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Study on effects of circular seam on drape of silk apparel fabrics

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Abstract

Drape is unique property that necessitates a fabric to be bent in more than one direction describing a sense of graceful appearance. Silk fabrics world over are known for their unique functional and aesthetic properties. Sewing is an important garment ensemble method. Fabric drape is more realistically investigated by considering seams. At present research in the area of Silk fabric seaming and study of drape is minimal. This paper presents a fundamental drape analysis of seamed fabrics, using cusick's drape meter. Apparel plain silk fabrics with various GSM values are given circular seams. The effect of seam positioning is investigated experimentally. This investigation may be used as an aid to garment drape prediction for clothing CAD system and help improve apparel design.

1.INTRODUCTION

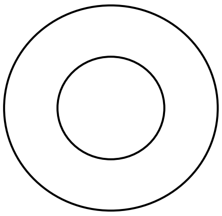
Drape refers to the manner in which fabric falls due to its weight from a support, be it human or object. Silk fabrics are known world over for their sheer properties and luxury tag. Draping property of fabrics is influenced by fiber and fabric related factors. Drape of a fabric in its entirety as felt by the onlooker is the combined result of various elements like-----**Fabric:** Material, process, finishing, **Pattern:** Type of garment pattern with style features**, Anatomical:** Small frame, Medium frame, Large frame of the wearer.

Garmenting is the conversion of fabric pieces into wearable ensembles. Most of the drape study concentrated on fabric drape without considering the garment conversion techniques. Seaming is the most common method of joining fabric pieces to convert them into garments.

Study on silk fabrics and seams in minimal. Three dimensional drape studies by Chu[1] established a measuring method for fabric drape. Chu quantified the drapeability of the fabric into a dimensionless value he called "drape coefficient." Finally, Cusick[2] investigated the experimental method by using a parallel light source that creates the drape shadow of a circular specimen from a pedestal on to a piece of ammonia paper. He also modified the calibration of Chu's drape coefficient in terms of paper weighting method. Investigating the effect of seams on fabric drape has a significant value for textile and garment industries. A real seam sewn on a fabric is the best method for studying its effect on fabric drape,

In this study, we investigate the effect of real seams on fabric drape of silk fabrics, using Cusick's drapemeter. We study circular seams sewn on to fabric specimens (ASTM D6193-92(2004) Standard practice for stitches and seams.). A circular seam is a plain seam sewn around a circular specimen with radius from the specimen's center. It drapes in a direction parallel to the circumference of the pedestal (Fig-1).

We discuss the seam allowance and seam position contributing to the drape behaviour of fabrics. We use plain silk fabrics in various GSM values and present the experimental results in terms of drape coefficient, drape profile and node analysis.



(Fig. 1. A circular seam whose seam circumference is determined by varying seam radius

2 MATERIALS AND METHODS

2.1 Materials

Cusick's drapemeter as per BS 5058/1973

Cusick's drapemeter measures three-dimensional fabric drape due to gravity. The experimental method involves hanging a 15 cm radius fabric specimen over a 9 cm radius supporting disc. A parallel light source inside the drape box casts a shadow from the draping specimen onto a piece of ammonia paper; the shadow pattern on the paper can be highlighted when the paper is treated with ammonia vapour and drape coefficient (DC%) can then be calculated. In cusick's modified formula, the drape coefficient is defined as the percentage of the paper weight from the drape shadow W2 to the paper weight of the full specimen W1. The formula is shown in dimensionless quantities in equation 1:

$DC\% = W2/W1 \times 100$— (1)

A Usha Industrial sewing machine 8700/5590 was used for sewing seams in all the tests. Simple 101 class superimposed stitch was used, as it is easy and widely used stitch. As per D6193-97(2004) – Standard practice for stitches and seams

Sewing needle best suited for the fabrics was used –Microtex with a thin shaft, and a slim, sharp point, as these needles were good for light weight to medium weight woven fabrics. The needle size was chosen to suit the thread so that we get good stitch. Needle number 100/16 was used.

Pick Glass for Fabric EPI/PPI was used as per ASTM D3775.

GSM values (Grams/Sq meter) of all the test samples were investigated as per ASTM D3776-96 (2002)
Plain silk apparel fabrics available in the market (Mulberry/Tasar//Muga) with varying GSM values were used for investigations.

Sewing thread - We selected the thread to match the fabrics/project i.e A polyester ply yarn was used which is of 26 Tex in the medium weight. The colour was blue which can contrast with most silk fabrics when sewn.

2.2 Methods

Investigations of fabric geometric parameters of experimental specimens were done, pure plain woven silk fabrics available commercially and few experimental fabrics with varying GSM values were collected. Fabric geometric parameters like EPI, PPI, GSM and thickness were investigated and recorded (Table-1)

All specimens were ironed at standard temperature and all were conditioned at 27°C and 65 % RH for 24 hours before testing.

Table-I. Fabric construction particulars.

Sample No	Fabric	Construction	EPI	PPI	GSM	Thickness. mm*
S1	Mulberry,Silk(100%)	Plain	110	100	78	0.18
S2	Tasar	Plain	86	44	44	0.10
S3	Mulberry, Taffetta Pink	Plain	102	102	93	0.20
S4	Mulberry,Taffetta Yellow	Plain	136	102	84	0.16
S5	Mulberry,Soft silk white	Plain	138	124	40	0.09
S6	Mulberry,Dupion-1	Plain	116	104	86	0.17
S7	Mulberry,Crepe-1	Crepe	95	95	76	0.29
S8	Mulberry,Chiffon-W	Plain	184	162	33	0.14
S9	Mulberry,Satin-Sateen-B	Satin-sateen	126	96	150	0.40
S10	Mulberry,Raw silk	plain	128	72	40	0.16
S11	Tassar-Degummed	plain	128	92	43	0.11
S12	Mulberry,Sateen	Sateen	204	122	114	0.28

S13	Muga	Plain	104	98	56	0.15
S14	Tasar Reeled	Plain	94	64	87	0.20
S15	Mulberry,Satin-Sateen-G	Satin-sateen	115	106	138	0.25
S16	Eri	plain	85	70	59	0.13

*Thickness at pressure of 16.3 g/cm.cm

We intend to investigate the effect of real seams on fabric drape using Cusick's drapemeter. We study circular seams sewn onto fabric specimens (ASTM D6193-92(2004) Standard practice for stitches and seams.) A circular seam is a plain seam sewn around a circular specimen with a radius from the specimen's center as shown in Fig. 1.

We designed two tests for circular seams. The radius of each round seam was measured from the specimen's center and the specified radii were 7 and 11 cm. (No seam as 0 cm radius) The seam allowance was fixed at 10mm.The sewing method for each seam was to cut up the fabric and then sew the pieces together. All experiments used the drapemeter with a 6.5 cm radius hanging disc and a 13cm radius Cusick paper disc. There were three fabric samples for each lot and the results are presented in terms of drape coefficient, drape profile and node analysis.

3 Results and Discussion

3.1 Effect on DC% fabrics with circular seams

According to figure 2,3 and 4,the drape coefficient of light weight fabrics initially increase with an addition of seam but show decrease when the seam is moved away from the center. This is because the seam located almost at the center of the draped cloth initially straightens the cloth but with seam at the periphery adds to its weight and hence the decrease in DC%. Exactly opposite is observed with heavy weight fabrics, initially with a seam near the center, it reduces the drape but when the seam is moved away from the center it straightens out the fabric and show increased DC%. Medium weight fabrics show continuous increase in DC% with both seams as the fabrics tend to be stiffer with a seam.

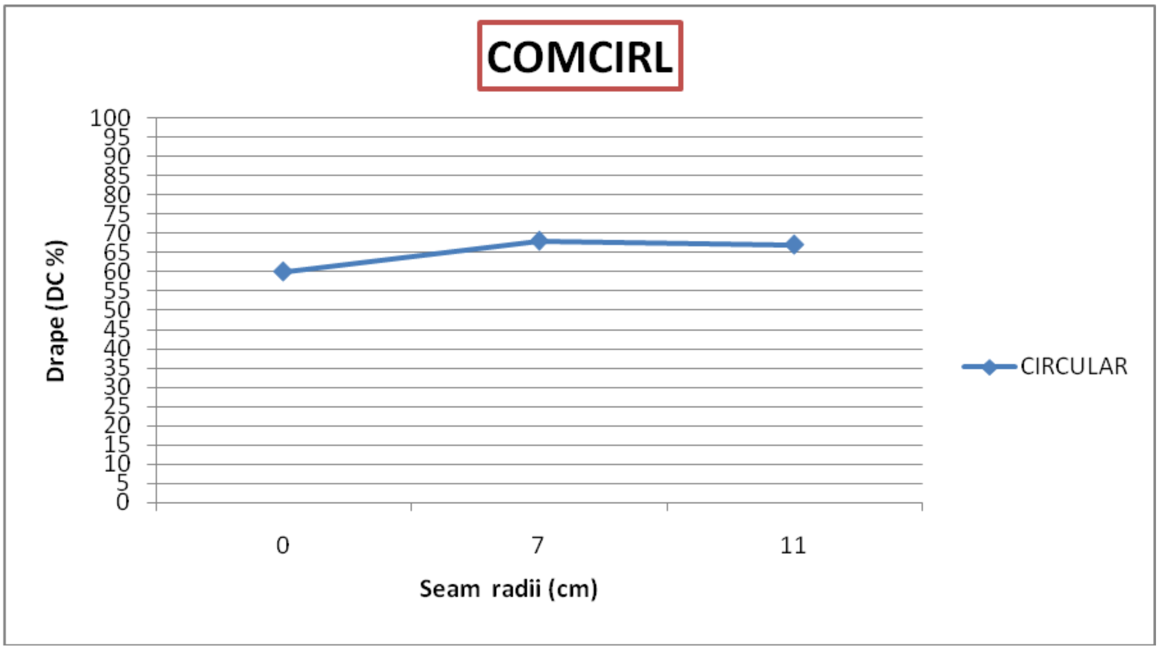


Fig. 2 Drape coefficient of a circular seam, for light weight fabrics in various seam radii.

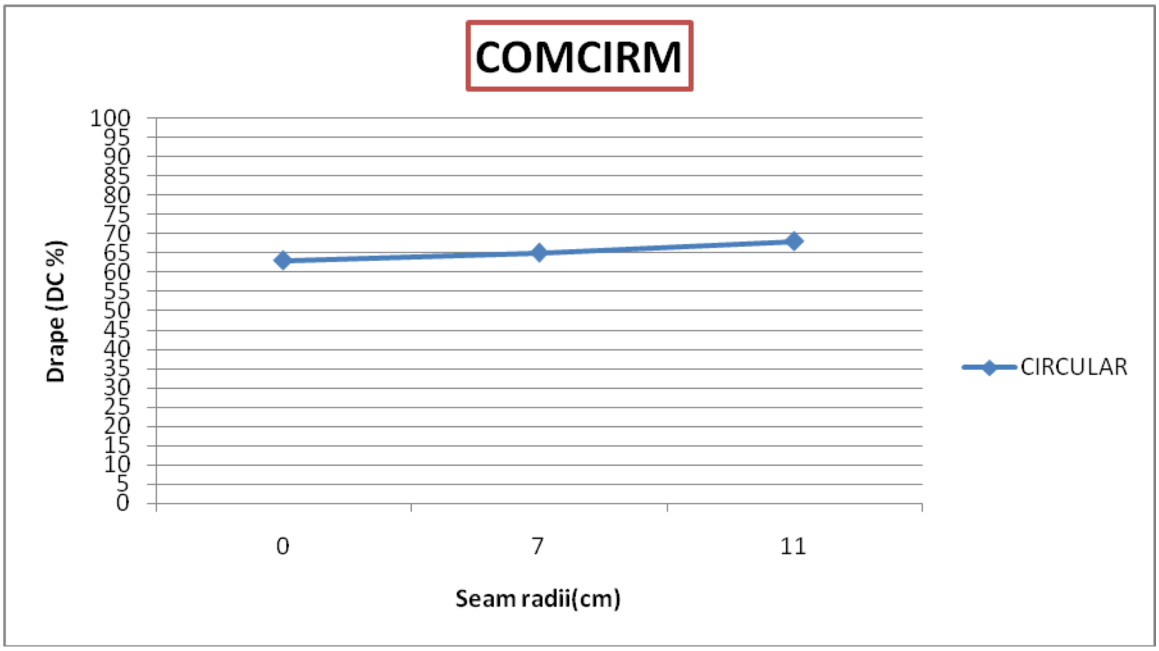


Fig. 3 . Drape coefficient of a circular seam for medium weight fabrics in various seam radii.

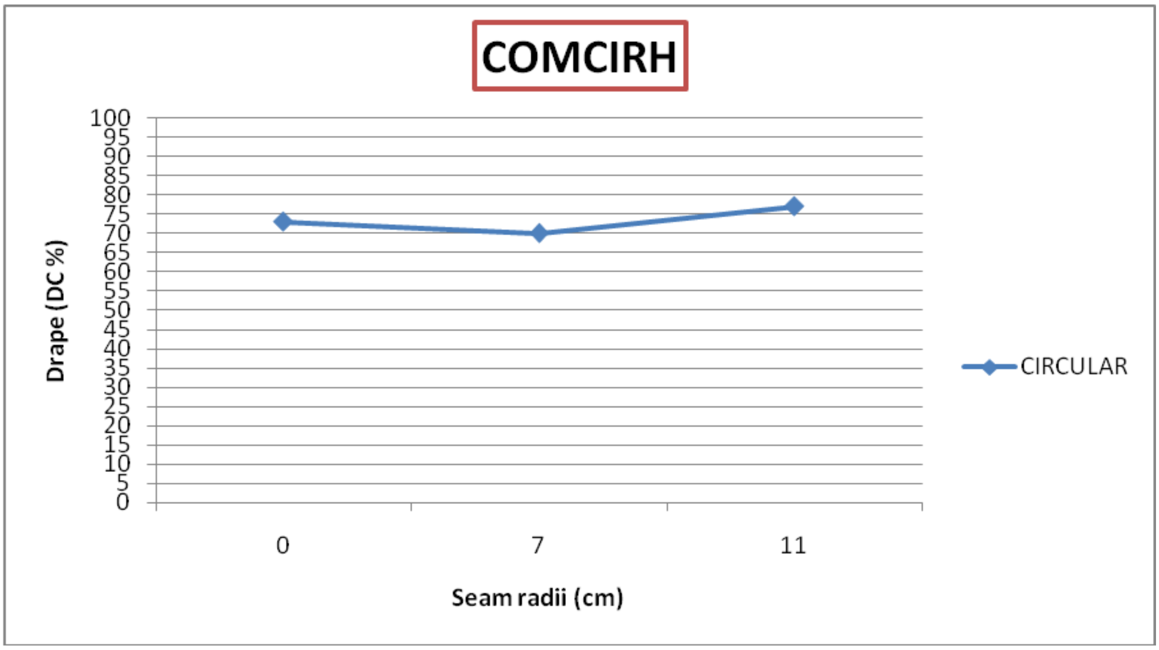


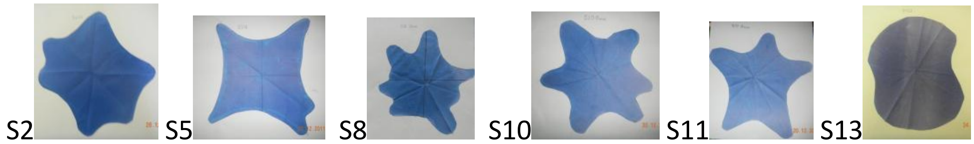
Fig.4 Drape coefficient of a circular seam, for heavy weight fabrics in various seam radii.

3.2 Effect on Drape Profile of Fabrics with circular Seams

Number of nodes more or less remains constant and there is no consistent change of node number as seen from the Table 2. Profiles for light weight fabrics, with introduction of a seam show rearrangement of nodes, but changed seam position do not alter the profile appreciably as seen from Figure 5.Profiles for medium weight fabrics also more or less follow the same trends as those of light weight fabrics as seen in Figure 6 . Profiles for heavy weight fabrics almost retain the same nodes and profiles with an introduction of 7cm seam, but with seam when taken away from the center show disturbed profile as seen from figure 7.

TABLE 2. Number of nodes with circular seams at a distance of various radii from center

Radial distance in cm	Light weight fabrics	Medium weight fabrics	Heavy weight fabrics
0	6	6	6
7	5	6	6
11	5	5	6



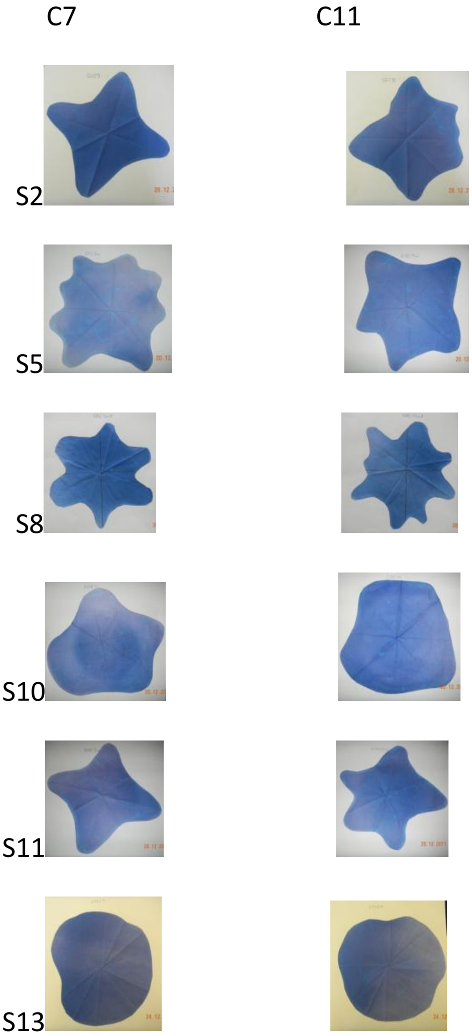
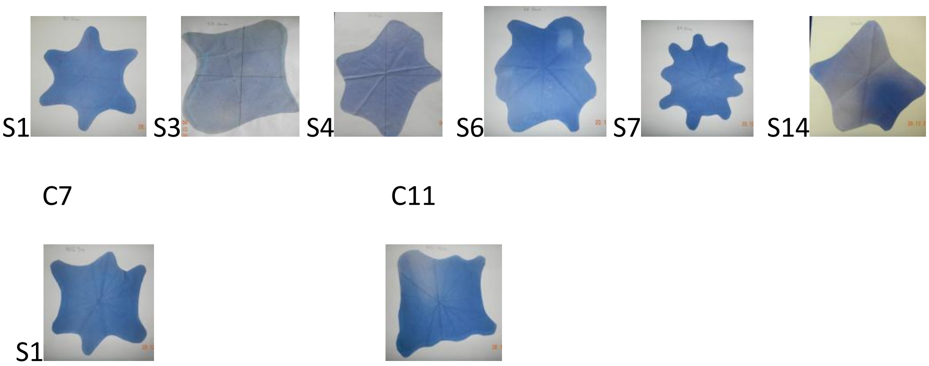


FIGURE 5. Zero Drape profiles of Light weight fabrics Vs Circular seams(7 cm/11cm)



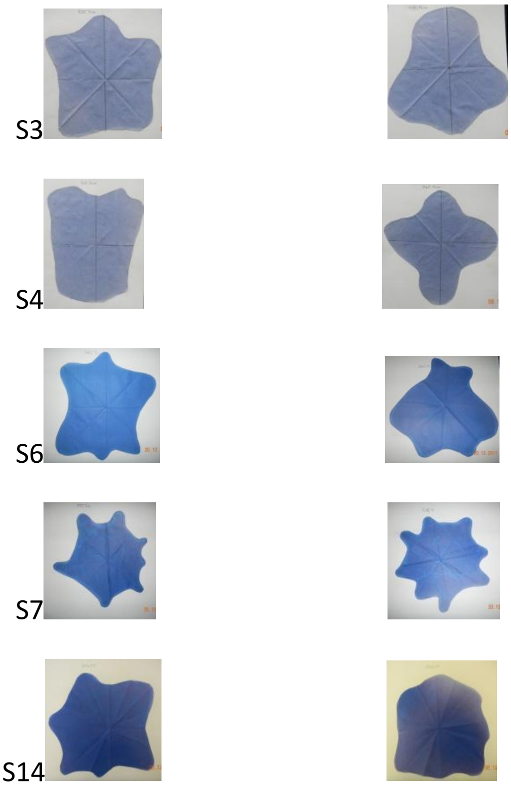


Fig. 6 Zero Drape profiles of Medium weight fabrics Vs Circular seams(7cm/11cm)

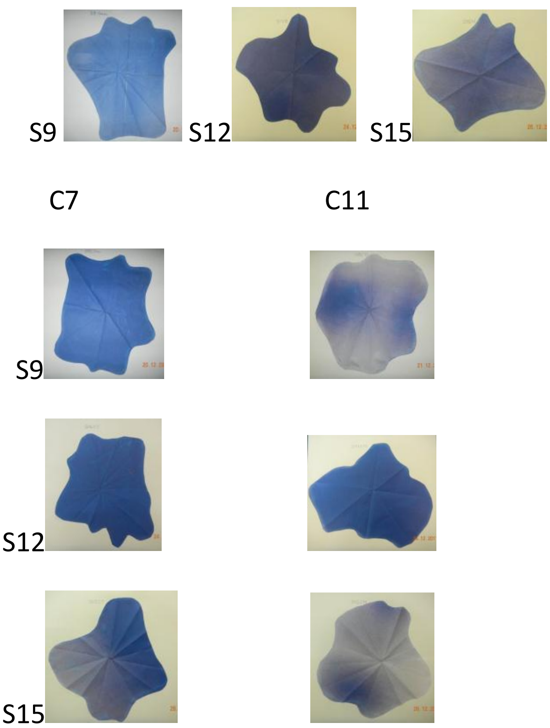


Fig.7 Zero Drape profiles of Heavy weight fabrics Vs Circular seams (7 cm/11cm)

4 CONCLUSIONS

In this paper we have highlighted an experimental investigation into the drape behaviour of silk fabrics with circular seams using Cusick's drapemeter.We have studied the effects of seam positioning on the drape behaviour. Varying position of a circular seam show varying effects on DC% of light and Heavy weight fabrics but medium weight fabrics show gradual increase in DC%. Drape profiles more or less show consistency with changed seam positions for light and medium weight fabrics but heavy weight fabrics show disturbed profile. Our investigation of fabric drape for silk apparel fabrics with seams has a significant value for both textile and garment industries because it provides a realistic drape study with respect to garment appearance.We believe that the results can be applied to computer simulations of drape in the silk apparel industry.

REFERENCES

1 Chu , C.C, Cummings, C.L and Teixira, N.A.Mechanics of elastic performance of textile materials. Part V: A study of the factors affecting the drape of fabrics. The development of Drape Meter. Text. Res.J. 20 539 (1950)

2 Cusick, G.E.The measurement of fabric drape, J.Textile Inst. 59(6) 253 (1968)