

A new approach to testing – the total solution

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What happened when a prestigious UK retailer approached James H Heal for a solution to a quality problem?

James H Heal rose to the challenge and responded with a novel approach to rapid test method development.

James H Heal are one of the worldwide market leaders in manufacture of textile testing equipment. With well equipped production facilities, backed by a team of designers and technologists, they are perfectly placed to develop cutting edge equipment and solutions for textile testing with functionality and commercial appeal.

1. Introduction

This article presents one of the latest developments by James H Heal – the **SnagPod** ‘*Snagging Resistance Tester*’ and sets out to answer a number of commonly asked questions regarding its development

- Why is it different?
- How does it compare to wear?
- Is it more sensible than Mace testing?
- Who else is using it?

2. The Problem: Snagging

‘Customers may forgive a range of ills but snagged garments are returned very early on and can alienate a customer for years to come.’ (Jaeger)

This retailer reported that Snagging was a continual problem, on a wide range of fabrics, and one which they had not found a reliable test method to evaluate. One of the key issues affecting garments in particular is that snagging is, quite often, more

noticeable on contrast fabrics, popular for ladies soft suiting (figure 1).



Figure 1: Snagging on Soft Suiting Garment

With product lines shortening, RTM's increasing, and customer retention a priority, there was a need for a **'fast-track'** solution.

Here was a new opportunity for HEAL'S, a challenge to the usual design process, not only for a new product development but also for the conception of a new test method; the **total solution**. The design team had *carte-blanche* to develop a reliable, rapid method for the performance testing of fabrics to the **resistance to snagging**.

'We rarely have an opportunity to devise a concept based on desired outcomes and not the constraints of existing test methods', Simon Davies Heal's Design Centre Manager

3. Technical Partnership

To supplement and support the development Heal's set up a Technical Forum, inviting some of the most experienced individuals in the field of textile testing to join. Our invitees rose to the challenge, invigorated by the prospect of a new approach to testing. The group comprised members from the UK's leading independent test houses; PPT, Technicare Services Ltd and Intertek Testing Services as well as retailer representation from Coats plc.

This unprecedented approach brought together a collaboration of, arguably, some of the best textile brains in Europe! All with extensive experience of textile testing, some of whom were involved with the original test method development. It is

worth noting that the majority of the Technical forum members are experts on the British Standards committee TCI 24 for the Physical Testing of Textiles and also actively participate within the European and International standardisation communities.

4. The Development Process

The process began with a fundamental definition of snagging.

What is snagging?

Def. A snag is an undesirable surface loop of varying size on woven or knitted fabrics often caused by catching on sharp points or objects.

Other surface defects, generally associated with snagging and, also found to be undesirable, are defined as

Protrusions: not fully formed snags

Filamentation: a fibrous or hairy appearance due to broken filaments on the fabric surface.

Shiners: a thread that is generally tighter than its neighbours, as a result of pulling and snagging of the yarn in the fabric.

Indentations: a concave distortion of the fabric surface. The opposite of a snag or protrusion.

Next came a review of the current test methods, the aims being to address the technical issues and devise a new way forward.

History of Snagging

'There is a definite need for a more realistic snagging test for general apparel wear' (ITS)

The forum commenced with a review of the existing instrumentation and documented test methods for assessment of the propensity to snagging, namely,

- BS Handbook 11/ASTM D3939 (Mace)

- ICI Method 444 (Pilling box) with pins
- ASTM D5362 (Bean bag)

The strengths, weaknesses and relevance of each method in today's environment were appraised.

The Mace Test

Think of snagging and most specifiers immediately consider the *Mace Test* as the primary method. Developed by ICI in the late 1960's it was a perfect fit for materials around at this time and was effective in evaluating the performance of the production methods of the day. The group felt that today's apparel fabrics cannot be compared to those popularised by the period and testing of typically 'softer' fabrics by this method was generally considered to be over severe and non-discriminatory with regard to actual performance.

The Box with Pins

Again developed by ICI, this method was reported by our experts to be unreliable, with pin manufacture inconsistent and fitting of the pins awkward. However, this method was generally preferred to the Mace, and it has proven validity for testing school wear. It was felt this method produced results which related better to a customer's perception of snagging. As can be seen later, consideration of this was given in the **SnagPod** design.

The Bean Bag Test

More recent test method developments are represented by the *Bean Bag* and this procedure it was felt had most to offer. It is documented that studies of fabric snagging have shown this test method to be suitable for a range of woven and knitted fabrics. However, in the extensive experience of the Technical Forum the effectiveness of this method is compromised by the tendency of the bags to 'hang' on

the pins thus causing a collapsing of the bag. The result produces inconsistent and localised snagging around the periphery and seams.

This review exposed the important fact that, generally, none of these methods resulted in a realistic snagging effect nor correlated well with the performance of garments in practise. This concurred with the experiences of our retailer.

Not surprisingly, the forum members all had examples of real problems relating to snagging on which their advice had been sought. All welcomed a new method for end uses such as,

- Football replica jerseys
- General Sportswear
- Corporate wear
- Lingerie

It wasn't only our original retailer who needed help!

The next questions were

- ***How to harmonise these test procedures?***
- ***Could one test satisfy all requirements?***

With the forum focussing on the sole purpose of test method development their shared knowledge came quickly to a proposal for a new method based around the existing principles of the Bean Bag Test. A design for a new test chamber design, ***the SnagPod***, was proposed which would have the advantage of the being driven by the existing equipment for the Pill Box Test thus making it cost-effective and accessible for current users.

5. Requirements of the Test Method

The primary requirement of any test method is to produce a set of standard conditions under which different materials can be consistently evaluated and which will reliably rank fabric performance. The consistency and efficacy of a proposed test

method is usually evaluated by *ring tests*. This is the usual *standardisation* process.

Ring Tests

The initial development trials were conducted on a range of eleven fabrics known or considered to be susceptible to snagging in practice;

- six woven corporate fabrics
- two knitted (football replica) fabrics
- three lingerie fabrics

The trials were then extended to cover other input variables such as,

- test speed
- test duration
- methods of assessment

Finally, with the test protocol established further trials were conducted to evaluate

- the success in ranking of fabric performance
- assess performance against retailers returns

Extracts, from the extensive trials are given in Table 1.

Table 1

Trial	Objective	Outcome	Conclusion	Results
1 Bean Bag	Evaluation of test chamber and between laboratory variation	Localised and severe snagging. Damage to the bags. Poor correlation between laboratories	Over severe. Unsatisfactory	Figure 2
2 Felt tubes	Evaluation of test chamber with specimens mounted on felt-covered tubes and between laboratory variation.	More even distribution of snagging. Better correlation between laboratories	More realistic. Satisfactory	Figure 3
3 Ranking	Evaluation of proposed test method against ranking of customer returns and assessment method.	Good correlation between laboratories. Consistent ranking of performance against customer returns.	Satisfactory	Figure 4

Figure 2 Ring Trial 1: Bean Bag

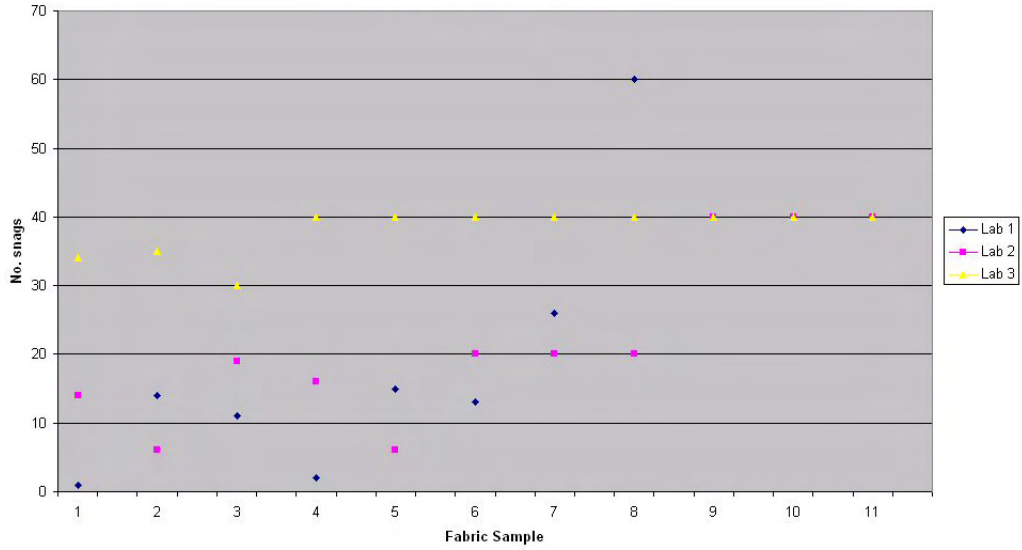
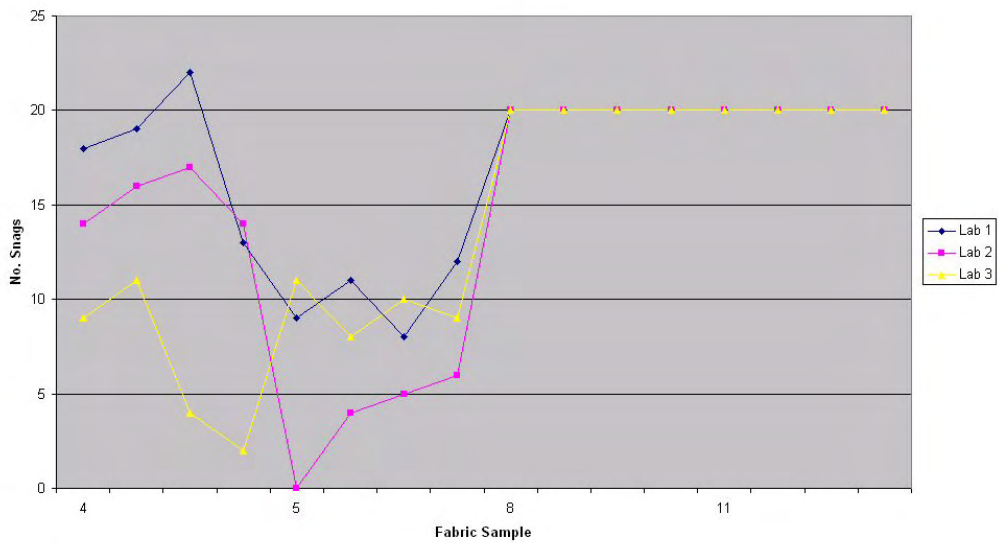
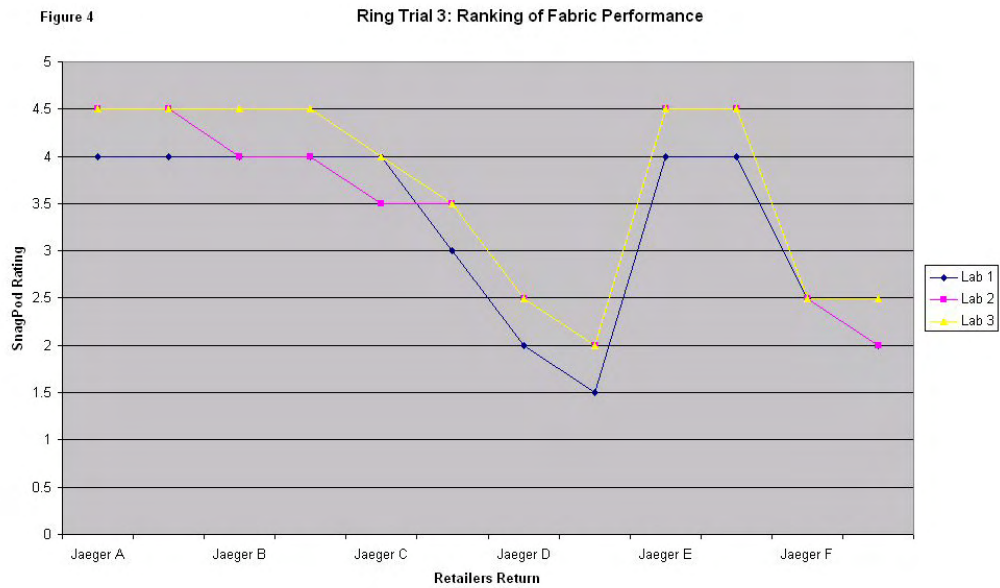


Figure 3 Trial 2: Felted Tubes





Figures 5 – 8 illustrate typical tested specimens from the Mace Test, SnagPod and a section of a complaint garment.



Figure 5: Mace Snagging

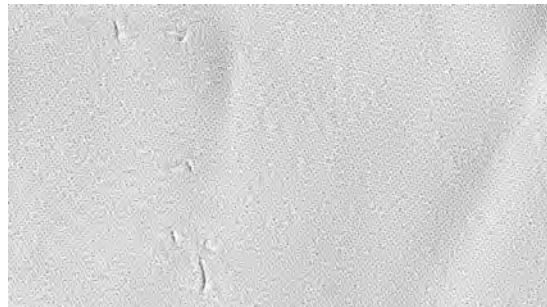


Figure 6: Garment Snagging

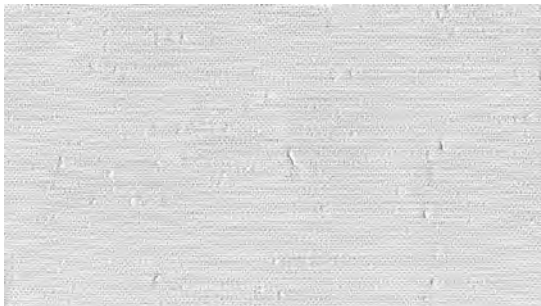


Figure 7: SnagPod Sample 1

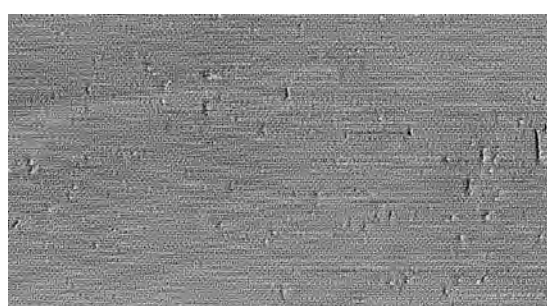


Figure 8: SnagPod Sample 2

6. Summary of the Development Test Method

Scope

This test is designed to determine the propensity to surface defects by a snagging mechanism of textile fabrics. The test is suitable for knitted and woven structures. Filament yarn, textured or untextured are usually more prone to snagging but spun staple yarns in certain types of design structures can also be prone to snagging.

Test principle

Specimens are mounted on felt-covered rubber tubes and tumbled randomly at a constant rotational speed in an octagonal pod fitted with rows of snagging pins.

Apparatus

The *SnagPod* (Figure 9) octagonal in shape, incorporates four snagging bars fitted with pins (Figure 10) inclined forward with the direction of rotation. The Pod rotates at 60rpm and fits, as an additional chamber to an ICI Pilling Tester or later generation *Heal's Orbitor*

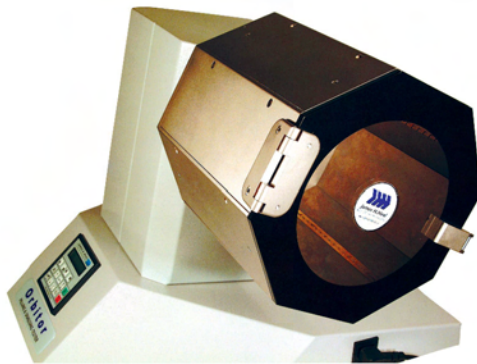


Figure 10: SnagPod Pins



Figure 9: SnagPod

Test parameters

Four test specimens are mounted onto felt covered tubes and tested simultaneously for a test duration of 2000 revs. The test takes around 30 minutes to complete.

Assessment

After testing the specimens are graded in a standardised Assessment Viewer against a series of specially developed and fully traceable SnagPod Reference Photographs. The tested specimens are individually assigned an alpha-numeric rating reflecting the change in surface appearance and the classification of surface defects.

Expression of results

The individual specimen grades are reported together with the classification of surface defect.

7. A success story?

The **SnagPod** differs by offering a real and effective solution for reliable and reproducible testing for resistance to snagging. The now registered design, provides the tumbling mechanism for producing an even level of snagging consistent with ranking of fabric performance in wear.

Jaeger, via their independent test laboratory, use the development test method for pre-selection of all their susceptible fabrics,

'The test acts as a filter for fabric selection at the buying stage and ensures consistency of garment performance which ultimately results in customer retention. At the start of the project garment snagging was a real problem for us with RTM's exceeding 10%, we had no solid basis for decision making. Since running this test the complaint levels of the past are practically non-existent'
(Jaeger)

The success story doesn't end there. Numerous other retailers and manufacturers disillusioned with current methods are now building reliable data using the SnagPod. Examples from the Heal's reference list include,

- Sportswear: Adidas Salomon, Puma
- Leading retailers: BHS
- Lingerie: Victoria's Secret

'The new POD Snagging Testing method, in my opinion, provides a test method that is more representative from a real wear test point of view. Once fabrics have been benchmarked, it gives a clear and consistent method for determining pass/fail suitability of fabrics', Lee Thompson, Technical Manager BHS

8. The way forward – Standardisation

Generally, there are two options for test method development,

- a) to rely upon in-house documented procedures developed using in-house technical resource or an external body such as an independent test house,
- b) via a standards organisations, National, European or International.

The latter, although extremely valuable, has been found to be notoriously slow and weighed down by bureaucracy and politics.

The well researched and documented development method outlined above is available for the ultimate benefit of all users. The **SnagPod** has been presented to British Standards committee TCI 24 'Physical Testing of Textiles' and is being progressed as a new work item. Interest has also been shown in developing the method for hosiery.

9. Final comments

'By the usual yardstick the Forum made remarkable progress – achieving in just over 12 months what normally might have taken years. I can't help thinking that this 'fast-track' method of dealing with poorly developed or non-existent methods might have further appeal', David Repper, Managing Director, Heals

'It's amazing that a project like this has come to fruition in such a relatively short time and indicates what can be done if the right calibre of people get together with a sole purpose in mind', Derek Johnson, Technical Manager, ITS

This article has shown that the development process can be shortened.

Remember Testing

- Protects the customer
- Reduces returns on sales
- Protects the business

Can you afford to wait for the standardisation process?

James H. Heal and Co. Ltd.

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