Surpassing Tradition: Investigating Design Innovation Possibilities for Harris Tweed

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Abstract

This paper describes a research project between a woven textiles designer, researcher and educator, and the company Harris Tweed Hebrides. In the 1960's over five million metres of Harris Tweed fabric was produced annually, reducing to an all time low of 454,963 metres in 2009. However, since the opening of Harris Tweed Hebrides Shawbost Mill, production of Harris Tweed has more than doubled. Customers include Alexander McQueen, Chanel, YSL, Paul Smith, Margaret Howell, J.Crew and Vivienne Westwood. Harris Tweed is governed by an Act of Parliament; in order for the fabric to receive the trademark 'Orb' stamp it must be woven according to a set of regulations covering yarn type, spinning, dying, weaving and geographic location. The definition of Harris Tweed is a fabric "…handwoven by the islanders at their homes in the Outer Hebrides, finished in the Outer Hebrides, and made from pure virgin wool dyed and spun in the Outer Hebrides" (HMSO 1993: 7).

The aim of this research project was to explore the potential for innovation within the range of designs produced by Harris Tweed Hebrides. An empirical investigation was undertaken to uncover existing design practice and processes. The author adopted the position of practitioner-researcher to provide insight beyond the existent situation and extend design innovation. Practical investigations undertaken by the author, explored designs options that would be immediately viable on the current looms utilised by the island weavers. Sampling which was out-with the possibilities of the machinery currently being used, which would require looms to be adapted, was also undertaken. The paper concludes by providing suggestions to enhance design innovation in Harris Tweed and discusses areas for further research regarding the design and production of woven fabrics.

Key words:
Practitioner-research, woven textiles, weaving, Harris Tweed, tacit knowledge, design innovation.

Introduction

Harris Tweed is a unique fabric; it is the only fabric in the world to be protected by an Act of Parliament stipulating permitted yarn type, method and location of production. This legally protected status can be compared with that of another famous Scottish export – whisky, or with products like Champagne, resulting in Harris Tweed being commonly referred to as the champagne of fabrics. This status is a valuable asset for the industry in terms of protection from cheaper imitations and the Harris Tweed Authority actively challenge the misuse of the name (BBC, 2012).

This paper presents findings from a research project, which investigated possible ways to expand the range of Harris Tweed designs currently produced. During visits to the island, knowledge was gained in relation to the different models of operation within the industry and the roles of the weavers and designer. The researcher who is also a weaver and educator was able to compare existing practice within the Harris Tweed industry with the design process of the practitioner-researcher resulting in suggestions to enhance design innovation within the industry.

The Research Context and Rationale

Harris Tweed fabric has been produced since the 1800s. Fabrics are densely woven using structures like twills, herringbones and other derivatives of these structures with short float lengths. The colours of the cloth are closely linked to the landscape of the island. The fabric is synonymous for its practical application in traditional clothing (figure 1).

Figure 1: Traditional Harris Tweed clothing. (Copyright Harris Tweed Authority Archive)

The main use now for the fabric is within the fashion industry (for examples see http://www.harristweed.org/blog/designers/) and it is recognised around the world through its utilisation by a prestigious array of designers. Another popular use is in the fashion accessories market (for example see, http://www.highsnobiety.com/2010/10/05/nike-air-royalty-harris-tweed-vach-pack/) and Harris Tweed has also recently been used in a commercial interior context (for example see the Blythswood Square, Glasgow).

Harris Tweed is a unique product due to governance by its own Act of Parliament. To receive the Harris Tweed Orb stamp (figure 2) issued by the Harris Tweed Authority, the fabric has to be '…handwoven by the islanders at their homes in the Outer Hebrides, finished in the Outer Hebrides, and made from pure virgin wool dyed and spun in the Outer Hebrides…' (HMSO 1993: 7).

Figure 2: Photograph of fabric showing the Orb stamp.

Weavers (figure 3) are self-employed and buy their own looms and can work for any of the three mills on the islands.

Figure 3: Harris Tweed weaver, with loom, in weaving shed, Isle of Lewis.

Harris Tweed '…provides the main source of work within the private sector in the Outer Hebrides and it is vital to the economy of those islands that the integrity, distinctive character and worldwide renown of Harris Tweed should be maintained' (HMSO 1993: 1). In addition to the economic benefits, Harris Tweed has always been at the heart of the community and island life in the Outer Hebrides, particularly on Harris and Lewis, where the majority of weaving takes place (Hunter, 2001).

As with the majority of the textile industry in the United Kingdom (UK), the Harris Tweed industry suffered decline in demand impacting upon production. In 1966, 7,632,150 metres of Harris Tweed were produced, reducing to a low of 454,963 metres in 2009 (Harris Tweed Authority, 2012). This decline resulted in a reduction in the number of weavers and an end in the way that the tacit skills and knowledge were passed to the next generation of weavers. The amount of active weavers has fallen dramatically over the last 10-20 years and the workforce is ageing; in 2009 the average age of a weaver was 62.

In recent years there has been resurgence in the popularity and demand for Harris Tweed fabric. The number of metres stamped has doubled in the last 3 years, with the Harris Tweed Hebrides Mill in Shawbost producing approximately 90% of the Harris Tweed manufactured (Harris Tweed Hebrides, 2012). Taking into account the number of orders still to be woven, the expectation is that by the end of 2012 the number of metres stamped will surpass one million (Harris Tweed Authority 2012), a figure that has not been achieved since the mid nineties. A modern apprenticeship scheme was introduced in 2009 and since then 39 new weavers have been trained and registered. While this boosted the industry, due to lack of loom availability the training scheme is currently on hold. There are concerns over how to meet demand and minimal opportunity for experimentation and therefore design innovation. Knowledge of design practice and processes remain embedded in the minds of a handful of individuals who have worked in the industry for many years. The woven textile heritage and knowledge of Harris Tweed pattern designing could face extinction if embedded tacit design knowledge remains uncovered. As recognised by Belford (2011: unknown), during the making process '…in an industrial context, there is much tacit knowledge that never gets written down.'

In addition to the issues faced by Harris Tweed, the rationale to undertake the research presented in this paper is motivated by a wider problem, that of the scarcity of research

and literature regarding textile design thinking and in particular the lack of existent insight into the creation of woven textiles and methods of design innovation in this discipline. Textile specific literature tends to be practitioner or company monographs or primarily technical and instructional in nature. It has been recognised, that as a discipline, textile design has been identified as peripheral to design research discourse (Bye 2010; Igoe, 2010). Bye (2010: 207) explains that knowledge '…unique to a discipline is required to build and advance the discipline.' Further explanation to the situation is offered:

> *'…tacit knowledge of hands-on experience is distinct, but cannot remain solely with the practitioner or the artefact. Clothing and textile design has a long tradition in creative practice and apprenticeship but due to the increasing complexity of our world, there is a need to formally capture the knowledge of the field.'* (Bye 2010: 215)

Therefore, this paper seeks to shed light on the woven textile design process, specifically in relation to the design of Harris Tweed.

The Research Process

This paper describes a research project made possible due to funding awarded by The Glasgow School of Art (GSA), the author's employer institution and through working with Harris Tweed Hebrides and the Harris Tweed Authority. The project involved field research, which included informal and formal interviews with Harris Tweed Authority and company representatives, designers, weavers and others involved in the design and production of Harris Tweed fabrics. Visits to various Harris Tweed sites were undertaken; the purpose was to gain insight into existing fabrics, practices and processes involved in the creation of Harris Tweed fabrics. Establishing key factors evident in the existing situation directed the next phase of the enquiry. This involved the design and production of woven fabrics by the author and a research assistant using yarn supplied by Harris Tweed Hebrides to investigate possibilities in terms of design innovation. As the author was an established woven textile designer the practitioner-researcher position was adopted. This approach is ideal for someone working in a particular area and carrying out enquiry relevant to his or her work (Robson 2011). The practitioner-researcher position brings 'insider' knowledge and experience to the research situation (Gray and Malins 2004). The final phase of the investigation involved reflection on the data collected and generated to discuss and ascertain the findings of the practitioner-researcher and to 'test' the fabrics

produced by requesting feedback from Harris Tweed representatives. This feedback and the critical perspective adopted by the researcher throughout the investigation counteracted against the inevitable subjectivity encountered when undertaking this form of research (Gray and Malins 2004).

Establishing Existing Practice

Analysis of data collected enabled the author to establish understanding regarding the existing design practice and processes involved in the creation of Harris Tweed fabrics. Four diagrams (figures 4-7) have been created to provide an overview of current Harris Tweed design and production processes. These depict relationships between the customer (C), mill (M) and weaver (W).

Mill Driven Model

In the 'Mill Driven Model' the mill designs and selects the fabrics to be produced for inclusion in their stock collection for that season. These fabrics are presented at trade fairs such as Premiére Vision, Paris and to potential customers globally, via in-country agents. In this model, the design process primarily consists of referring back to previously woven samples, and reworking with different colour combinations. Sample looms at the mill are used to test new colour combinations and new warp and weft colour orders to make minor changes to existing fabrics designs. 'Test blankets' are woven to produce small sections of different designs to ascertain the success of design and colour combinations and to enable selection of designs to be taken into production. In the 'Mill Driven Model' designs are developed from the pattern designers existing knowledge of fabric structures, combinations of yarn, colour selection and previous customer orders. Design choices are based on the direction that the mill considers relevant to supply existing markets. After the design selection process has taken place the mill prepares the yarn by warping it up, putting it onto beams and delivering it to the weaver, figure 4 (1).

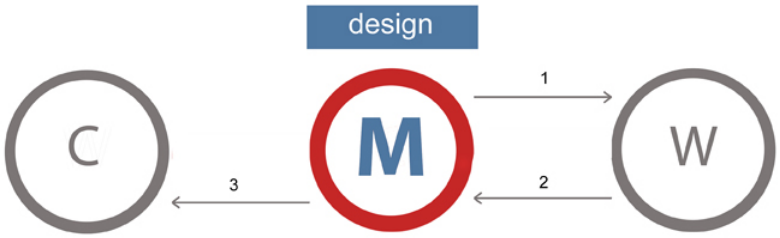

Figure 4: Mill Driven Model

The weaver sets up their loom by drafting the warp threads in the order stated and weaves the weft patterns using the yarn in the colour order as per the mill instructions. After which the fabric is collected and taken back to the mill for washing, finishing and stamping (2). The mill then dispatches the fabric to the customer (3).

The mills are currently the only locations with the equipment to dye and spin the yarn, wash and finish the woven fabric, to achieve the qualities and quantities required by the majority of the market. Stamping with the orb (figure 2) takes place at the end of the process. Therefore in all four of the models depicted these activities take place at the mills.

Customer Initiated – Mill Model

Customers may elect to create a design based on their own specific requirements. In the 'Customer Initiated – Mill Model' the customer discusses their requirements and the viability of creating a design with the mill (figure 5).

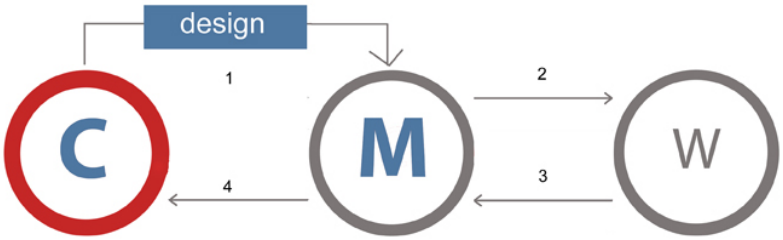

Figure 5: Customer Initiated - Mill Model

Samples may be produced and sent to the customer prior to the final order being placed. The design process takes place between the customer and the pattern designer at the mill (1). To manufacture the fabric the mill prepares the yarn and warp and sends it to the

weaver (2). The fabric is woven and returned to the mill for washing, finishing and stamping (3) and dispatch to the customer (4).

Weaver Driven Model

A small percentage of stamped fabric is produced by weavers to sell independently to customers, this may be via the weavers website or directly to visitors. In the 'Weaver Driven Model' (figure 6), the weaver selects colours and purchases yarn from the mill (1).

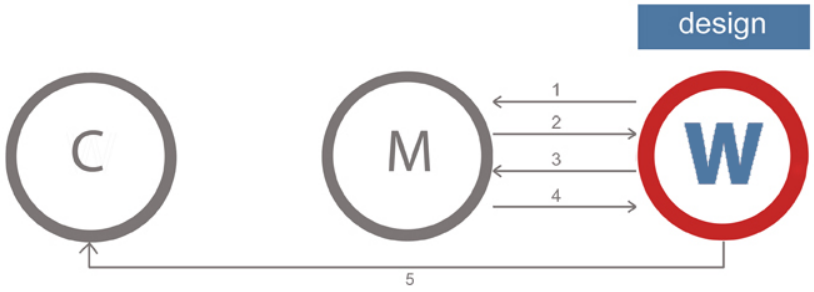

Figure 6: Weaver Driven Model

The yarn is then warped by the Mill and delivered to the weaver (2). After weaving, the fabric is returned to the mill for washing, finishing and stamping (3). It is then delivered back to the weaver (4) and is sold by the weaver to customers (5).

Customer Initiated – Weaver Model

In the 'Customer Initiated – Weaver Model (figure 7) the customer contacts the weaver directly to design a fabric to their own requirements.

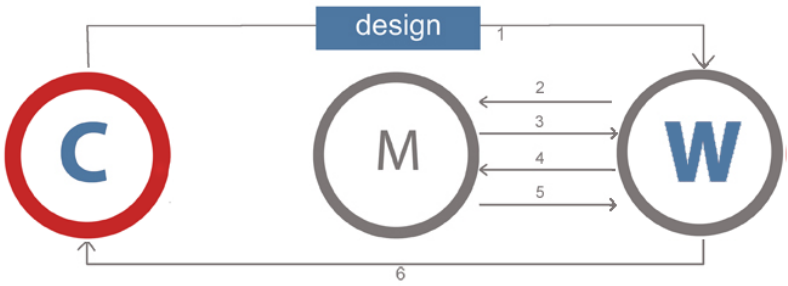

Figure 7: Customer Initiated – Weaver Model

The initial stage is similar to that in figure 5, where the design of the fabric is a collaborative process but in this instance it takes place between the customer and the weaver (1). After the initial design is created, the stages of production and distribution (2-6) are the same as the Weaver Driven Model in figure 6.

Reflection on Existing Practice

It appears that the majority of Harris Tweed fabrics are created by adapting colourways of previously woven fabrics. This confirms the scope for an exploratory and experimental approach to design innovation and therefore substantiates an aspect of the rationale already described in this paper. It also appears that a limited range of structures are utilised in the design and construction of Harris Tweed fabric, suggesting further capacity for design development. Examining existent design practice and processes highlights the importance of inherent tacit understanding in the design process of Harris Tweed fabrics. Due to the time spent working in the industry the expert pattern designers and weavers accrue a wealth of knowledge. There does not appear to be a system in place to record the design process, or a way in which knowledge relating to yarn colour blends, structures, drafts or fabrics produced could be easily passed on to a new generation of designers entering the industry. Often the process of design selection is due to the expert's ability to internally visualise the likely outcome of a different structure and colour combination. Due to this situation it is highly important to explicate the woven design process to enable transference of knowledge to future generations. The use of computers as part of the design process at Harris Tweed Hebrides was found to be non-existent although a rather archaic system did exist at another island mill. While older weavers were observed listening to Gaelic radio stations while weaving, the younger generation are listening to digital radio stations via Bluetooth headphones or checking emails on laptops or iPads. A digitally literate and connected generation of weavers have the potential to bring new areas of expertise to the Harris Tweed industry.

Practitioner-Researcher Investigations

The understanding gained regarding existing design practice, processes and fabrics directed the practical investigations carried out by the author. Each of the investigations were recorded and documented through sketches, peg plans, drawings, notes, photographs, digital files and technical samples. Pointcarré, computer aided design (CAD) software has been used in the investigations at varying stages. The initial intention was to investigate the design possibilities that would be viable on looms currently used in the production of Harris Tweed fabric (four shaft patterns). The investigations then extended to explore the possibilities of designs that could be produced if changes were made to existing looms (eight shaft patterns). The intention of all investigations was to create designs that extend beyond those currently manufactured. This was explored by utilising

4-shaft structures that were not evident in Harris Tweed Hebrides' current collections or archive of patterns. Traditional applications for Harris Tweed fabrics with requirements for tough, hardwearing and natural coloured fabrics have been extended with increased utlisation in contemporary fashion and interior contexts. Fabric in these new contexts can have a longer float length, which gives the cloth a different drape and handle and can therefore be used for a wider range of product applications. The fabrics produced would meet the Harris Tweed regulations with the exception of the weaving location, therefore if woven by an islander at home (as opposed to using the facilities at GSA) the fabric could receive the Orb stamp.

Colour combinations for warps were selected from yarn provided by Harris Tweed Hebrides. Colour selection focused on combinations deemed best to show the woven structure and design possibilities as opposed to customer or trend directed. Prior to commencing weaving a warp, samples to be achieved on that warp were designed by the author using hand-drawn techniques and CAD. While sampling these predetermined designs, observations were made regarding the effect of introducing alternative weft colours or patterns. Changes to patterns and weft colours were made immediately during the sampling of a particular warp, with other ideas saved as written notes and CAD files to inform future warps. The act of weaving samples generated further ideas in addition to the pre-determined set of samples the warp was originally set up to produce. Reflection during and after each warp informed future warps.

Four Shaft Patterns

Warps 1, 2 and 7 were set up to explore four shaft patterns. Some of these warps produced samples with patterns and surface qualities quite different to the existing Harris Tweed fabrics observed. Warp 1 produced samples which, due to the longer float length and grouping of warp floats, had much more surface texture than any Harris Tweed fabric observed. In figure 8 the grey areas of the cloth are raised and the coloured sections form a recessed dip. Colour can be used to accentuate the structure and surface levels within the cloth.

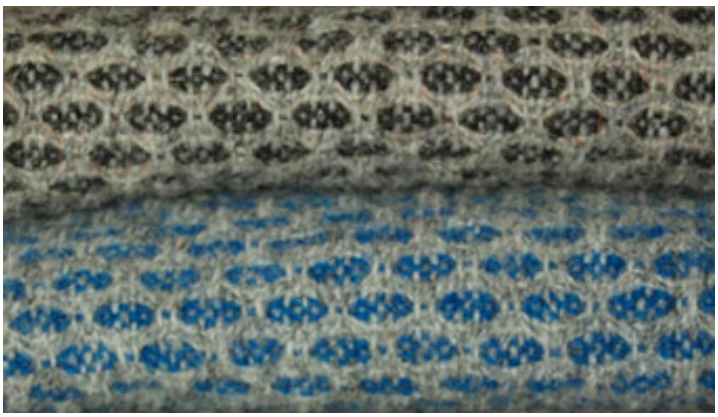

Figure 8: Selected samples from warp 1

In the second investigation the warp was made using one green and one grey thread in repeat. Figure 9 shows examples of different fabrics created on this warp by altering the weft colours or changing the lifting pattern. The top two fabrics show a broken zig-zag pattern. The final fabric uses a navy coloured weft thread and due to the nature of the structure the fabric is almost completely navy on the reverse. There is potential for further investigations into double-faced fabrics.

Figure 9: Selection of samples from warp 2

Eight Shaft Patterns

The first of the eight shaft warps (warp 3) was set up using a draft and structures selected by the author based on previous weaving knowledge. Structures were initially explored by

hand drawing on pointpaper (figure 10) and were later transferred to CAD (figure 11) primarily as a means of recording structures used.

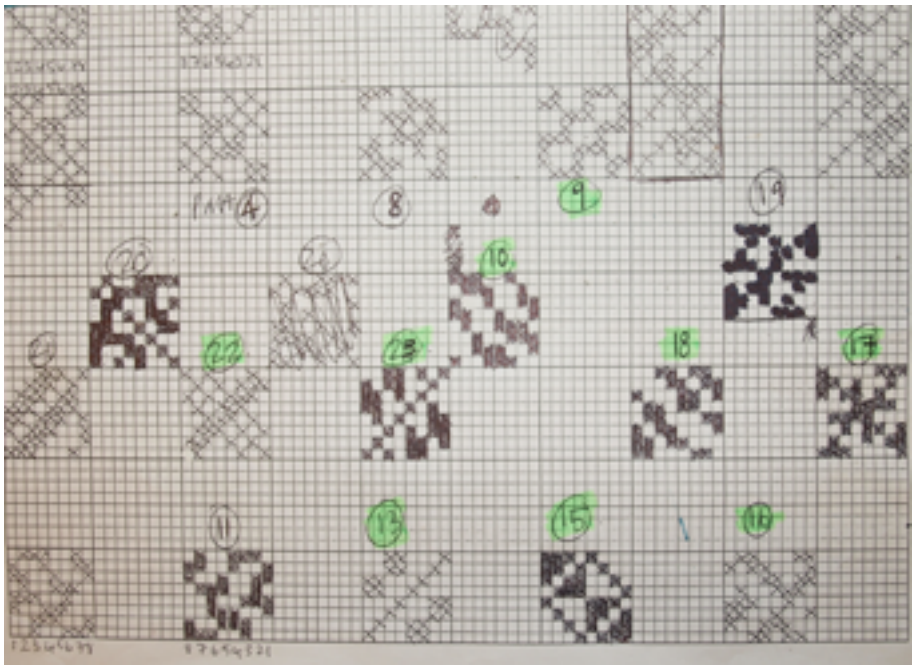

Figure 10: Design drawings on pointpaper (warp 3)

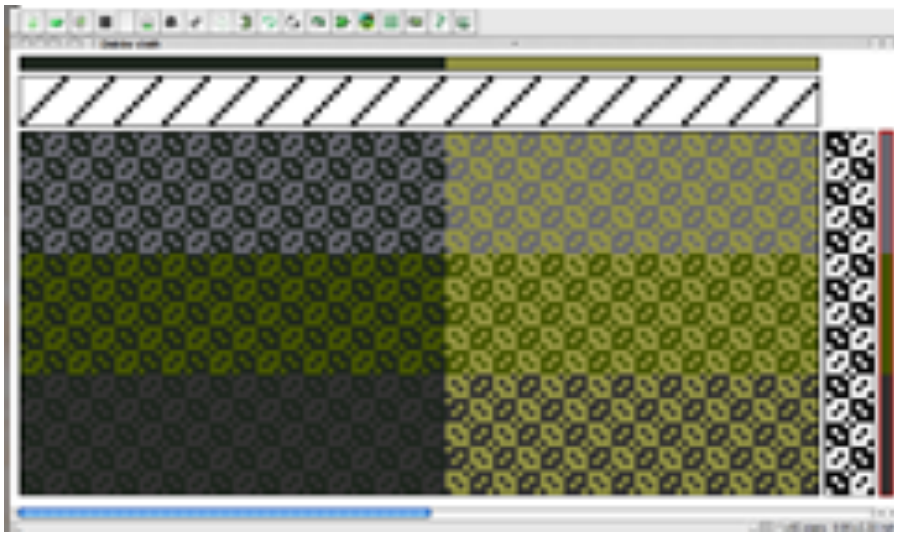

Figure 11: CAD drawn design (warp 3)

The resulting samples from this warp shown in figure 12 seemed to be a little more flexible and feel lighter in weight than existing Harris Tweed fabrics. Due to the solid colours used in warp and weft the resulting patterns are quite graphic and defined, particularly in the sample with the red weft and dark warp (figure 12); this is quite different to existing Harris Tweed fabrics.

Figure 12: Selected samples from Warp 3

Warp 4 used the same draft and structures as warp 3 but introduced different groupings of coloured threads in the warp (8 dark blue threads and 8 green threads in repeat) and different combinations in the weft, which produced a set of designs (figure 13) that were visually completely different from previous samples woven as part of this research and different to existing Harris Tweed samples; it was possible to produce similar patterns at a larger scale or create completely new ones.

Figure 13: Selected samples from Warp 4

CAD became a useful tool when considering combinations of coloured yarn and structures as it allowed a large number of design options to be considered in a much faster time scale than drawing all options by hand.

In warp 5 seven different sections of warp and weft colour order were being considered, this would produce 49 different possible designs from each individual pegplan. Fifteen different pegplans were under consideration as possibilities for weaving - this meant a total of 735 possible designs could be woven on this particular warp. Restrictions on time, loom availability, warp length and quantity of yarn available would not allow this number of designs to be physically woven. A method of selection had to be developed prior to setting up the loom. At Harris Tweed Hebrides when a physical blanket comes off a loom it is checked over by the designer to assess the samples that have potential and warrant being woven in larger quantities for inclusion in the stock collection. The designer uses instinct and tacit knowledge to make these decisions. This method of selection was tested with the 'digital CAD blanket'. While CAD allows a preview of the fabric, viewing 735 possible designs on a computer screen and remembering which looked most interesting soon became unwieldy.

The intention was to identify those combinations of structures and colours that were not evident in the company's current collection or the archive books and explore these as new fabric possibilities. The researcher used knowledge of how structures worked in previous warps, in conjunction with CAD information on screen to make informed choices about the pegplans that should be selected and woven. Each design was given a score from zero to four, with zero being a sample that looked to have almost no potential to make a successful design and 4 being those with the greatest potential. Designs were deemed to have potential if they looked aesthetically different to anything previously stamped as Harris Tweed, had a different surface texture due to the combination or placement of warp or weft floats or had a different drape and handle to existing fabrics. The example scoring sheet below (figure 14) shows design scoring 3 highlighted by a green circle and those scoring 4 with a green block.

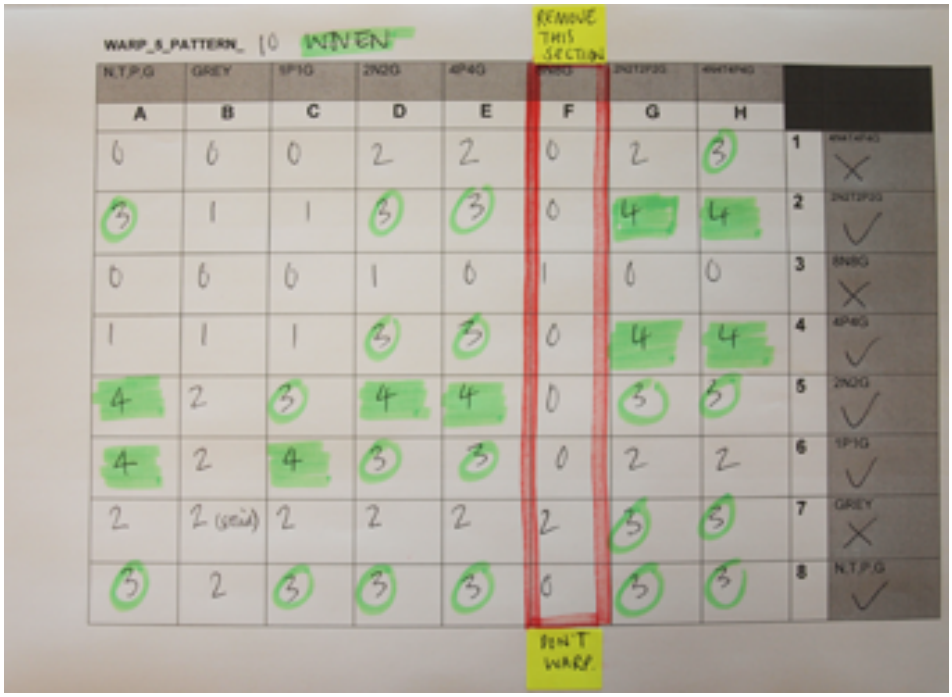

Figure 14 – Scoring sheets developed as a method of design selection

Pegplans with the most high-scoring weft colour orders were then selected to be woven. Individual designs scoring three or four but which were part of a pegplan that did not receive a high enough overall score were highlighted to be simulated in CAD, printed for reference and possibly then woven on a future warp. From viewing the scoring sheets it quickly became apparent that section F, (highlighted in red, figure 14) in the warp was producing very few high scoring designs with any of the weft colour orders in any of the pegplans. This section of the warp was eliminated at the digital stage before getting to the point of physically warping up. The elimination of this section could be done with relative confidence at this stage due to the knowledge gained from previous warps and confidence that the CAD simulation was a close enough representation of the fabric. In this warp the drafting order of the warp threads was adapted from that used in warp 4. The pegplans used in warp 3 and 4 also informed some of those used in warp 5 but due to the different threading order the resulting structures were different, producing samples (figure 15) with a very different handle, surface quality and range of designs from those of previous warps.

Figure 15: Selected samples from Warp 5

Designs from warps were bigger in scale and involved more complex interlacing of warp and weft threads than possible on 4 shaft looms.

When considering warp 6 the author looked back to observations made, and records of possible alternative designs not woven during warp 3, 4 and 5. Warp 6 utilised the same threading order and selected structures from warp 3 and 4 along with colour orders and combinations resulting from reflections on those employed in warp 5. The samples from this warp, shown in figure 16, contain a vast number of designs many of which are quite distinct from samples produced earlier in this project or existing Harris Tweed samples.

Figure 16: selected samples from Warp 6

The CAD selection method developed in Warp 5 was also utilised when considering the set up of warp 6 and warp 7. Warp 7 returned to use only four shafts and used a draft and set of structures informed by warp 2 but also used knowledge gained during the 8 shaft investigations regarding colour orders and combinations of warp and weft yarns. Samples from warp 7 (figure 17) have similarities with warp 2 however the patterns are more clearly shown due to the two warp colours being of a higher contrast than those of warp 2 (see figure 9).

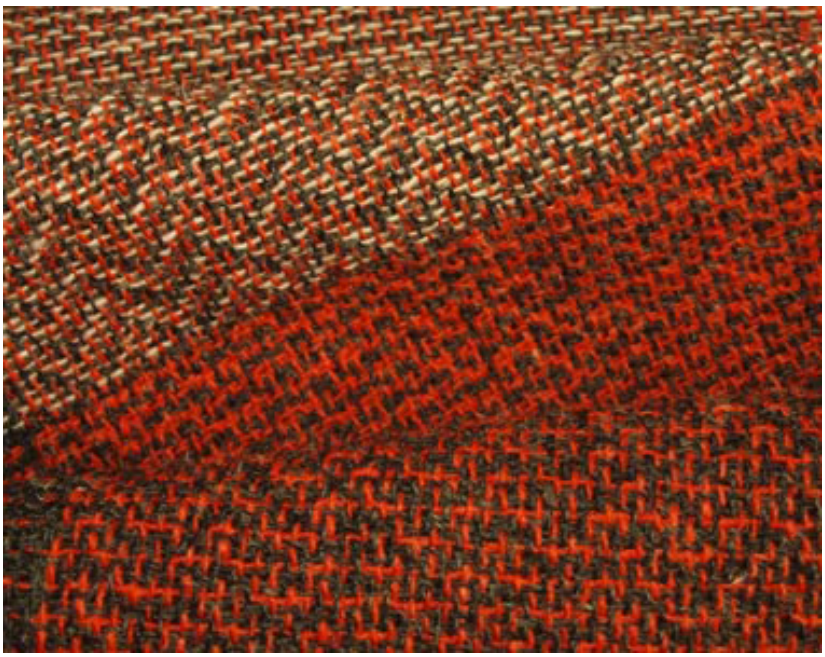

Figure 17: selected samples from Warp 7

Proposals and Discussion

Through undertaking the research project described in this paper the author can propose and describe various areas for consideration to enhance design innovation at Harris Tweed Hebrides. The proposals are written in *italics*, with an explanation provided below.

Four shaft fabric developments

Four shaft designs produced as part of the research project could offer an immediate solution to the desire of Harris Tweed Hebrides to increase their range of designs. These could be woven on the existing looms, requiring little investment. The surface quality and handle of the milled fabric would be different to that of the author's hand-washed samples therefore fabric would need to be woven by the weavers in order that sections could be tested with different industrial milling and finishing techniques to achieve a fabric ready for market. The four shaft designs received a favourable response from Harris Tweed Hebrides. The author will provide technical data for a selection of these fabrics to allow them to be woven and milled on the island. Market feedback will be sought from customers.

Eight shaft fabric developments

Adapting existing looms or introducing new looms with eight boards would facilitate the possibility of creating a vast array of new designs. Harris Tweed Hebrides representatives

selected eight shaft patterns they believed had potential to sell in existing markets. However, discussion regarding the possibility of developing a loom with eight shafts is at an early stage and would require significant investment from mills and weavers. Therefore, this is a long-term option for increasing the range of designs. However, it is possible that some of the eight shaft fabrics would be woven at GSA in sections large enough to be industrially milled, in order to test the effect of the finishing process on the drape and handle of the cloth. Eight shaft designs are only speculative samples at the moment but would be an exciting development for the industry.

Practitioner-researcher influencing designer-weaver

The way in which the Harris Tweed industry operates, and the relationship between the mill and the weavers could be further explored. The author, as practitioner-researcher developed a cyclical design process, involving designing-weaving-reflecting-altering-designing-weaving-reflecting-altering. In the case of weavers who are weaving for a mill they have no design input, however the act of physically weaving means they acquire understanding of woven structures and how the warp and weft threads interlace. Capitalising on this knowledge and finding ways to work more closely with weavers could facilitate discussions, which could lead to new ideas and innovations.

Training designer-weavers and potential to extend the role of the weaver

Due to the current market demand the existing population of weavers is fully occupied with "business as usual" production using tried and tested structures, leaving little time for research and development or the inter-generational transfer of tacit knowledge. To allow true innovation to take place, ways need to be found to allow time for speculative sampling and testing of new ideas and structures. Interaction between older and newer generations of weavers on a more frequent basis needs to be facilitated to encourage the passing on of many years of insight.

CAD utilisation

Weave specific CAD software was a useful tool throughout the practical investigations to aid the design and selection process, however it became essential to the design process when designing eight shafts patterns. At Harris Tweed Hebrides, CAD could be introduced to record and archive previously woven samples, this would be a valuable resource for the company and provide a huge number of designs that could be drawn upon in the future. The current designing and sampling process would also be enhanced if CAD was

introduced and used in conjunction with hand-drawn techniques and the pattern designer's vast knowledge of existing structures and patterns. If eight boards were introduced to enable the production of eight shaft fabrics, CAD would become a highly useful and essential tool in the design process; as the number of drafts, pegplans and colour orders increases, the design possibilities for consideration increase exponentially. Using CAD allows a preview of the fabric; colour orders, drafts and pegplans can be changed in seconds resulting in the generation of many possible new designs. Those with potential could then be sampled or saved for a future project and those with little potential could be eliminated at the outset saving on time and yarn. Time saved when designing stock fabrics could be directed towards designing new and innovative fabrics which would allow the company to continue to respond to customer demands and also look to new design innovations that could be presented to existing or new markets.

Conclusion

Although the project described in this paper was small scale, an extensive quantity of potential design innovation ideas were generated through researching the existing Harris Tweed context and undertaking the practitioner-researcher practical investigations. Adopting the practitioner-researcher position was beneficial to undertaking textile design research, however, decision-making regarding the level of detail and specific information to be communicated through this paper required continual reflection and refinement, due to the amount of data amassed.

While initially it may appear that the regulations governing Harris Tweed are a limiting factor in its growth and development these are actually a key part of what make this fabric special. There is plenty of room for innovation within the industry while working within the boundaries of the regulations. Combining the traditional skills and knowledge of those who have considerable experience with the new generation of weavers who bring a different skill-set and outlook could allow for innovation not seen within the industry for many years. The Harris Tweed industry is at an exciting point in time.

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