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Garment Marker Planning – A Review

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Abstract
After receiving the order for garment manufacturing, the first crucial step of the pre-production process is the marker planning. In manufacturing a garment, fabric cost constitutes to more than 50% of the total garment cost. As the profit margins of the garment companies are very less, it is of utmost importance to use fabric efficiently and reduce fabric wastage. This is achieved in the marker planning section of the garment manufacturing process. Marker planning is one of the most important pre-production steps of garment production. A highly efficient marker plan increases the fabric utilization in the garment industry, which in turn increases the overall profit of the garment industry. A poorly planned marker leads to a lot of fabric wastage and adds to the loss of the industry. This paper reviews about the different types of marker planning methods like manual and computerized, factors affecting marker planning, unavoidable fabric wastages and factors affecting marker efficiency and its calculation.

Keywords
Marker, Marker Planning, Fabric Wastages, Fabric Utilization, Marker Efficiency, Short Marker, Long Marker

I. Introduction

Marker making is the process of determining the most efficient layout of pattern pieces for a particular style of fabric and size distribution. It is the process of plotting all the pattern pieces for all the sizes of a particular style of garment on a thin piece of paper, known as the marker paper, in such a way that maximum fabric will be used and minimum fabric will be wasted (figure 1).

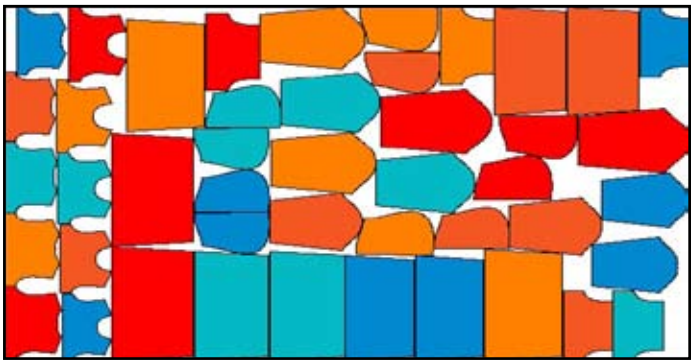

Fig. 1: Example of a marker plan

II. Methods of Marker Planning

In a garment industry, marker planning is done by two methods 1. Manual method (fig. 2) and 2. Computerized method (fig. 3). Now-a-days mostly Computer Aided Designing (CAD) systems are used for marker planning, but still in certain cases where there are complicated patterns on the fabric, manual marker planning method is more preferred. Marker planning with CAD systems increases the accuracy, increases control over variables and reduces time required in making markers.

In manual method of marker planning, marker making is done by an efficient marker maker. It depends on the marker makers efficiency and expertise, that how efficiently marker planning is done. Manual marker making can be done by either drafting full size patterns on a marker paper and then placing the marker on the fabric spread or by preparing miniature patterns reduced to 1/5th of the original size and then reproducing the patterns on the fabric spread. Marker making using the latter has the advantage of higher marker efficiency, since the control over the marker is better than the full size patterns.

The major advantage of this method is that it can be used for all types of fabric designs. Virtually this method has no limitation. But as this method involves an operator, it is also accompanied with many disadvantages. The main disadvantage is that it is highly time consuming and requires a great deal of space, since the marker maker follows trial and error method for getting the best marker plan. Also, this method is more prone to errors and inconsistencies. The labor cost for this method is also very high; hence it is an expensive method.

Fig. 2: Manual marker planning

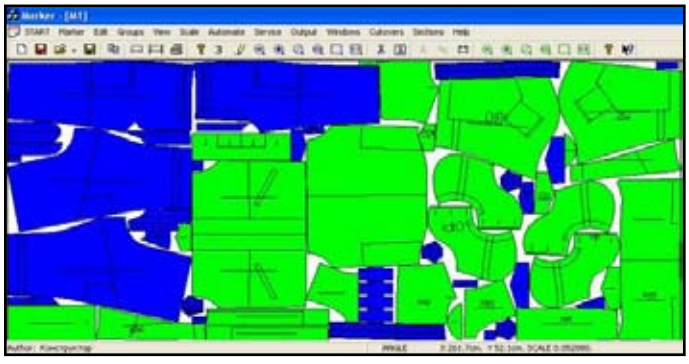

Fig. 3: Computerized marker planning

In computerized method of marker planning, first production pattern is entered in the memory of the computer by using digitizer or by scanning of the manually prepared patterns and then full size production patterns are stored in the memory of the computer. Now-a-days, CAD systems have inbuilt directory of various pattern pieces which makes the marker making less skilled and

less time consuming. Also with the advancement of technology, even calculation of marker efficiency is done simultaneous as the pattern pieces are placed on the marking area.

CAD systems are now available in two forms: 1. Automatic marker making, in which the system itself gives out the most efficient marker plan, and 2. Interactive marker making, in which the operator has the freedom to place the marker places as per his skills, system acting as a support tool in case of any errors.

The main features of this method are that it is highly accurate, highly efficient and requires less time. All the parameters can be entered before hand in the system which makes planning a lot easier. CAD systems have inbuilt protective devices which ensure the grain line alignment and prevent overlapping of pieces. Even they give a rough estimate about the cost of fabric that is being utilized prior to line adoption. Its only drawback is that the initial invest is too high for a small scale manufacturing unit.

III. Constraints of Marker Making

The main aim of any marker planning method is to make the maximum utilization of fabric and reducing the wastage. To achieve this, a marker planner has to consider following five factors before marker planning:

Grain Line: Hang and drape of a garment depends on the matching of grain line. To maintain the grain line is one of the biggest constraints to achieve higher marker efficiency. If the grain line is not properly matched, then the drape of the garment will be affected. Maintaining the grain line though being a tough job is possible but the fabric wastage becomes higher. (fig. 4)

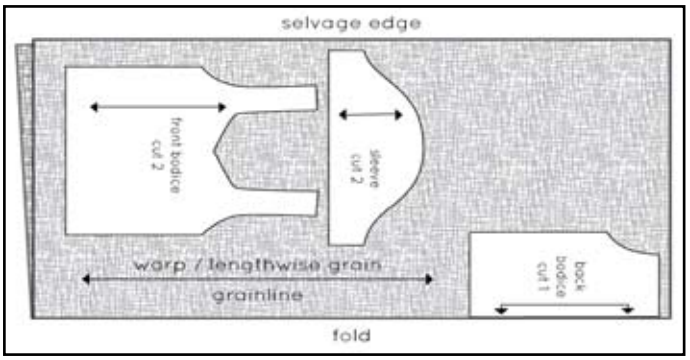

Fig. 4: Fabric grain line and pattern pieces

Fabric Characteristics: Special attention is required to set pattern pieces on the asymmetrical fabric, such as pile fabric, special prints, etc. In symmetric fabric, the constraint of grain line is minimized, whereas for an asymmetric fabric, it becomes very difficult for the marker maker to match the grain line and hence efficiency is reduced.

Garment Design: Garments from check or stripe fabrics require matching of check or stripes in the adjacent garment parts. The pattern pieces may miss the designs or may overlap the designs if the garment design in not kept in mind while marker planning.

Cutting Quality: Marker is an indication for the cutter during cutting of garment pieces. The marker should be carefully made so that cutting blade can move easily on the fabric spread. Closely spaced pattern pieces on marker plan, increases the risk of improper cutting of the pattern pieces. Also it restricts the movement of cutter and the type of cutter that can be used for cutting the pattern pieces.

Production Planning: A single marker contains pattern pieces of different sizes which are not in the exact same proportion. The marker planner has to take in to consideration the number of garments to be produced, number of pieces in each garment, different types of sizes to be produced, fabric thickness, length of the spreading table, type of cutter available, etc. Two types of markers are available: i) Short marker: useful when the size of the cutting table is small, two or more markers are prepared to accommodate all pattern pieces, consumes less time in preparing a marker, and ii) Long marker: it can accommodate all pattern pieces in a single marker, hence it is more efficient and takes more time.

IV. Points to be considered before Marker Planning

Following points should be considered before marker making (fig. 5):

1. During marker making it should be followed that fabric width must be higher than marker width (Bn) (At least ½ inch).
2. Fabric length must be higher than marker length (Ls) (At least one inch).
3. Marker width should be taken according to the fabric width and fabric spreading must be done by taking the guideline from the marker length.
4. When garment pattern pieces are laid down on the layer of fabric, in that time the grain line must be parallel to the line of warp in a woven fabric and wales in knitted fabric. It should be noted here that, when pattern pieces are laid down across the layers, then the line is kept parallel to the weft for woven fabric and course in knit fabric.
5. All the pattern pieces of a garment should be along the same direction when laid down on an asymmetric fabric.
6. During marker making, length of fabric cutting table should be considered.
7. Plan for garment production should also be considered during marker making.
8. During marker making, marker should be started with the large pattern pieces. Then fits the smaller pieces in the gap of larger pieces. In this way, fabric wastage is minimized and marker efficiency is also increased.

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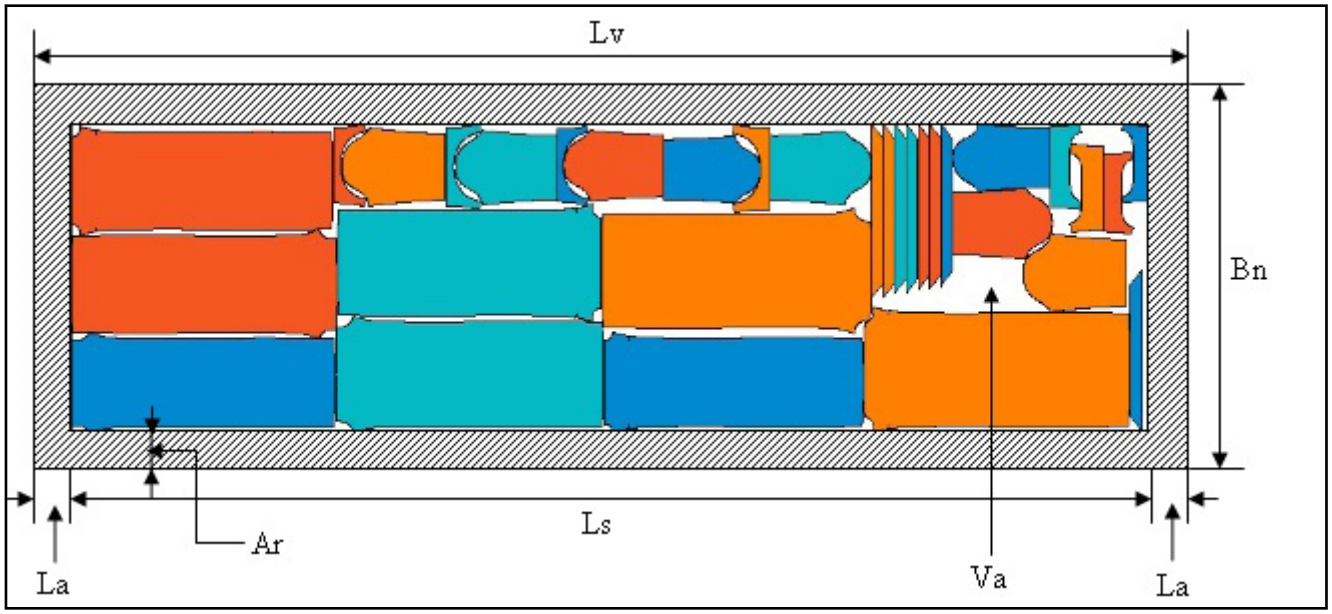

Fig. 5: Details of a marker plan

9. In the last step of marker making, all the patterns are shuffled in various directions to reduce the marker length. It also helps to increase the marker efficiency.

In figure 5,
La = End allowances, i.e. allowances at the beginning and end of a layer;
Lv = Lay length, i.e. marker length + end allowances;
Ar = Edge allowance, i.e. allowance at the fabric edge;
Va = Cutting loss, i.e. waste from within the lay plan;
Bn = Usable width, i.e. cloth width – edge allowance; and
Ls = Marker length

V. Marker Efficiency

Success of marker planner is measured from the efficiency of marker plan. Marker efficiency is defined as "a ratio of area of marker used in a garment and area of total marker." If the marker efficiency is high the fabric wastage will be less and vice versa.

VI. Calculation of marker efficiency

Calculation of marker efficiency can be done either by using the area of pattern pieces and the fabric spread or by using the weight of the cut pattern pieces and the total weight of a single layer of fabric spread.

$$Marker\ Efficiency\ (\%) = \frac{Area\ of\ Pattern\ in\ the\ marker\ plan}{Total\ area\ of\ marker\ plan} \times 100$$

A CAD system automatically calculates the total area of garment pattern pieces placed in a marker, i.e. the fabric consumed by the garment pattern pieces. Total marker area can be calculated by multiplying marker length with the marker width. In manual marker, it is difficult to measure the surface area of garment patterns in a marker. Mechanical devices like planimeter can be used to calculate surface area of pattern pieces, but it is a very time consuming process.

$$Marker\ Efficiency\ (\%) = \frac{Weight\ of\ fabric\ consumed\ by\ pattern\ pieces\ in\ marker}{Total\ weight\ of\ the\ fabric\ under\ the\ marker\ area} \times 100$$

To calculate weight of garment parts cut one layer of fabric according to markers and weigh all garment parts that are included in a marker. Total weight of the fabric under the marker area can be measured by simply weighing one layer of fabric spread over the marker area.

VII. Factors related to Marker Efficiency

Marker Planner: Marker efficiency dependents on experience, honesty, sincerity, trial and technological knowledge. The more, the number of markers, the more is the possibility to get higher efficiency.

Pattern Engineering: Marker efficiency can be increased by changing the pattern according to the rule. Such as a big component can be divided into two parts. This will help to save the fabric wastages.

Size of Garments: The more the number of the pattern sizes is including, the more possibility to get more efficiency.

Marker Length: Higher marker length, higher the efficiency. It can also help to increase the production of cutting room.

Fabric Characteristics: Symmetrical fabrics are those which are similar in all directions. Marker efficiency is good in those types of fabrics. However, marker efficiency will be less for asymmetrical fabrics.

Marker Making Method: We can generally make markers by two methods. They are manual and computerized. Computerized marker is more efficient when it is done interactively with the planner so marker efficiency varies from method to method. Sometimes a skilled operator can make more efficient marker than computer.

Marker Width: The more the fabric width, the easier to plan or make marker which will increase the efficiency.

Style of Garments: There are some garments which have only large patterns such as overcoat. If there are less number of small components, the marker will be less efficient.

VIII. Unavoidable Fabric Wastage

Some wastage in the fabric is such that it cannot be avoided. The buyer has to bear the losses for such wastage. Such wastages are:

Ends of Ply Losses:

Some allowances are needed in each piece of fabric during fabric spreading because of limitation of utilized machines. Usually 2" in each end and on each ply 4 inch wastages are unavoidable.

Loss of Fabric in Roll:

Fabrics usually come in roll form in garments industries. There are the limitations of fabric length in each roll. Fabric spreading is done according to marker length. As a result some wastage of fabrics is found at every roll. Thus we have to do splicing sometimes.

Selvedge Loss:

Each fabric has two selvedges. Mostly we do not place the pattern components over the selvedge. Thus approximately 3% fabrics are wasted along width. If the fabric is very expensive and extensible, we can save some fabric by wasting 2% along width.

Purchase Loss:

Fabric length is identified by fabric manufacturer and suppliers. Sometimes less fabric is wound than the exact amount in the roll so before purchasing the length should be measured and fabrics should be scoured only from the reputed manufacturer.

IX. Conclusions

Marker planning is one of the most important cost saving stages in the process of garment manufacture. Hence it is important that all the factors affecting marker efficiency which in turn is related to the fabric utilization should be considered. Computer Aided Marker Planning, though has high initial cost, should be preferred because of time saving and as it gives accurate and fault free marker plans. Efforts should be made to minimize the avoidable waste by selecting appropriate method of marker planning. Highly efficient CAD systems are now available in the market. The more the fabric saved, the more will be the profit margin of the industry.

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