Computer Applications in Fabric Defect Checking

The fabric is the base for the garment and it may have defects that may lead to rejection of garment if not eliminated. It becomes a costlier affair if the garment is eliminated because the cost involved in producing the garment, the raw materials used, the time, energy and manpower spent on the garment is high. In the fabric defect checking process the defects are identified and the defective parts or either eliminated or corrected. The inspection of the fabric is done prior to the spreading process or during the spreading process. In the first case the equipment is designed for identifying defects and in the second case, it is a part of the spreading machine.

The spreading machine moves across the table for spreading the fabric. During this process the spreading machines identify fabric defects. The defect identification is followed by creating a splice. Splice marks are marked on the edge of the spreading table prior to spreading. This serves as a reference mark to the marker and ensures that whenever a splice is created, the overlap of fabric is sufficient to complete the garment parts. How much fabric is wasted when a splice is made depends not just on the size of the fabric defect but the size of the garment

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panels in that part of the marker. But this is comparatively less than elimination of the garment.

If more time is available it is possible to move the position of the small fault to a place where there is no pattern. In this computerised marker plan the position of the faults can be easily identified.

In the modern textile mill, fabric or cloth is commonly tufted, woven or knitted in predetermined widths on high speed, automated looms and knitting machines. It is common on these machines the thread supplies in the machine may break, thus expensive stopping times. These stoppages often results in the yarn such as slubs, yarn irregularities and impurities of one kind or another. Similarly during weaving the stoppages in the loom may lead to irregularities. The dyeing and printing of fabric may also bring defects like shade variations and imperfect prints. In the modern world of fashion, people are more quality conscious and therefore fabrics has to be checked for its defects and removed in the fabric stage itself. It becomes a costlier affair when the defect appears on a sewn garment.

CAD in Pattern Making

System Description

Computer - A computer either desktop or laptop with specifications to suit a CAD program is essential. The display unit requires a higher resolution for picture clarity. It is nowadays common to have a LCD or LED screen for display.

Printer - A printer helps in taking print outs of the patterns in a smaller size while drafting the patterns or after completion of the pattern. These patterns can be circulated inside the house for approval and to check the proportions of the patterns with the style.

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Digitiser - This is essential if the pattern is drafted manually and is fed into the computer. This digitiser consists of a digitising working table and a free floating cursor. This digitiser converts the manual patterns into a digital pattern. In the digitising table, there is a fine network of wires similar to that of a graph paper which provides an extremely high resolution grid. The cursor has two hair line engraves on a viewing glass and the intersection of these line is used as the registering point. The manual pattern is placed on the digitising table and the cursor is placed along the outline of the pattern at regular intervals. The positions are registered as 'X' and 'Y' coordinate as and when the button in the cursor is pressed. This process is repeated on a number of points on a line so that the computer can determine the curves and end points of the patterns precisely.

Plotter - The plotter is a large size printer which prints the pattern in its original size. This can be used while cutting the fabrics. Some plotters have provisions for cutting the outline of the pattern either by cutting knives or by laser rays.

Software - Software is a program which controls and coordinates the functioning of the tasks in a computer. The patterns can be created using general purpose software or pattern making software. General purpose software includes AutoCAD, CorelDraw and similar software. Pattern making software includes TukaCAD, LectraCAD and GerberCAD and many more. The CAD software for pattern making also includes pattern grading and marker planning.

Information Flow for Pattern Making

The flow of information in Pattern making can be discussed under three stages

- Input of Data
- Data Processing
- Final Output

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Input of Data – The data refers to the set of measurements. Individual measurements can be entered in the computer using keyboard. In this case body measurements are taken manually by using a measuring tape. CAD software also provides standardised body measurements. Thanks to the technology, measurements can be taken with the computerised body measuring systems. These automatic systems operate by using scanning or photographic equipment linked to a computer. The person to be measured stands inside a chamber where he/she is scanned or photographed. The measurements taken in this way are more accurate and give more details about the body contours.

Data Processing – The procedures involved in the preparation of patterns with the set of body measurements is referred to as data processing. The patterns can be generated automatically by inputting a set of data or it can be created by an interactive method where the system operator creates the pattern from the scratch

Final Output – The patterns can be printed out in a smaller scale during or end of the process for verification and approval. The full size pattern is printed out using a plotter.

Process involved in Pattern Making - Patterns can be prepared in two ways – Drafting and Draping

1. Preparation of patterns using drafting method

This is a method of preparing patterns in the two dimensional form for a three dimensional garment. A garment is the result of joining of pattern pieces cut in the fabric. For drafting of the patterns, mathematical skill is essential. Computerised patterns can be evolved in one of the following ways

Method 1: Patterns can be created manually and the patterns can be transferred into the computer using a digitiser. In this case, the pattern master has skills in pattern making but lacks knowledge in computer operations. The digitiser

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consists of a digitising working table and a free floating cursor. This digitiser converts the manual patterns into a digital pattern. The details of process are given in the system description titled digitiser.

Method 2: The patterns are drafted directly in the computer using CAD software. The measurements needed for the patterns and the garment style is first decided. The software has a library where styles can be chosen. The patterns can be generated automatically once the set of measurements is fed. For new styles the patterns can be drafted in the computer using the drawing tools and editing tools. The following are the steps followed in drafting the patterns.

- A new file is created in the name of the pattern and the dimensions (cm, inches) are entered before the drafting of the pattern.
- The outline of the pattern is positioned on X and Y axis, and the grain line is also marked. If the pattern is placed vertically the grain line follows the Y axis and if the pattern is placed horizontally the grain line is positioned in the X axis.
- The pattern is created using the different shapes like rectangle, square and circle. Arc and spline is used for making armhole and similar curves. Some programs provide french curve for making curves. The pattern construction also involves editing of the lines and curves. Darts, pleats and seams can be added using special tools. Mirror tool helps in opening the patterns.
- The pattern details are added to the patterns in the final stage and the file is saved for further use.

Block Patterns

Initially block patterns or master patterns are created. This usually consists of bodice block, sleeve and skirt / pant. Modifications are made in the block patterns to suit the garment styles

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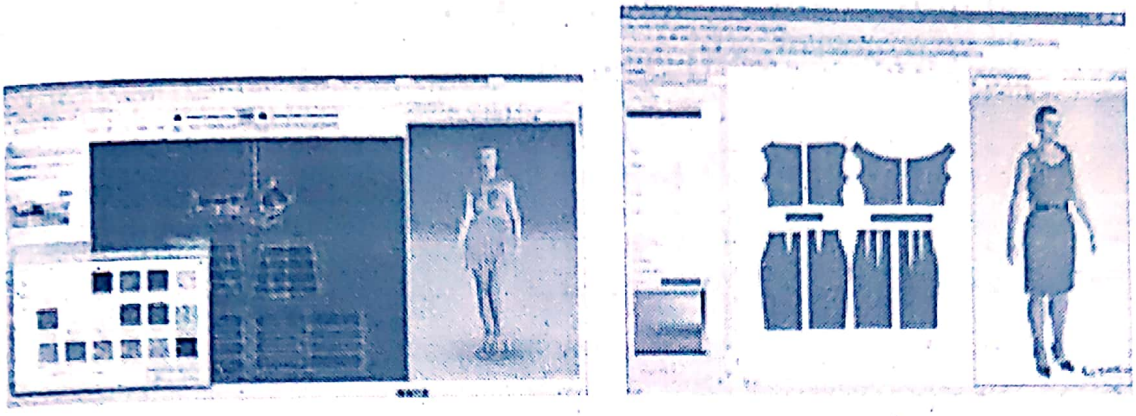
2. Draping Modelling



The pattern is draped on a model to check the fit of the garment. This is a latest development in the pattern making field. The pattern positions itself on the garment along the seam lines, portraying the final appearance of the garment. This final output can be texturised with a fabric sample / design taken from the design library or scanned from the sample fabric. If the garment is too tight or loose it can be seen on the computer itself. Alterations can be made in the patterns to get a perfect fit.

CAD in Pattern Grading

Pattern grading is a process of increasing and reducing the sizes from a master pattern according to a size chart.
System Description – same as pattern making

Information Flow

The stages of pattern grading can be discussed as follows

- Input of Data
- Data Processing
- Final Output

Input of Data – Grading of patterns is a process that follows pattern making. The patterns form the basic data for grading. The input of patterns can be done in two ways – by transferring the manual pattern into the system using a digitiser or by using the pattern that is drafted in the computer. The method of transfer

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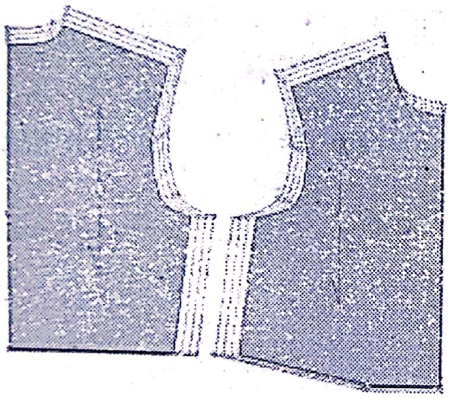
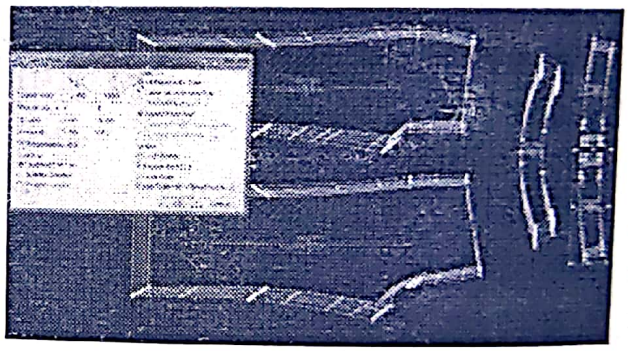
of manual patterns is explained under the pattern making. This stage also includes the range and the intervals of the sizes required the grade points and the grade rules. The computer in this stage should have a clear set of instructions for grading of patterns

Data Processing – The pattern grading is worked out as per the instructions given. The graded patterns can be generated in the computer once the data is entered. Grading technique requires great skill and craftsmanship, but it is simple and direct when performed by automation. Some cases the grading can be worked by the system operator, where the range and intervals may not be equal for all the sizes. The set of grading rules may vary within pattern sizes.





Final output – The graded patterns can be presented as individual components or in a nested form. The same can be presented in a miniature form or in a full scale. The printer is used for the output of miniature form and the plotter is employed for full scale patterns. Nested patterns refer to the presentation of all the pattern sizes as one set.

Process Involved in Pattern Grading

As defined earlier, pattern grading is increasing or reducing a sample pattern for a size chart. As mentioned earlier the data to be input for the grading process is the sample pattern, grading increment, grade point movement and grade rules. The sample pattern / master pattern / basic pattern / block pattern is also termed as production pattern. The sample pattern if made

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manually can be digitised into the computer. Computer generated pattern can be opened within the program.

Grading increment is the difference in measurement between two sizes, either in a size chart or a specific point in the pattern. Changes in body size takes place three dimensionally and therefore the increase or decrease in size takes place within the pattern area.

Grade points are positioned at the cardinal points of a pattern where the measurement to another size takes place. The horizontal movement is recorded as X-axis and the vertical movement is Y axis from a zero point that is stationary at the junction of the axis. The measurements are marked form the zero point in one of the four directions of +X, -X, +Y and –Y. The X axis usually represents the straight grain in a pattern and the direction of the warp yarn in the fabric and is also termed as grade reference line. The diagonal line movements can be in any one of the following directions (-X, +Y), (+X, +Y), (-X,-Y) and (+X,-Y).

Grade rules define the movement of the graded points. Each movement of the graded point in both X and Y direction is defined by a grade rule which is listed in the grade rule table. Once a grade point is assigned to a point on the pattern the computer automatically redraws the shape of the pattern piece by connecting the grade points. Example – For the following bodice pattern the pattern gradig rules are as follows

Rule at Point A, B, C, D, E for the S, M, L sizes is as follows

Point A	X	Y
S	0	0
M	0	0
L	0	0

Point B	X	Y
S	0.5	–0.5
M	0	0
L	–0.5	0.5

Point C	X	Y
S	–0.25	–0.5
M	0	0
L	0.25	0.25

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Point D	X	Y
S	–0.5	0
M	0	0
L	0.5	0

Point E	X	Y
S	–0.5	0.5
M	0	0
L	0.5	–0.5

Point F	X	Y
S	0	0.5
M	0	0
L	0	–0.5

The effectiveness of pattern grading depends on the grading increments and grade rules. If a miscalculation is made in the grade increment or rules the pattern grading turns out to be a wrong one.

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