Material Empathy in the Manufacture of a Multi-block Printed Wallcovering

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ABSTRACT

This paper reflects on the interconnection between studio and factory production as the merging and metamorphosis of my printmaking practice. Specifically, the 'process of correspondence' (Ingold, 2013) in the making of multi-block matrices prior to factory printing.

In 2020, Kunsthøgskolen i Oslo funded my artistic research, to embody 'material empathy as the physicality of craft' (Shales, 2017) in the manufacture of a multi-block printed wallcovering. How did first-hand knowledge of factory production impact my studio practice? What new insights into printmaking were revealed through the delimitations of manufacturing?

CONTEXT

The Latin origin of 'manufacture' was first recorded in the sixteenth century as 'making by hand (manus) or with mechanised tools' (Harper, 2022). 'In the nineteenth century, "handicraft" became a pseudo-technical and romantic word, and in the twentieth century, it ossified into simultaneously both utopian dogma and hollow advertising' (Shales, 2017:6).

According to Shales (2019), 'artists viewed manufacturing with contempt', perceiving industrialisation as far removed from the creative mind. The Anglo-Saxon definition of 'printmaker' (Shabal, 2017), which was first recorded between 1925 and 1930 (Collins, 2019), was used to elevate the cultural-economic value of prints made by artists in the studio and distinguish them from mechanically mass-produced prints made in the factory. However, twentieth-century globalisation led to an exodus of mass production from the western world and European manufacturing struggled to survive in a post-industrial landscape. In a riposte to this socio-political upheaval, craft historian Ezra Shales published 'The Shape of Craft' (2017) to reassert manufacture's humanity as handicraft for the twenty-first century.

Shales writes about design, craft, and art in everyday life. He draws on his pedestrian research as field trips into factories, arguing that artists can learn from manufacturing through material empathy. As Hemmings (2019) noted, 'Going into factories and meeting people and then understanding that they have material intelligence, which you lack, is eye-opening'. Material empathy with factory workers reveals collective knowledge through attunement to materials when working with process, tools, and technology.

Image 1

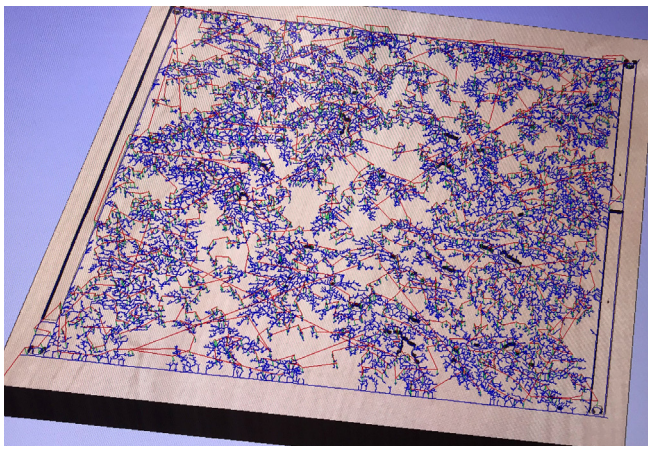


Image 2

Image 1: Digital vector file of reduction to multiblock
Image 2: VCarve simulation of toolpaths

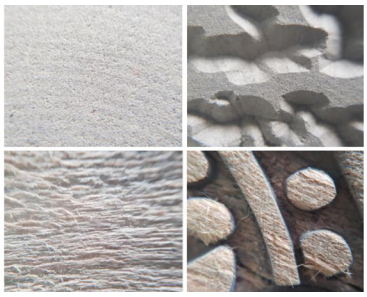
According to Shales:

> *A contemporary factory tour is enlightening for inspecting the ways in which craftspeople are still necessary tool builders no matter how far automation advances, and to think about the ways humans have worked more momentously and with more meaning together than apart. Today, the distinction between artisanal and industrial craftsmanship in these engineered marvels and factories seems less easy to categorise. Each of these seemingly disruptive technologies generated new types of craftspeople.*
>
> Shales, p.6 (2017)

My printmaking practice takes inspiration from post-industrial craftsmanship and is situated at the intersection of tacit knowledge, machine tools, and digital technology. I combine hand carving with mechanical tooling to augment embodied space-time, while retaining a haptic connection with the print matrix and press transfer process. My ongoing artistic research explores colour printing through the transformation of reduction printing into multi-block prints. In 2018, during field trips to hand-block printing manufacturers across Europe, I discovered that factory workers continue to re-print nineteenth-century [William] Morris & Co. woodblocks at Anstey Wallpaper Company in Loughborough, England (Browne, 2020).

'Anstey has the broadest machine profile for wallpaper in Europe, operating a unique combination of mechanical, digital, and hand printing processes' (Anstey, 2022). Their vast site contains semi-automated machinery for flat-bed screen, rotary screen, surface print, digital, flexographic, gravure and hybrid printing. On a smaller scale and located in the far corner of the factory floor are two foot-operated arch lever presses accompanied by two ink trays for hand-block printing. The woodblocks are stored on shelves in a climate-controlled room and demonstrate craftsmanship knowledge of chapeaudage, coppering, and woodcarving. Several had been thrown out and dismissed as redundant manufacture from the 1980s, only to be salvaged from the skip at the eleventh hour.

Today, Anstey continues to re-print these historical woodblocks in the same colourways as Morris & Co. intended (Wallpaper Design, 2014). Demand for similar (out of copyright) historical designs has revived European hand-block printing in the twenty-first century, led by conservators and craftspeople such as Allyson McDermot (England), Adelphi Paper Hangings (USA), and Handtryckta Tapeter (Sweden). However, this research project came to be the first commission at Anstey in over one hundred years to propose a new contemporary hand-block printed wallcovering.



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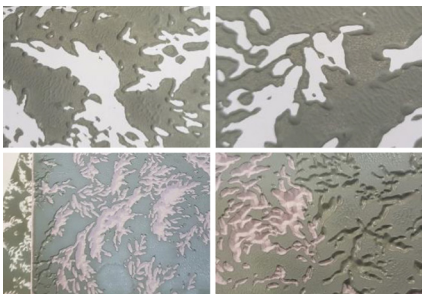

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CONTEXT

From my locale in Oslo, correspondence continued by email with Sabrina Earp, business development manager, and Miles Thacker, business development director at Anstey about sharing my practice-based artistic research via publicly accessible photo-documentation; exchanging knowledge of the delimitations in the process; comparing

Image 3: Factory test Valchromat Vs pearwood
Image 4: Factory test absorbency of Valchromat
Image 5: Factory test Valchromat print
Image 6: Oslo Finer Fabrikk

multi-block printing on a rolling press in the studio with multi-block printing on a top-down press in the factory, and agreeing on a budget, time and scale for factory production.

The project began with a series of digital vector files, archived from an earlier artistic research project, and the transformation of reduction into tessellated multi-block relief prints (Browne, 2021). A linoleum relief block underwent a subtractive carving process, using a hand tool or 'transducer to convert the kinetic quality of the gesture – from the register of bodily movement and awareness to that of material flux' (Ingold, 2013: 123). The digital vector paths were attained by tracing digital scans of the reduction relief process.

The making of multi-block matrices, as 'a dialogue between the maker and the material employed' (Ingold, 2013: 306), led to the exploration of an alternative material to the European pear (Pyrus communis), a fruitwood that was hand carved in the eighteenth and nineteenth century for traditional woodblock printing. Today, pear trees are rarely grown for timber in Europe, either commercially in plantations or the wild (Tree Plantation, 2000). The research project required a contemporary alternative that was accessible, sustainable, economical, and with comparable shore hardness for mechanical tooling.

Valchromat (HDF) was developed in 1998 at the research department of Valbopan–Fibras de Madeira, in Portugal. It is an evolution of MDF made from pinewood fibre, that is derived from forest waste pressed at high temperatures and bonded by a special resin (melamine urea formaldehyde resin with low formaldehyde emissions). The wood fibre panel is easier to machine tool and stronger than MDF, with a greater shore hardness and bending resistance, and it is labelled non-toxic for cladding, furniture, and acoustic panels (Investawood).

To replicate the strength of cross-laminating pearwood staves for traditional European woodblocks, I pre-prepared the matrix material using a wood veneer hydraulic press by laminating valchromat (12mm) onto two layers of cross-grain birch ply (18mm x 2). To mimic the scaffolding of the woodblock matrix, the digital vector files required post-editing by; adding a selvedge to keep the matrix flush at the surface of the printing press, adding corner pins to register the matrix for repeat multi-block printing, and adding a 3mm bleed along both vertical edges for tolerance of the mechanised paper trimming.

I had previously relied on a technician at Kunsthøgskolen i Oslo to CNC-route my woodblocks but this process of correspondence required shared knowledge to interconnect in the making of multi-block matrices for factory production. I needed to acquire digital knowledge to convert vector files into 2.5D toolpaths and hands-on mechanical knowledge to run a CNC router.

Fellesverkstedet is a non-profit open-access workshop for artistic production with a focus on high-quality tools, guidance, and infrastructure (Fellesverkstedet, 2022). This maker space was vital for a constructivist approach to learning, through correspondence by email,

Image 7

Image 8

Image 9

Image 10

Image 7: Digital vector file of box cut
Image 8: CNC-routing cherrywood
Image 9: Cherry woodblock close up
Image 10: Cherry woodblock

pre-production meetings, one-to-one guidance, and shared knowledge in the workshop. I learnt to import and post-edit vector files in V-Carve software, export Gcode as multiple toolpaths, and run a CNC router. Following a subtractive manufacturing process, I machine carved two woodblock matrices (60 x 60cm), each demonstrating one layer of the reductive printmaking process by planing with a three-flute surfacing bit, carving to a depth of 3mm with a two-flute, 45-degree v-carving bit, and clearing with an 8mm spiral cutting bit.

The valchromat blocks were delivered to the factory site in February 2021. Initial tests were performed by Nicole Snart, technical assistant at Anstey, to compare the material properties of valchromat with pearwood, including the woodblocks' specifications (weight, depth of engraving, shore hardness, gloss reading, surface description), the absorbency (water and ink), the moisture reading (dry, wetted and drying), and the clean-up. Printing tests were performed by Dave Thornton, hand block printer at Anstey, to assess the press transfer process with CNC-routed woodblocks on a foot-operated arch lever press.

The factory's written report, accompanied by photo and video documentation and material evidence, revealed several problematics. Traditionally, European hand-block printing relies on water-based distemper ink consisting of pigment, chalk, and glue size, to produce a thick-bodied opaque colour. The report stated that the valchromat block 'feels very solid and heavy, the edges are sharp, and the carving is fairly shallow. These factors are quite negative when handling the block. The absorption was slow, water droplets remained on the surface and the block retained moisture. Print areas filled in, with uneven coverage in the solid areas, and print marks lacked a definitive shape'. Although valchromat could replicate the shore hardness of pearwood, the matrix surface repelled rather than absorbed ink. The transfer from tray to block was uneven, flooding the matrix surface, adhering the block to the paper, and culminating in too much ink transfer. The uncertainty of the process, on a limited timescale and budget, required an alternative material to correlate with straight-grain pearwood.

CNC-routing tests were performed on three accessible hardwoods that had been imported from three different continents. In comparison to mahogany from Africa and beech from Europe, cherry (Prunus serotina) proved to be the superior quality wood for tooling. It is considered a moderately sustainable fruitwood, with a fine pore and straight-grain material structure. The wood is grown and imported from North America, with commercial stands in the Allegheny and Pocono plateaus of western Pennsylvania (FPL). The last of the old-growth virgin cherry was logged over fifty years ago; what remains are scattered juvenile trees and a shortage of knot-free full staves (Gattchell, 1971).

Oslo Finérfabrikk is a leading supplier of lumber and wood-based raw materials in Norway. Although cherrywood solid timber was not readily available, Oslo Finérfabrikk could supply work surfaces made from knot-free narrow slats, finger-jointed into various lengths and thicknesses. The width of the wood panel was determined by the

anthropometric dimension of standing work (650mm), while the depth (30mm) and length (500mm) were demarcated by the strength of the material and delivery capability. With the support of fellow staff at KHiO, I pre-prepared the matrix material by laminating finger-jointed cherrywood (30mm) with cross-grain birch ply (18mm) on a wood veneer hydraulic press.

The digital vector files also required post-editing to reduce the layers of ink in the overprint and to disguise the join in the repeat print. This could be achieved by transforming the reductive printmaking process into both subtractive and additive multi-block matrices, and by adding an irregular box join along the horizontal edges. Before CNC-routing at the Fellesverkstedet, the digital vector files were further edited in V-Carve software during postproduction by offsetting the carving path by -0.2mm to reduce the matrix surface area and compensate for the fill-in of distemper ink, and offsetting a new clearance path by 15mm to add sunken pockets at 10mm and prevent unintended ink transfer in open areas. The subtractive and additive manufacturing processes produced four multi-block print matrices, demonstrating different combinations of the reductive process by planing with a three-flute surfacing bit, carving to a depth of 5mm with a two-flute, 60-degree v-carving bit, and clearing with a 4mm and 8mm spiral cutting bit.

OUTCOME

In the process of correspondence, I became more attuned to the sustainability and accessibility of materials in my locale, and to the delimitations in the manufacture of multi-block print matrices prior to factory production, specifically when transferring water-based rather than oil-based ink and compensating for the absorption properties of wood. The change in humidity between Oslo Finérfabrikk, KHiO, and Fellesverkstedet, for example, altered the shape of the matrix material.

The manufacturing process of hand-block printing on a top-down lever arch press culminated in the build-up of distemper ink around the edges of the imprint. This trait was also visible in the manufacturing process of semi-automated surface printing, which feigns a similar print impression. Although the CNC router could machine carve with greater precision than hand carving, the multi-block matrices were delimited by the process of transferring distemper ink with low viscosity from tray to block to paper. Digital information was lost when the vector files were negatively offset to compensate for the ink spread. In addition, splitting the reductive printmaking process into both subtractive and additive manufacturing processes led to considerably more removal of the matrix material. This weakened the matrix scaffolding and added to the material loss of information. On average, this transformation increased the timescale to CNC-route each woodblock from four to eight hours.

However, by merging with the material intelligence of factory workers, craftspeople, and conservators, the methodology of my artistic practice metamorphosed, revealing printmaking knowledge as post-digital production; transforming the reduction matrix into additive and subtractive digital vector files for colour remixing, editing 2.5D toolpaths for precision carving, and accessing mechanical tooling for new

craftsmanship in the twenty-first century. 'CNC-routing simultaneously bridges digital and ancient technologies, when computer technology affects the material realm, to continue printmaking's ongoing story as an art form of innovative industrial appropriation and adaptation' (Cantanese & Geary, 2012: 20). 'Technicity has become demanualised' (Leroi-Gourhan, 1964, as cited in Ingold, 2013: 255), but engineering and technology can still be suggestive and emotive of humanity as handicraft in manufacturing.

Making as a process of correspondence is not merely 'the bringing forth of [material] potentials immanent in a world of becoming' (Ingold, 2013:31), it is about the capacity of objects to endure, by 'latching onto the metaphorical value and social meaning of a material, a function, or a social context' (Shales, 2017: Ch. 5). Although making multi-block matrices for hand printing in the factory was less accessible, less sustainable, and less economical than the project had foreseen, the outcome elicited both visual and haptic responses to the woodblocks: from carving with machine precision and consistency, to re-making organic nature into hard-edged shapes, 'to touching with the palm to calm the prefrontal cortex activity and [induce] physiological relaxation' (Miyazaki, 2017).

The final objective of this research project will be to re-visit Anstey's factory site, for primary engagement with the press transfer process and to observe hand printing of these new multi-block matrices in the manufacture of a large-scale wallcovering.

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AUTHOR

Victoria Browne is educated in England, France and Norway. As Associate Professor of Printmaking and Publishing at Oslo National Academy of the Arts (KHiO), her artistic research investigates post-industrial craft heritage. More specifically, material agency of the print matrix at the intersection of tacit knowledge, machine tools and digital technology. Browne's studio practice embodies David Pye's first-hand account of the workmanship of risk by integrating Computer Numerical Control (CNC) routing; to overcome process limitations, to realise large scale multi-block prints and to explore colour printing further. Iterations of her polychromatic printed backdrops have been exhibited as videos, billboards, wallcoverings and artist's books. Her prints and publications are held in international collections including Bergen City Council, MoMA, Tate and the V&A.

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IMAGE GALLERY

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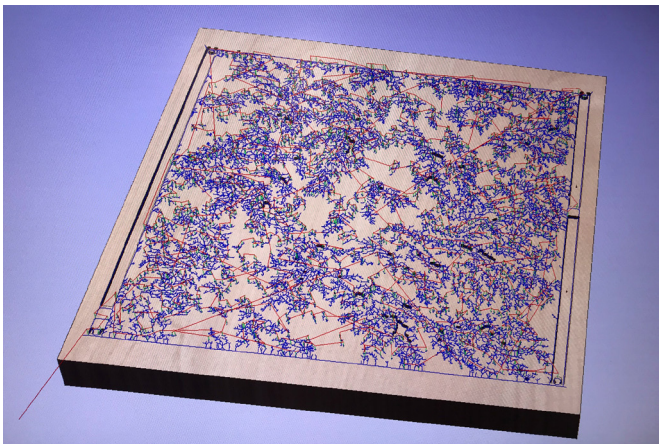

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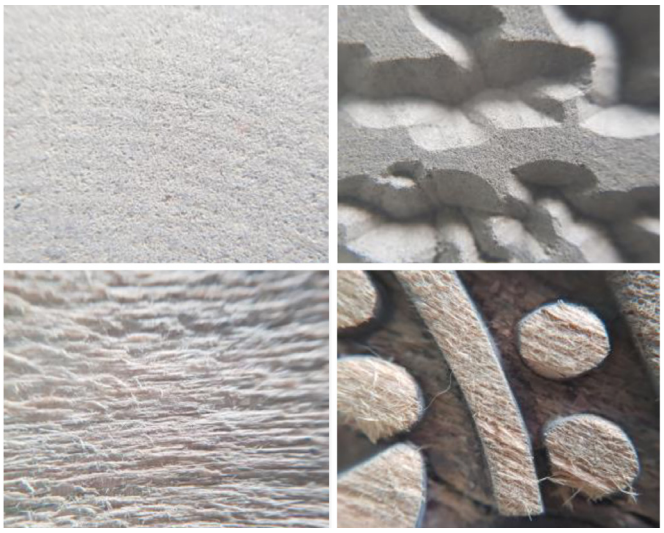

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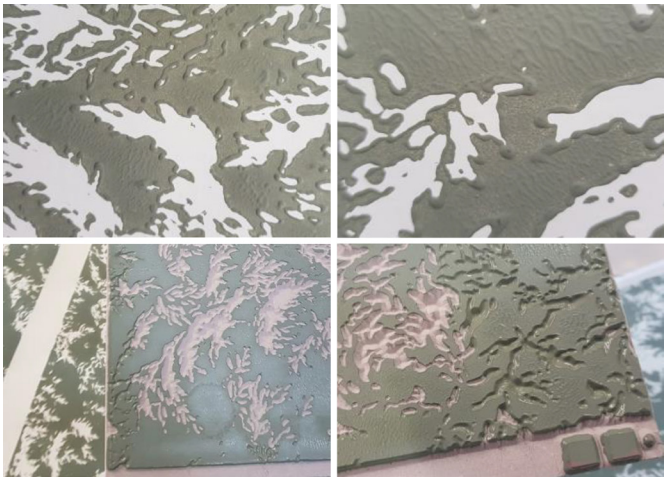

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