

## SOFTWARE OF THE WEAVING WEAVE CONSTRUCTION SYSTEM

**Uzakova U.R, Ph.D**

Associate Professor

**Makhkamova M. M**

Master

**Annotation:** Construction methods in the Desint system are divided into three groups. The first group includes construction methods from initial elements  $\neg$ , such as one thread or a group of threads. The second group includes methods for constructing parts of pattern rapports from the initial elements. The third group includes special methods for constructing rapports with an arrangement according to a drawing. The desired group is determined by the type of the initial element necessary to build the final, desired weave.

In works [11-16], the coding system is considered as a means of describing weaving weaves. Efficiently translate code descriptions into a weave pattern using a dessinator interpreter (Desint), which is a package of applied programs that implements the considered algorithms for weaving construction [37, 38].

The classification of methods for constructing weaving weaves (Fig. 2.2) determines the structure and principle of operation of the Desint system.

The Desint system is based on the following principles:

1. In the process of building a rapport of one weave in one group, the transition to another group is excluded.
2. In the process of building a rapport in a group, two rapports participate, where at least one rapport is built from the initial elements.
3. In the process of building rapport in a group, corrections of completed rapports are allowed .
4. The system is implemented as an interpreter of code descriptions.

Input data files are usually punched onto magnetic tape or punched tape and written to disk memory by a computer program operator. Input files of code descriptions of small volume can be created by the dessinator technologist himself from the display keyboard without any difficulties.

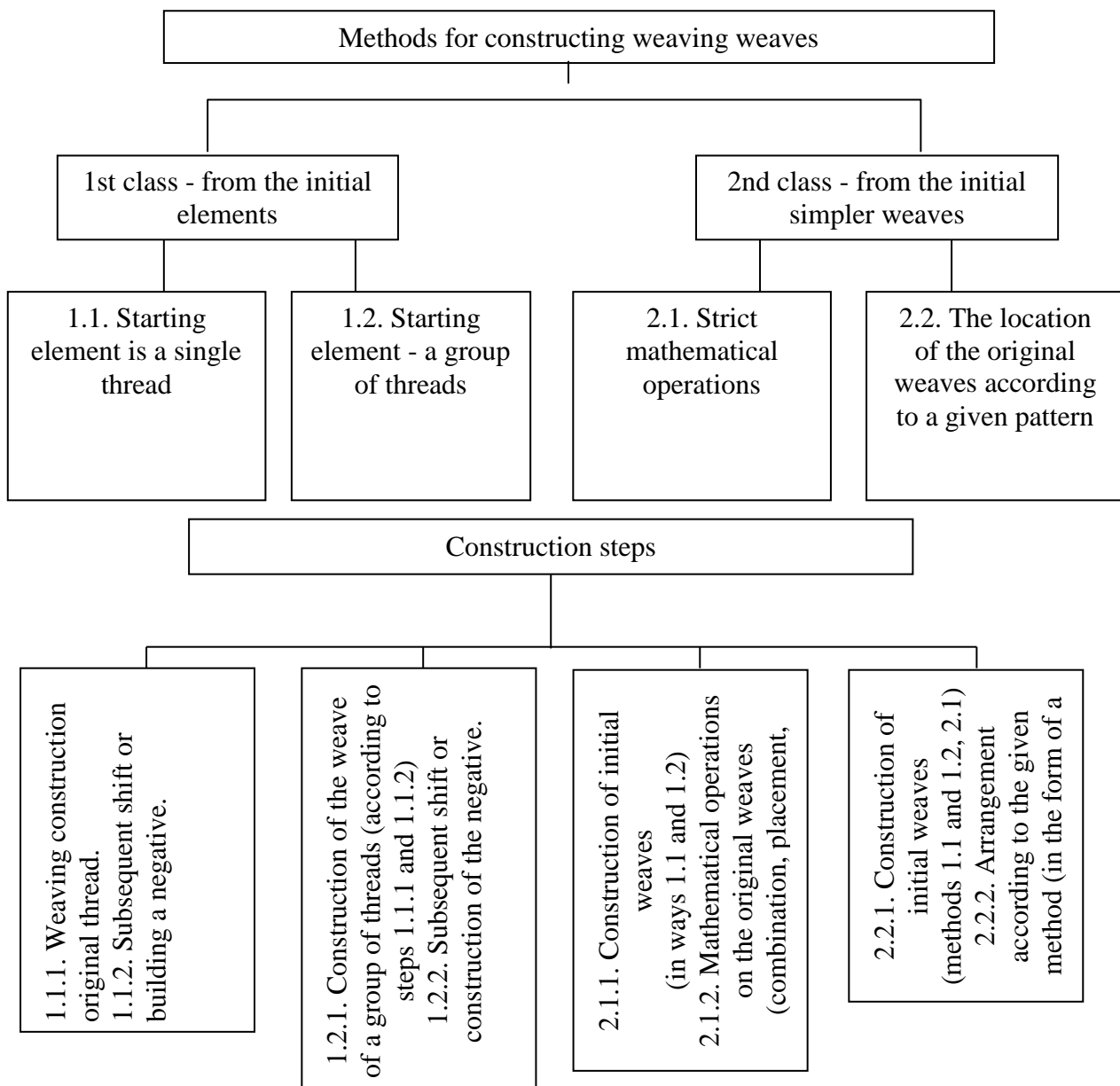
To do this, firstly, according to the operator's instructions, it is necessary to study the rules for combining several code descriptions into a sequential file, and secondly, one must be able to create and edit texts from a computer display. An arbitrary name is assigned to the created text file of code descriptions, and it is written to the disk memory.

In a computer-aided design (CAD) system for single-layer fabrics, the subsystem for generating weaves should cover all known single-layer weaves and it is possible to design new weaves with new methods of their compilation based on the presentation of information to a computer in a procedural way. The procedures for compiling weaving weaves are associated with the technological features of weaving, and new methods for compiling weaving are designed not by creating new procedures, but by changing their relationship.

CAD of fabrics opens up wide opportunities for dessinators - it reduces the time for searching, evaluating and choosing the optimal options for the structure of a fabric with the execution of all the necessary documentation, increases the level of manufacturability of these solutions, and accelerates the renewal of fabric assortments.

Designing with the help of CAD should be carried out in the shortest possible time with minimal costs of raw materials and labor, and the resulting product should be fashionable, beautiful, high quality, have the lowest possible cost and satisfy all the initial operational requirements [39-41].

Automated tissue design preserves the dissinator's experience in tissue design, but at the same time it is possible to create a design "tool" with modern computer technology that will allow dissinators and technologists to view and evaluate the results of various design decisions. Design is provided by man-machine procedures, during which time-consuming constructions and calculations of options are assigned to the computer, and the technologist is left with the evaluation of options and the adoption of optimal design decisions. Therefore, the purpose of fabric design is to determine the main parameters of its structure, the combination of which in the fabric with a minimum consumption of the selected raw materials gives the best satisfaction of all properties arising from the purpose of the fabric.



## **Fig.2.2. Classification of methods for constructing single-layer weaving weaves.**

The method for determining the structure parameters is based on the knowledge of the dependences of the service properties of the fabric on the structure parameters. When solving these problems, an information bank is formed, which is

The core of the information support of the automated design system. The proposed CAD of tissues requires the researcher to conduct targeted scientific experiments to study the dependences of individual technological and operational properties on the parameters of the tissue structure. The dessinator or weaving technologist must prepare a design brief that contains three components of input data: type of raw material, required properties, weave.

Desinator must choose:

- from the variety of raw materials, a given type of raw material in terms of properties, linear densities of warp and weft threads and their combinations, which determine the texture and appearance of the fabric;
- requirements for the properties of the designed fabric, which must have a certain set of operational properties and are set by the dessinator based on the significance of a particular property for the designed fabric.
- interweaving of the fabric, on which the manufacturability, performance properties and appearance of the fabric depend.

The computer-aided design technique involves compiling a code description of the weave, according to which the Desint subsystem builds a rapport, calculates the digital characteristics of the weave, and generates filling documentation.

On fig. 2.3 shows a structural and functional diagram of CAD fabrics. The system consists of a subsystem of interweaving, informational and computational, which are oriented towards the - interactive mode of design.

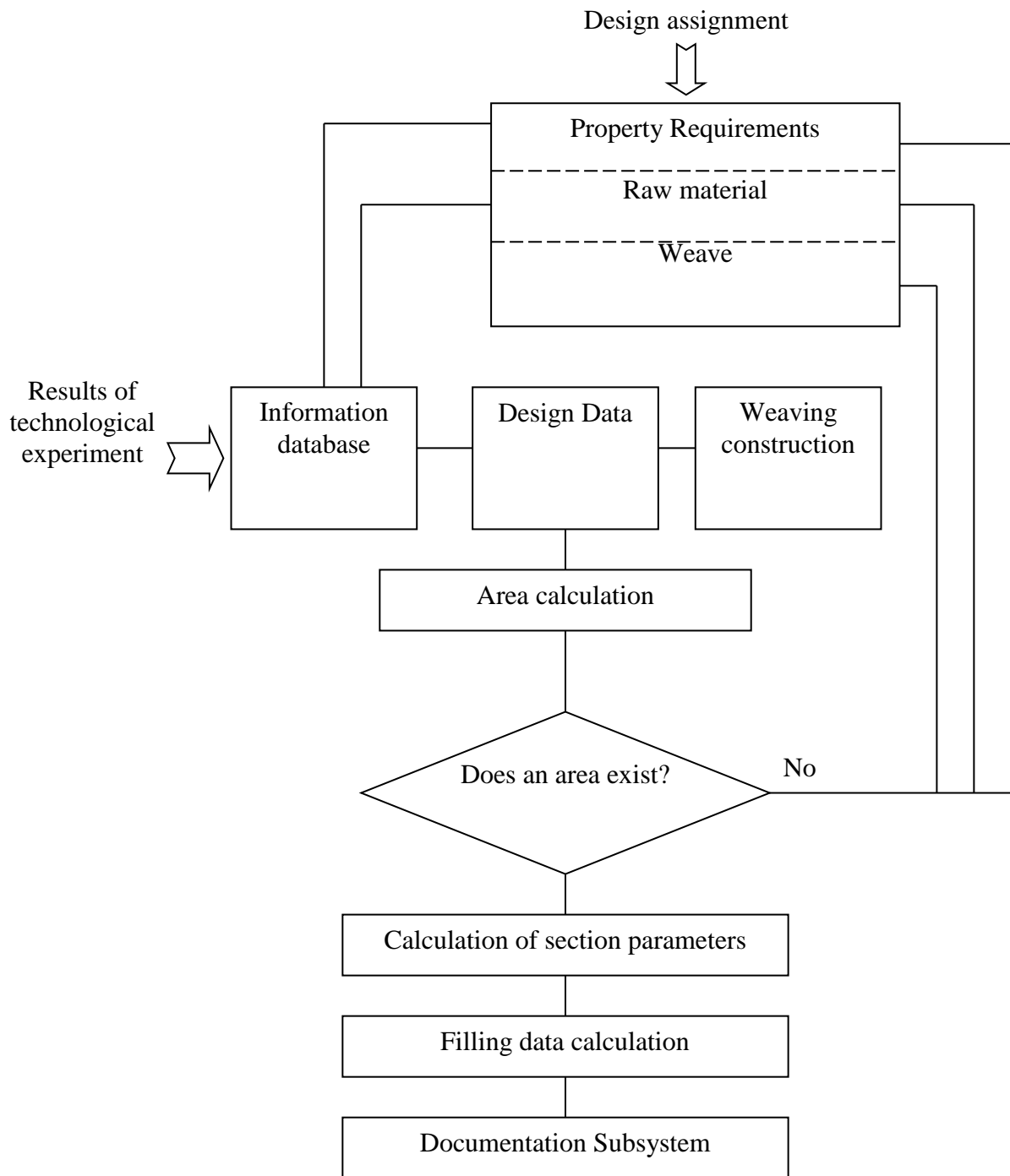
Data transfer between subsystems is carried out through a common area of design data.

The calculation subsystem is designed to calculate the allowable design area, in the coordinates specified by the dessinator, according to the parameters of the tissue structure. The design area is built according to the set of properties specified by the dessinator in the design task, where the dessinator selects a certain point within the allowable area, which gives the optimal values of the tissue structure parameters. Then, the dressing and properties of the fabric are calculated, the parameters of the fabric section are calculated, and the design results are printed.

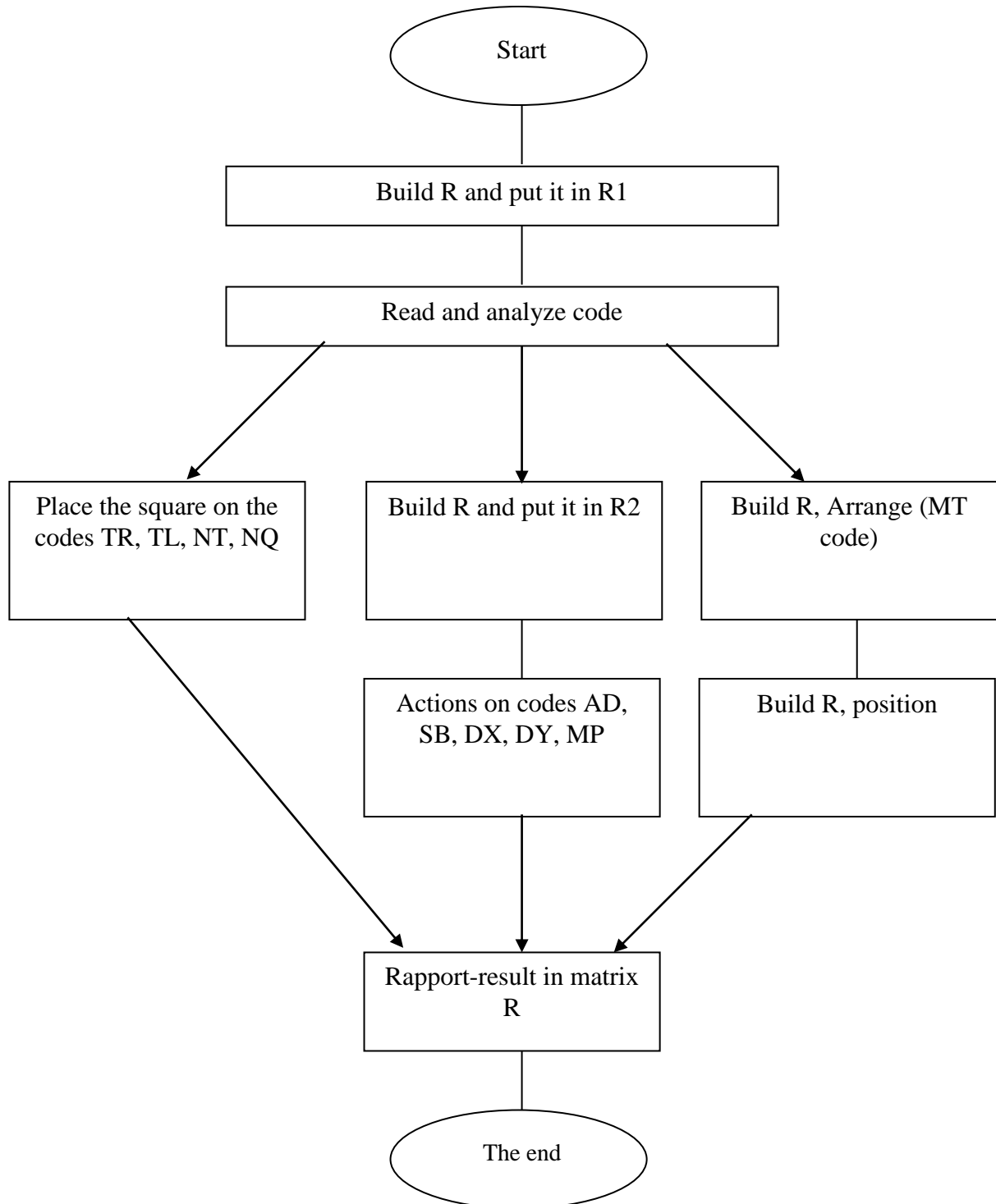
Therefore, the desinator does the following:

- selects the type of raw material, linear densities of warp and weft threads;
- designs the weave, that is, a code description is compiled , according to which the weave construction subsystem builds the weave;
- calculates numerical characteristics (average overlap of warp and weft threads, coefficient of binding or tension of fabric production);
- builds a new weave with unsatisfactory parameters of the weave under consideration;
- carries out the transition to the calculation subsystem with obtaining a satisfactory weave;
- builds an allowable area by calculating the values of each property at discrete points of the plane, followed by checking against the normative value;

- calculates the fabric at that point in the region with specific density values for the warp and weft, which, in the presence of an allowable region, determines manufacturability, production efficiency, unification of machine filling, and the lowest consumption of raw materials. In the absence of an acceptable area, corrects the requirements for properties or conducts additional technological studies aimed at



**Fig 2.3. Structural and functional diagram of CAD fabrics.**



**Fig.2.4. Scheme for constructing weaves from simpler ones.**

- improving the quality of tissue and obtaining new functional dependences of properties on the - parameters of tissue structure.

Pattern modeling is carried out using an incomplete or oriented method of automatic tissue design [40]. Incomplete design is understood as the autonomous use of individual CAD subsystems, where the values of the coefficient of cohesion or tension of fabric production on a loom are revealed, which

determine the density of warp and weft threads necessary for this weave and the accepted type of raw material.

Oriented design involves the development of a prototype fabric. The construction of the design area in the coordinates weft density - fabric production tension allows you to quickly obtain new fabric samples without refueling the loom, by selecting the weave and weft density of the fabric.

Figure 2.4 shows an algorithm for constructing weaves from simpler ones. Compilation of weaves based on a motive requires the compilation of a motif matrix and two initial weaves. Unlike a motif, a drawing is represented by a special matrix, which is encoded by a dessinator.

The elements of this matrix can be any characters familiar to the user [42].

For all arrangements with transformations, it is characteristic that for their implementation only one initial weave is needed, representing a square. Separately, two complex ways of constructing weaves should be noted: the arrangement according to the pattern, and the compilation of woven twills. To encode an arrangement according to a drawing, a pattern-matrix is characteristic, and two, three or more initial matrices are required.

To perform the arrangement according to the picture, it is necessary to provide for the input of the picture, determine the required number of initial matrices to fill the picture, and then arrange the location of each matrix in the same way as in the case of the arrangement by motive. The code description of woven twill is significantly different in its structure from all the others.

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