LONGITUDINALLY STRIPED FABRIC DESIGN WITH A MODIFIED WEIGHT

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Abstract: *There are cases when the mass of woven fabrics requiring amendment intervening in the internal structure of the fabric, the reason most often for economic reasons, but also for the diversification by look.*
The internal structure of striped fabric obtained by combining groups wire ties, densities and / or different fineness creates a specific case on change of fabric weight.
Each stripe is a woven fabric whose features differ, in some cases significantly to the bars side by side. This is the reason why the change of mass of such a woven fabrics, it is not so simple as in the case of fabric with a uniform structure.
Changing the whole of the fabric weight can be done by changing the mass of each partial woven fabrics.The proposed method for mass modification consists in identifying and determining the partial structural fabric components and their mass change. To change the mass densities chosen method which involves designing a woven fabrics with weft yarn density, so the fabric assembly reference model resulted in a new woven fabric with a mass change After studying the structural features of these fabrics, and methods used to design woven fabrics with weight change , it has been found that there are other ways to solve this problem they known by has can achieve the same results but the simplest way.

Key words: *woven fabrics, structure, longitudinal stripes, features, density, fineness*

1. INTRODUCTION

Thus, the following describes a new method and algorithm of the design striped fabric obtained by combining by ties, densities and / or different fineness re both by content and by design are fully original and is something new in this domain.[1-4]

Next we will show a concrete example applied to a woven fabric whose characteristics are known. It take over the benchmark fabric density and length of the yarn systems and other characteristics required for calculation of the ratio by related components and the fabric weight.

It is proposed to change its mass by increasing the e=10%

The calculation of the re-design of the fabric to the mass change was made by applying the algorithm and the method described to obtain the results as shown in:

2. FABRIC CHARACTERISTICS BENCHMARK

- width: - stripes: L1=79,4
  L2 = 57,2 cm
  L3 = 10,4 cm
  $$l_f' = \sum Li = 147cm$$
  - edges : lm =30 cm
  - finite: lf = 150 cm

2.1. The density of yarn length:

- warp; from the fund Ttui Ttu1= 20tex

Ttu2=Ttu3= 10x2 Tex
From edges: Ttum = Ttu1 = 20 tex
- weft: Ttb = 16,67 tex

2.2.Yarn density:
- warp; Pu1= 200yarns/10cm
  Pu2= 300 yarns /10cm
  Pu3= 500 yarns /10cm
- weft; Pb = 250 yarns /10cm

2.3.Yarn contraction;
- warp in stripesi; au1= 9,8%
  au2= 6,9%
  au3=5,9%
- the weft stripesi; ab1= 13,5%
  ab2= 11,6%
  ab3=9,8%
- medium abmed=12,5%

2.4 Loss or gain of weight;
pf=4%

2.5. Mass calculation of the fabric:

$$Mf = \left[\sum_{i=1}^{m} \frac{Li \cdot Pui \cdot Ttui}{100\left(100 - 9{,}8\right)} + \frac{Pb \cdot Ttb \cdot l'_f}{100\left(100 - abmed\right)} \right] \cdot \frac{100 \pm pf}{100} \quad \textbf{(1)}$$

$$Mf = \frac{79{,}4 \cdot 200 \cdot 20}{100\left(100 - 9{,}8\right)} + \frac{57{,}2 \cdot 300 \cdot 20}{100\left(100 - 6{,}9\right)} + \frac{10{,}4 \cdot 400 \cdot 20}{100\left(100 - 5{,}9\right)} + \frac{250 \cdot 16{,}67 \cdot 147}{100\left(100 - 12{,}5\right)} \cdot \frac{100 - 4}{100}$$

$$Mf = 144{,}6 g / m$$

2.6. Calculation of the bonded fabric weight

2.6.1.Weft plain

$$Mf = \frac{l'_f}{100}\left[\frac{Pui \cdot Ttui}{100 - au1} + \frac{Pb \cdot Ttb}{100 - ab1}\right] \cdot \frac{100 \pm pf}{100}$$

(2)

$$Mf = \frac{147}{100}\left[\frac{200 \cdot 20}{100 - 9{,}8} + \frac{250 \cdot 16{,}67}{100 - 13{,}5}\right] \cdot 100 \frac{100 - 4}{} = 130{,}6 g / m$$

Modified mass calculation

$$M' f1 = Mf1 \cdot \frac{100 + e}{100}$$

(3)

$$M' f1 = 130{,}6 \cdot \frac{100 + 10}{100} = 143{,}7 g / m$$

Calculation of density

$$P_1 = \frac{P_{u1}}{P_b}$$

(4)

$$P_1 = \frac{P_{u1}}{P_b}$$

Calculation of the warp yarn density stripe thickness

$$P'u1 = \left[\frac{100 \cdot M'f1}{l'_f\left(\frac{Ttui}{100 - au1} + \frac{Ttb}{p1(100 - ab1)}\right)}\right] \cdot \frac{100}{100 - pf} \quad (5)$$

$$P'u1 = \left[\frac{100 \cdot 143,7}{147\left(\frac{20}{100 - 9,8} + \frac{16,67}{0,8(100 - 13,5)}\right)}\right] \cdot \frac{100}{100 - 4} = 220 \; fire/10cm$$

Calculation of density by weft yarn

$$Pb1 = \frac{Pu1}{P1} \quad (6)$$

$$Pb1 = \frac{220}{0,8} = 275 \; fire/10\,cm$$

2.6.2 The twill D 2/1

$$Mf2 = \frac{l'_f}{100}\left[\frac{Pu2 \cdot Ttu2}{100 - au1} + \frac{Pb \cdot Ttb}{100 - ab2}\right] \cdot \frac{100 \pm pf}{100} \quad (7)$$

$$Mf = \frac{147}{100}\left[\frac{300 \cdot 20}{100 - 6,9} + \frac{250 \cdot 16,67}{100 - 11,6}\right] \cdot \frac{100 - 4}{100} = 157,5g/m$$

Modified mass calculation

$$M'f2 = Mf2 \cdot \frac{100 + e}{100} \quad (8)$$

$$M'f2 = 157,5 \cdot \frac{100 + 10}{100} = 173,2g/m$$

Calculation of density

$$P2 = \frac{Pu2}{Pb} \quad (9)$$

$$P2 = \frac{300}{250} = 1,2$$

Calculation of the warp yarn density stripe thickness

$$P'u2 = \left[\frac{100 \cdot M'f2}{l'_f \left(\frac{Ttu2}{100 - au2} + \frac{Ttb}{p1(100 - ab2)} \right)} \right] \cdot \frac{100}{100 - pf} \tag{10}$$

$$P'u1 = \left[\frac{100 \cdot 173,2}{147 \left(\frac{20}{100 - 6,9} + 1,2 \frac{16,67}{0,8(100 - 11,6)} \right)} \right] \cdot \frac{100}{100 - 4} = 330 \ fire \ /10 \ cm$$

Calculation of density by weft yarn

$$Pb2 = \frac{Pu2}{P2} \tag{11}$$

$$Pb2 = \frac{330}{1,2} = 275 \ fire \ /10 \, cm$$

2.6.3 Bond rips D 2/12

$$Mf3 = \frac{l'_f}{100} \left[\frac{Pu3 \cdot Ttu3}{100 - au3} + \frac{Pb \cdot Ttb}{100 - ab3} \right] \cdot \frac{100 \pm pf}{100} \tag{12}$$

$$Mf3 = \frac{147}{100} \left[\frac{400 \cdot 20}{100 - 5,9} + \frac{250 \cdot 16,67}{100 - 11,6} \right] \cdot \frac{100 - 4}{100} = 186,5 \, g \, / \, m$$

Modified mass calculation

$$M'f3 = Mf3 \cdot \frac{100 + e}{100} \tag{13}$$

$$M'f3 = 186,5 \cdot \frac{100 + 1}{100} = 205,15 \, g \, / \, m$$

Calculation of density

$$P3 = \frac{Pu3}{Pb} \qquad P3 = \frac{400}{250} = 1,6 \tag{14}$$

Calculation of the warp yarn density stripe thickness

$$P'u3 = \left[\frac{100 \cdot M'f3}{l'_f \left(\frac{Ttu3}{100 - au3} + \frac{Ttb}{p1(100 - ab3)} \right)} \right] \cdot \frac{100}{100 - pf} \tag{15}$$

$$P'u1 = \left[\frac{100 \cdot 205,15}{147 \left(\frac{20}{100 - 5,9} + \frac{16,67}{1,6(100 - 11,6)} \right)} \right] \cdot \frac{100}{100 - 4} = 440 \ fire \ /10 \ cm$$

Calculation of density by weft yarn

$$Pb3 = \frac{Pu3}{P3} \quad \textbf{(16)}$$

$$Pb3 = \frac{440}{1,6} = 275 \, fire/10cm$$

The Compliance Test for the weft system

$$\frac{Pu_1'}{Pu\ 1} = \frac{Pu_2'}{Pu\ 2} = \frac{Pu_3'}{Pu\ 3} \quad \textbf{(17)}$$

$$\frac{220}{200} + \frac{330}{300} + \frac{440}{400} = 1,1$$

The Compliance Test for the weft system

$$Pb1 = Pb2 = Pb3 = 275 \, fire/10cm \quad \textbf{(18)}$$

The Compliance test for the mass

$$Mf = \frac{l'_f}{100}\left[\frac{Lui \cdot Pui \cdot Ttui}{100 - au1} + \frac{PbPb \cdot Ttb}{100 - ab1}\right] \cdot \frac{100 \pm pf}{100}$$

$$Mf = 159,4 g/m \quad \textbf{(19)}$$

$$Mf = \frac{100 \cdot Mf}{100 \pm e} = \frac{100 \cdot 159,4}{100 + 10} 144,9 \ g/m$$

Calculating the number of reports related to the width lf

$$NR = \frac{l'_f}{Lru} = \frac{147}{5,6} = 26,25 \, cm \quad \textbf{(20)}$$

Calculating the width of the stripes for liaison

$$li = \sum_{i=1}^{n} l_{ij} \rightarrow l1 = l11 + l12 = 2 + 1 = 3cm$$

$$l2 = l21 + l22 = 0,72 + 1,45 = 2,17 \, cm \quad \textbf{(21)}$$

$$l3 = l31 = 0,45 \, cm$$

$$Lru = 5,62 \, cm$$

Calculation of the total width of the bonded stripes

$$
\begin{aligned}
Li &= li \cdot Nr + r \\
L1 &= 3 \cdot 26 + 0,45 = 78,45 \\
L2 &= 2,17 \cdot 26 = 56 \\
L3 &= 0,45 \cdot 26 = 11,81 \\
\sum Li &= 147 \ cm
\end{aligned} \qquad (22)
$$

3. CONCLUSIONS

Changing the whole of the fabric weight can be done by changing the mass of each partial woven fabrics.The proposed method for mass modification consists in identifying and determining the partial structural fabric components and their mass change.[5-6] To change the mass densities chosen method which involves designing a woven fabrics with weft yarn density, so the fabric assembly reference model resulted in a new woven fabric with a mass change.

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