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# 2015

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## 4 part Sport Bra Report – Synopsis

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Progressive Sports Technologies  
Ltd

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**2015**  
**Ross Weir**  
**Laura Whittingham**  
**Francesca Buckley**

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## Report Synopsis

Progressive Sports have work extensively on sports bra research and development for many years. Examples of our activities include:

- Research – Fundamental research (PhD), scientific reviews and presentations, focus groups, user observation and expert user testing
- Testing & Validation – materials and component testing, 3D motion analysis, User perception analysis
- Design – concept development, prototyping and manufacture liason

The Sports Bra Report 2012 is in 4 separate documents:

- Part 1 Literature Review
- Part 2 Expert review and Focus Group
- Part 3 Patent Collection
- Part 4 Study – Sports Bra Construction, Performance and Comfort Relationships

*Each document stands alone and can be read in isolation from the other documents.*

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## Part 1 Literature Review

### Extract

Many women experience a feeling of breast enlargement during the week prior to menstruation. In women with natural menstrual cycles breast volume is smallest at mid-cycle when progesterone levels are at a minimum, volume then increases **by up to 40%** in the week before menstruation when progesterone levels are highest (Milligan et al., 1975, Hussain et al., 1999). This pattern of breast change for a normal cycle is illustrated in Figure 4 where breast volume is lowest (approximately 500ml) between days 9 to 17 and increases a peak (approximately 600ml) between days 21 and 25. The pattern of breast volume change is altered by the use of an oral contraceptive, breast volume is lowest at the end of menstruation and increases steadily until onset of menstruation. Milligan et al (1975) found

breast volume increased for both oral contraceptive users and non users in the final week of their cycle, up to 100ml in non users and 66ml users. Oral contraceptive use can lead to increased breast size and was found by Jernstrom and Olsson (1997) to be a strong determinant of breast size.

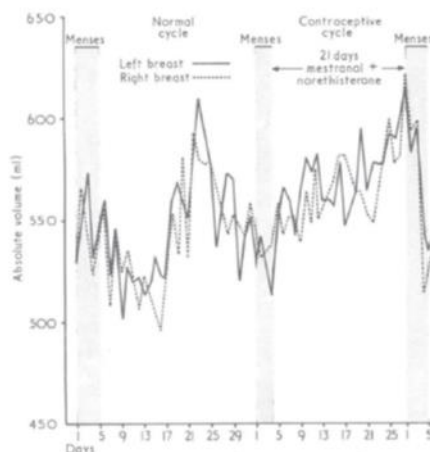


Figure 1 Absolute breast volume changes with time throughout normal cycle and subsequent contraceptive-controlled cycle (Milligan et al., 1975)

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## **Part 2 Expert review and Focus Group**

### **Extract**

The subjects who all currently wear 34DD bras were measured using the ISO7250 method. What becomes clear is that all of the subjects currently wear the same size bra yet their measurements vary significantly? Once the focus group was complete, the subjects were allowed to select their favourite product in any size in order for Progressive to purchase it as a gift. This was done as a test to see what size they felt they needed and so the subjects could “put their money where their mouth is” in terms of their design preferences. With the exception of subject 5, the remaining girls all ordered a similar size, with subject one happy with a 34DD but expressed her belief the E cup may fit even better (see Table 1). This exercise highlights the lack of continuity in measurement methods and Progressive’s belief is that a simple improvement in a fitting method could produce an improvement in sports bra functionality. It is important to reiterate that due to the disparity of size and shape of the subjects it is unlikely that each of the bras performs the same on each of the subjects. Progressive believes that it is important to design a sports bra that fits the client and not to try to fit the client into a highly limited number of pre defined sizes.

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## **Part 3 Patent Collection**

### **Extract**

Although it is common practice to do a thorough patent search during idealisation of concepts, an overview of the area has been considered in this document. What becomes apparent to the reader is that the intellectual property (IP) surrounding sports bras is varied and crowded, with similar patents appearing from time to time.

The patents concern specific detailing (such as fasteners etc) in addition to more global concepts regarding garment make up. A number of examples of the patents identified follows. These are by no means exhaustive and may act to inspire new ideas or provide a reference for further patent searches but no more.

As and when new ideas are created by the team it is expected that separate and focused patent searches and prior art searches be conducted.

Much of the patent content described in this document has not been commercialised into recognisable or related product. However, some points to product currently in the market place. Some of the patents will remain in force while others will have lapsed or failed to reach granted status. The report does not provide this detail. If such detail is required specific searches must be performed.

Searches have been performed using Google Patents, EspaceNet and the US Patent office platforms.

The document is provided as a general review document for quick reference and ideation inspiration!

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5.16 Item of clothing with built in support

## **Part 4 Study – Sports Bra Construction, Performance and Comfort Relationships**

### **Extract**

This study aims to investigate the relationship between soft tissue kinematics and sports bra construction. Studies have shown that breast movement during exercise causes user discomfort in >56% of subjects, and that breast support during exercise is shown to improve user comfort.

Tensile testing was used to assess a selection of market available bra constructions and to find the moduli of key sports bra components (cup, strap, underband, points of attachment). The findings were that variation existed between all bra styles within the component groups.

One subject (bra size 34C) tested seven bra constructions from the previous set during running at 10km/hr using an active marker CODA motion analysis system. It was found that cup, underband and strap characteristics may have a statistically significant relationship with breast motion, and that poor support and poor constructions lead to user discomfort. Three

component groups were identified from this testing as potentially having a significant effect on breast motion and user comfort.

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