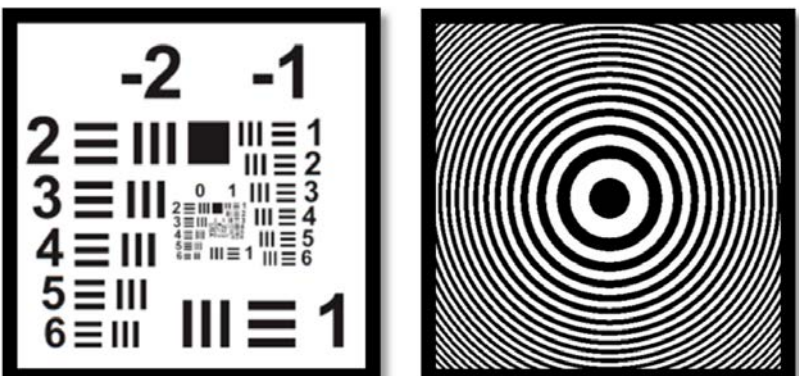


Figure 2: Test targets to assess resolution limitations of each of the relief plates.

Background to the project

Earlier tests undertaken in 2014 explored different methods to control the modulation of a surface by either carving (laser cutting, CNC engraving) from an existing material (acrylic, wood, model board) or building relief using additive fabrication (Makerbot, Océ 2.5D printer prototype). For the initial print analysis we used a section from a relief print by Ugo da Carpi (1480-1532) ‘Sibyl Reading, Lighted by Child with a Torch’ (c.1520-27). The original print was made in two colours, we therefore re-created the image as closely as possible, using two blocks and similar colours. The results of the target tests and the Chiaroscuro two-colour print, demonstrated a range of qualities that were promising but required refinement. We found that the rasterisation process from the bitmapped greyscale image to vector format - necessary for exporting to a CNC machine or fabricator - resulted in a poor resolution image, and demonstrated unrefined and jagged edges and loss of detail. The hypothesis was that in order to improve image quality and test the processes, a vector-based image may improve the output quality. The types of points, lines, curves that are used in vector imagery to create paths in 3D and 2D software can easily be transcribed into the same paths for laser engraving or machining.

Methods: designing a new test print

A complex decorative Japanese fish was generated in Adobe Illustrator and saved as a vector file. Two layers were designed as separate printing layers, so that when superimposed, appear as a complete image (figure 6). The file was then exported to a range of CNC machining and fabrication processes. For this project we used four different processes to create our test printing blocks: 2.5D printing, CNC milling, laser cutting, and hand cut lino.

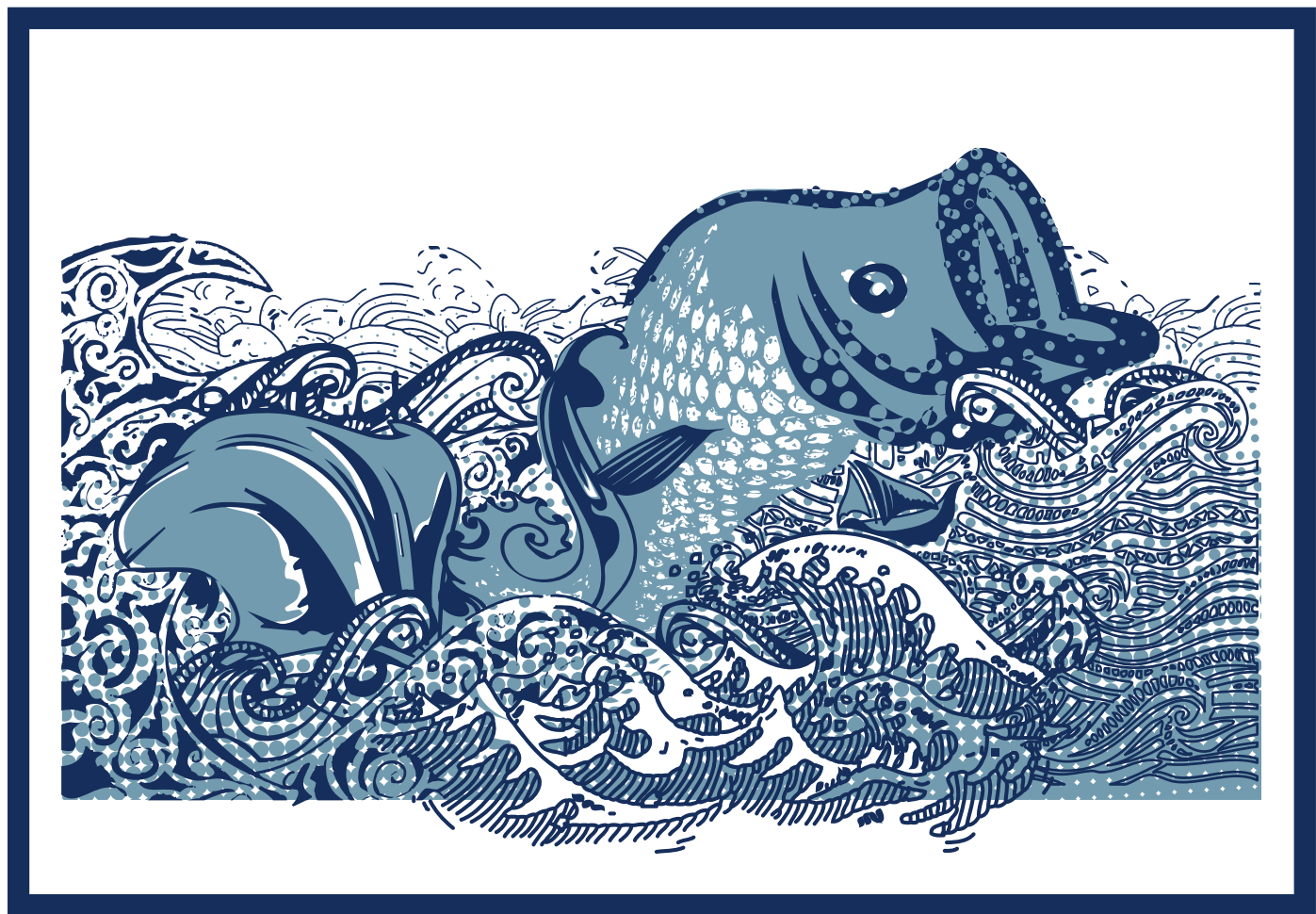


Figure 6: (left) Test image, showing the two coloured layers as a complete image.

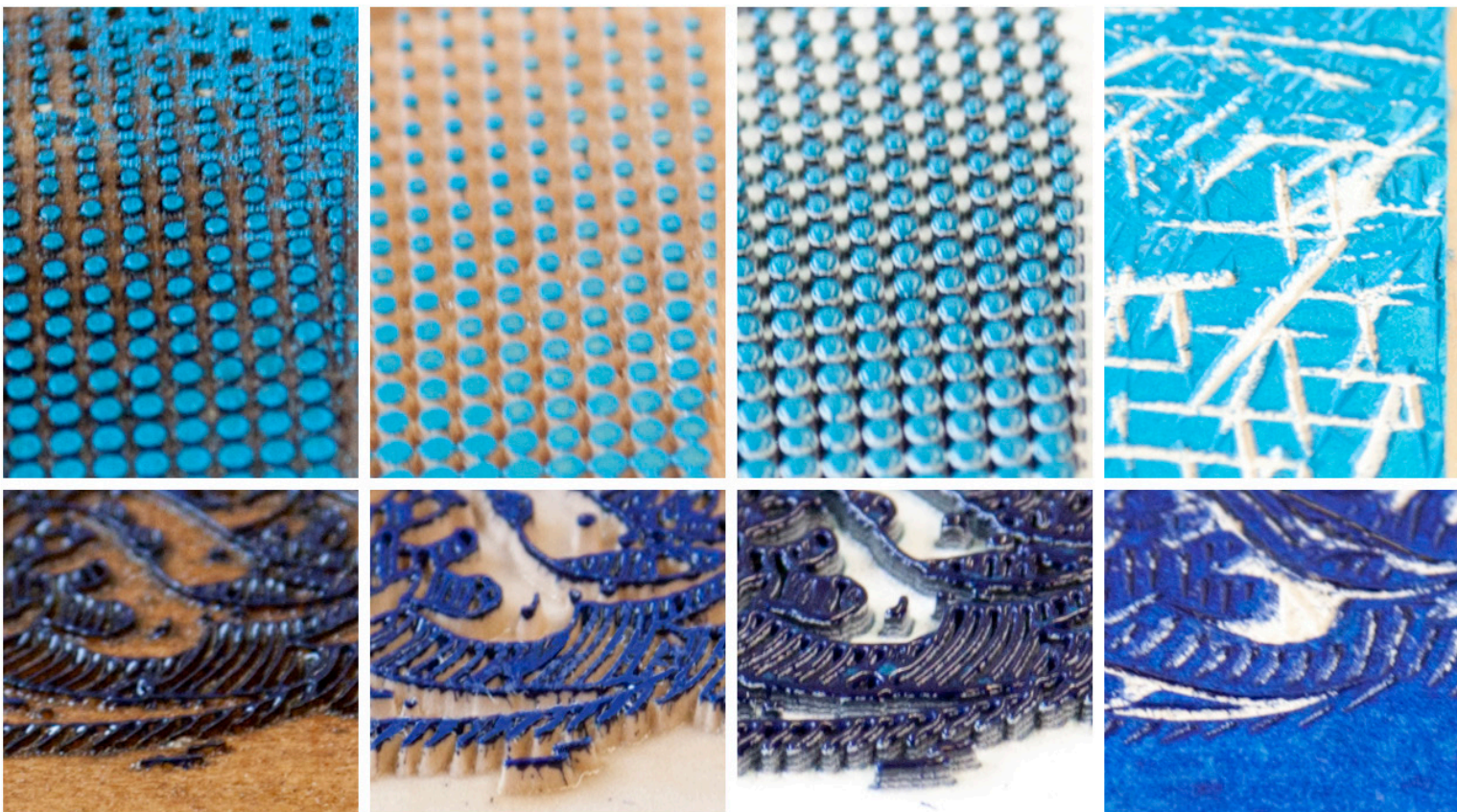


Figure 7: (middle) Details of the fabricated printing plates. The plates are inked, which highlight the differences. Processes from left to right: laser cut, CNC milled, 2.5D print, and hand cut lino.

Figure 8: (right) Comparing the printed results and machining/fabricating processes.

Methods: machining and printing

The time required to create the individual plates varied from approximately 45 minutes using the laser cutter, between 60 and 67 hours using the CNC milling, and several days to produce the lino cut. The 2.5D printing plates took just over 2 hours to produce both of the plates (which can be printed simultaneously). All the plates were inked and printed onto a heavy-weight 400gsm cotton paper. A mid teal blue was mixed for the background colour, and a dark blue was mixed as the second colour. The plates were printed on an Albion relief press. Each plate was individually printed and then together as a composite.

Conclusion

By building on traditional computer aided design (CAD) practices, CNC cutting, and machining, there are increasingly more opportunities for artists to work in vector formats. The different methods have highlighted alternative approaches and insights towards recreating print matrices. By recreating blocks using 21st century methods and materials has demonstrated the complexity and precision of the original process. The opportunity to study the different layers as separations may well provide historical insights into how woodblock prints were made, the tools used, the range of marks and methods of translating texture information through pattern.

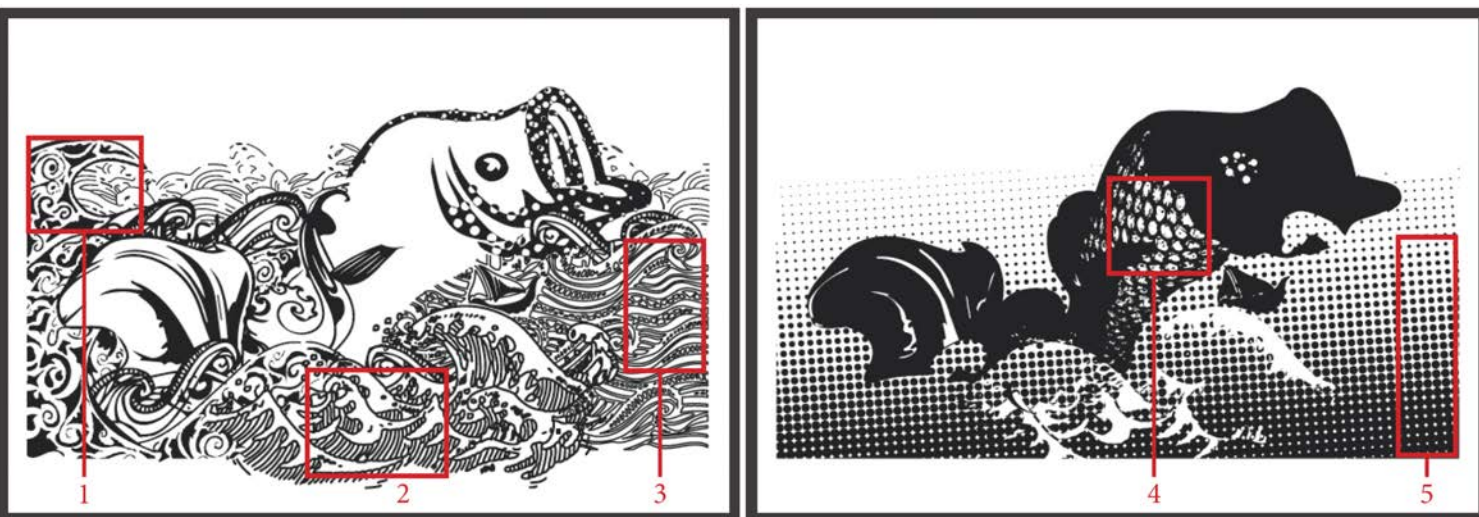
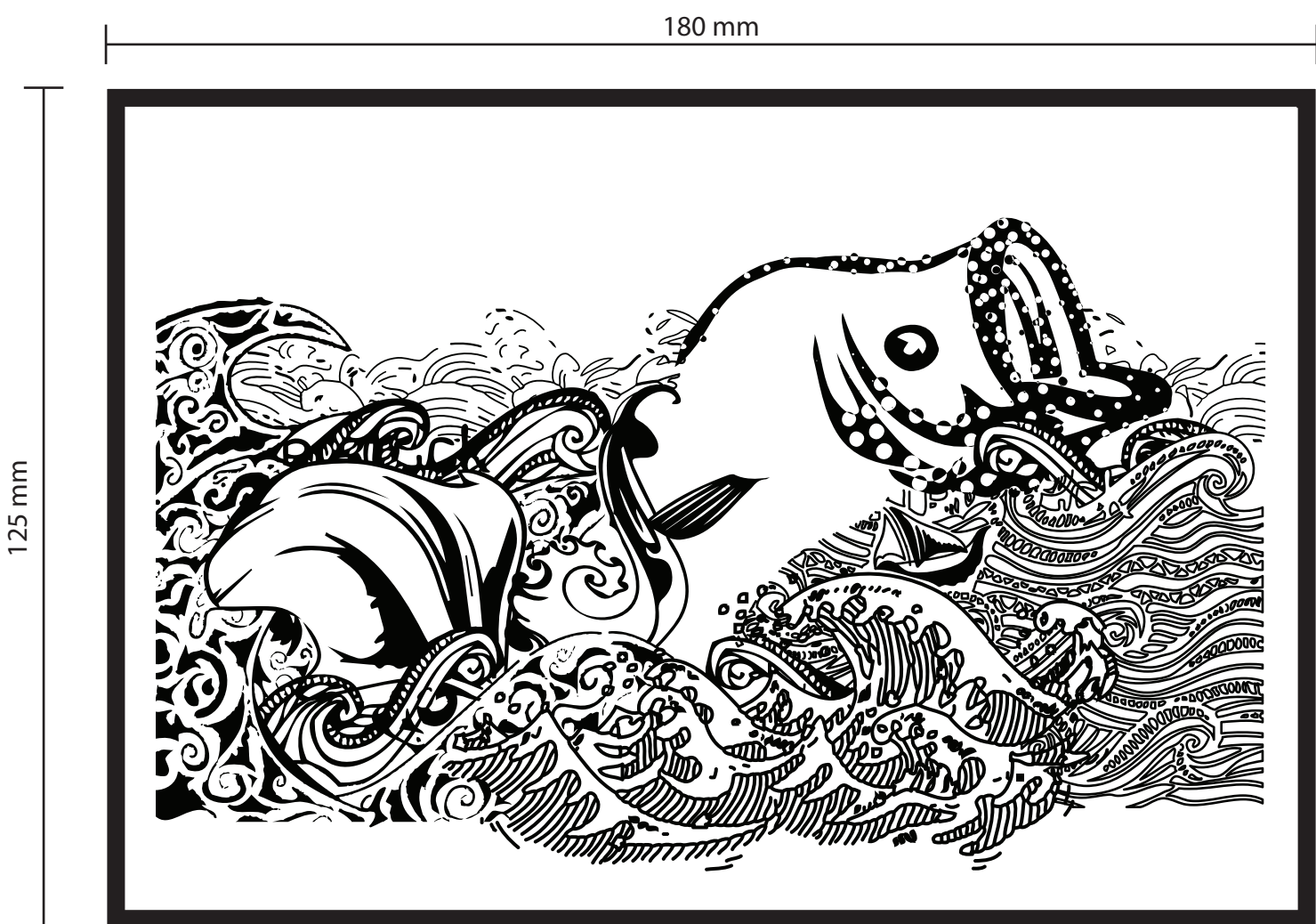
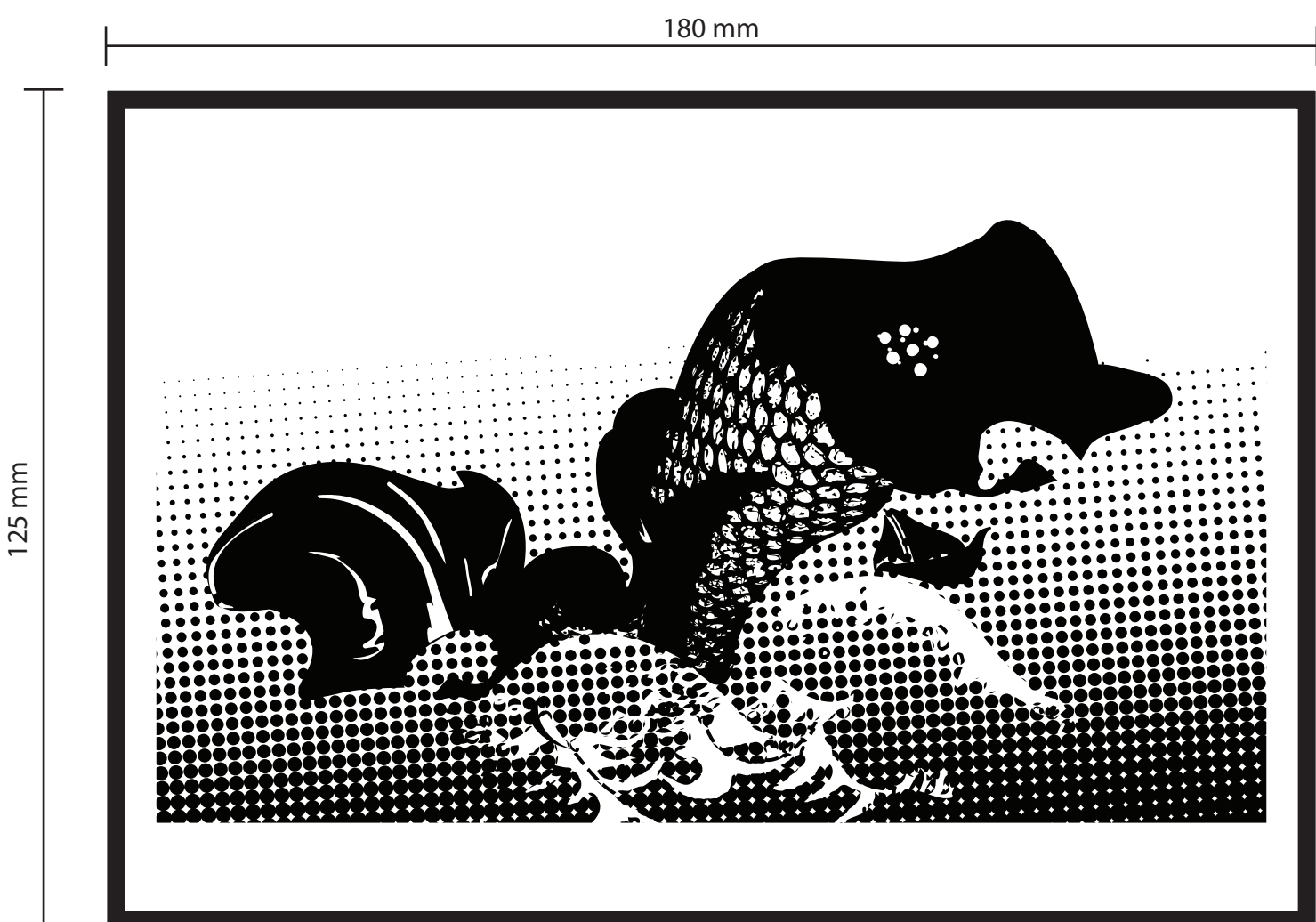


Figure 3 and 4: Test image, showing the separate layers.
Figure 5: (left) top layer and (right) bottom layer, and numbered sections for comparison between prints (see also figure 8).

