

Breakthroughs in the “Creative Design” Process for the Tufted Carpet Industry

New methods to produce Accurate Tufted Carpet Samples

Reducing Sampling Cycle Times to minutes

Reducing total Sample Making Labour by up to 90%

Freeing the Production Facility from Sample Making

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About Modra Technology

Modra Technology is a world leader in providing unique product development solutions to carpet manufacturers.

Carpet designers and manufacturers use Modra's products to experiment with colours, textures, different yarn types and variations in carpet constructions. The machinery manufactured by the Warragul company saves money, speeds up development time and has enhanced creativity for 110 customers in 28 countries.

The productivity and flexibility of Modra's advanced CAD/CAM manufacturing facility enable it to competitively produce machinery for export worldwide.

Modra sells directly and through a network of international sales agents. Modra is located in Warragul, Victoria, Australia.

About the Author

Tim Modra started Modra Technology in 1991. His professional engineering focus has been in areas of Product Development and Industrial Design. He is the Managing Director of Modra Technology.

His skills in mechanical systems and electronics control systems combined with the analysis and understanding of complex technical problems in the textile industry have enabled the development of systems and machinery specifically in the areas of Carpet Prototyping.

Abstract

The Tufted Carpet Industry is continually seeking new innovations to make breakthrough improvements in the design and manufacture of Tufted Carpets.

A streamlined “creative design” process is essential to proactively respond to Customer requirements as well as to perfect your product development ideas. Eliminating non value adding activities and set-up times; and reducing the “end to end” cycle time to produce a tufted carpet sample are effective ways to make measurable breakthroughs in the creative design process.

The Challenges in the Creative Design Process

The creative design process is one of the core business processes in a Carpet Manufacturing Company. The success or failure of a new carpet range is dependant on many factors, and the “quality” of the creative design is one of the most important.

Inefficiencies in the Creative Design Process

Carpet Designers and Carpet Manufacturers must be able to quickly respond to their Customer’s requirements. Inefficient processes and unsuitable sampling machinery all hinder a company’s ability to create innovative carpet designs. This in turn hinders the exacting requirements of the “custom/contract” market segment and the “running line” market segment.

Carpet Designers and Carpet Manufacturers face a number of challenges including:

1. Producing accurate sample qualities i.e. samples accurately match the production equipment
2. Quickly responding to their customer’s design need i.e. reducing the end to end cycle time
3. Reducing the cost of producing tufted carpet samples i.e. eliminating sampling equipment setup times, eliminating yarn wastage and eliminating production plant downtime
4. Maximising the business benefits from their Carpet Sample Machinery investment

Accurate Sample Quality

Producing a carpet sample of quality that accurately matches the wide range of types of tufted carpet possibilities can be a challenge.

If you have a Servo Scroll Tufted Carpet machine or a Level Cut Loop (LCL) machine how do you sample for it?

- a. Use your production plant machinery
- b. Utilise the services of a sample / strike off company
- c. Invest in a sampling machine based on production technology, valued at up \$1.5m or
- d. Invest in the Mtuft, an innovative tufted carpet sample machine

Sampling Cycle Times

Carpet designers and manufacturers who have not streamlined their creative design process typically have “end to end” cycle times of 3 to 4 weeks, just to produce one sample.

For the conventional tufted carpet sampling machine or running samples on a production machine, the setup time for one sample could take up to one full day with setup of up to 200 cones of yarn. This is a lot of non value added work just to setup the sampling machine. The value adding time to produce one

carpet sample is small. Hence the percentage of value adding time in the end to end Conventional Tufted Carpet Sample process could be less than 1%¹.

The best practice cycle time to produce a new carpet sample, including the setup time is now 20 minutes. How does your creative design process compare?

Sample Costs

The total cost to produce a tufted carpet sample is inclusive of labour and yarn costs, and are estimated to be in the order of US \$100.

The total labour cost includes the setup time and the sample producing time; with the setup time being a non value adding cost and is up to 90% of the total labour time.

The traditional tufted carpet sampling machines need between 30 to 50kg of yarn, which is then fed into approximately 200 cones, just to make one carpet sample. If this quantity of yarn is not available then it has to be specially made.

A skilled operator can reduce the amount of yarn wastage, but it can be up to 0.25kg at a cost of \$5 to \$10 per kg. The calculated minimum yarn wastage is estimated to be \$1.25 to \$2.50 per sample.

Production Plant Savings

Making carpet samples on your production plant is advantageous because the samples will accurately replicate the production quality. However it comes as a great cost to the company in terms of:

- significant production downtime i.e. overhead costs
- a source of frustration to the production team in scheduling in urgent samples
- unable to quickly react to Customer requirements, i.e. waiting for a gap in the production schedule

The challenge for Carpet Manufacturers and Carpet Designers is to continually develop competitive advantage. Being an early adopter of the next innovation in Tufted Carpet Sampling delivers these companies with a real breakthrough in their “creative design” process.

Understanding the Mtuft’s Innovation

Modra Technology has spent 5 years developing a sample machine specifically for tufted products and the result is the Mtuft Tufted Carpet Sample Machine.

The Mtuft can produce a carpet sample within 20 minutes, inclusive of the setup time. This enables the design team to create up to 12 to 14 quality samples per day.

The Mtuft is fully integrated with Ned Graphics Vision Tuft software, so a new carpet design can be quickly imported into the Mtuft. The Mtuft has the ability to simultaneously produced a sample and allow the Designer to create a new design.

“The Design Interface is on the Mtuft; so I can stop it, make a change, restart it, and see the results immediately”

¹ Value Adding Time is the time actually spent in producing the Tufted Carpet Sample which excludes all of the setup times. Elapsed Time is defined as the end to end cycle time from when the Customer requests the Carpet sample to when the sample is presented to the Customer. Value Adding Time / Elapsed Time is typically less than 1%

The Mtuft uses conventional needles with a looper, hook and knife to tuft yarn into a primary backing. The Mtuft has the capability to use up to 8 different yarns or colours in one sample, but only one package of each yarn is required for each yarn or colour.

A needle is used to stitch a line of tufts from right to left, and the backing is advanced for the next line. This advance of the backing between lines of tufts becomes the gauge of the sample. The gauge is computer controlled and is adjustable in the Mtuft software. The stitch rate is precision controlled by the Mtuft's computer and is adjustable in the Mtuft software. The software selects the required needle at the beginning of each row and the pattern is produced at up to 1800 needle inserts per minute.

Full repeat scroll (FRS), single, double and unequal sliding needle bar, fine line, cut and loop and cut pile can all be produced at a wide range of gauges and stitch rates without changes to any gauge parts. This is achieved by the servo controlled yarn feed and unique looper/hook/knife selection combined to provide the desired pile height or to produce cut pile along the stitch path. The traverse from right to left can be modified to 'zig zag' and sliding needle bar product can be reproduced following a cam pattern.

This gives the Mtuft remarkable flexibility in that one machine has the capability to sample any type of tufted carpet.

The Mtuft machine has the capability to produce 1m by 1m samples. It also has the capability to produce miniature samples which enables the Designer to perfect their product ideas quickly, without the wasted investment in yarn and setup time.

The Mtuft innovation also enables Carpet Manufacturers and Carpet Designers to get to the same end point as with traditional tufted carpet sample machinery but much quicker and with less cost.

The Solution: Streamlining the Creative Design Process

The Mtuft's innovation is the critical enabler to improve the efficiency and effectiveness of your creative design process. Investing in the Mtuft machine enables you to capture a number of breakthroughs in your creative design process. The Mtuft also enables Carpet Manufacturers and Carpet Designers to rethink their whole approach to producing carpet samples.

The Mtuft enables you to streamline the end to end creative design process by significantly reducing the setup times and eliminating the non value adding costs in the creative design process.

Other leading Carpet Manufacturers around the world have realised the following business benefits from their Mtuft machines:

Mtuft Customer Comments:

Market Positioning

- We are now proactive in meeting our customer requirements. We can give a guaranteed response time to our Customers of only 2 days for a new design
- We have an enhance belief in our product development team, their innovative capability and their ability to meet the custom business market's requirements
- The Mtuft also enables you to structure your business processes to best meet the custom / contract market segment

Creative Design Process

- Our sample cycle time has been reduced from 3 to 4 weeks, down to the same day, with available yarn
- It use to take us up to 2 weeks to produce a 10 colour palette range for one of our new designs; now we can setup the Mtuft to run overnight and produce this one design with 8 different colours. We just set the Mtuft to run at 5pm and it is finished well before we arrive to work the next morning
- We have saved over 20% of our design team time by eliminating the non value adding setup times. This time is now spent on creating more innovative designs for our customers
- Previously when I had a new idea, I could only produce 1 sample. Now I can try many variants in the creative process and make a better choice on the best option. This is because the design interface is on the Mtuft; so I can stop it, make a change, then restart it, and see the results immediately
- We are now producing more designs and samples, with a faster turn around time. The lead time for a sample can be 20 minutes, so we can give a guaranteed response time to our Customers of only 2 days
- We can fully cost a new range based on our Mtuft samples; we weigh and measure the amount of yarn used, then we apply our standard costs to determine the overall production costs
- The Mtuft enables us to perfect our new product ideas before we commit them to our pilot production plant i.e. theoretical construction development, dye development and diagnostic work. This is exploratory stage is critical in the creative design process

Ease of Installation

- We produced our first Customer sample on day 3 of owning the Mtuft machine

Risk Management - Production

- The Mtuft helps our Manufacturing Team access the production risks in with new ranges

Sample Quality

- The Mtuft sample quality is approximately 95% aligned to our production machinery
- The sample quality is far superior to samples produced by hand trialists

Sampling Costs

- We have had a 90% reduction in the cost to produce our Tufted carpet samples
- Since our sample costs have come down; we now no longer need to consider the cost of making a sample, we just do it.

Business Justification

- Our business justification was based on an 18 month payback period, with the financial savings based on labour costs. We achieved this payback in less than 18 months
- A change of mindset is required to maximise the benefits from the Mtuft

Conclusion

20 years ago Carpet samples were made by a hand trials, then the traditional Tufted Carpet Sampling machinery eliminated the hand trials; however the designer was the machine operator. Now the Mtuft can produce tufted carpet samples within 20 minutes and the designer is spending > 20% more time in the creative process.

“If you are serious about being proactive in the “custom/contract” carpet market segment, having the capability to perfect your new product ideas and producing carpet samples within 24hrs the Mtuft enables you to achieve these objectives. “



The Mtuft from Modra Technology



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