

Kerstin & Irmgard Friedrich

GRAFIS

Textbook for Beginners
Part II



GRAFIS

SOFTWARE
FOR

CLOTHING CONSTRUCTION

Contents

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Chapter 11

“The construction parameter x value”

11.1	The x values of the basic blocks	2
11.2	The x values of the construction record	7
11.3	The x value reference	13
11.4	Complex Exercises	14

Chapter 12

“The construction parameters g and z values”

12.1	The g values	2
12.2	The z values	3
12.3	Complex Exercises	6

Chapter 13

“Part organisation and hereditary automatic”

13.1	Basics of part organisation	2
13.2	Insert without transformation, hereditary automatic	5
13.3	The x values of all parts	9
13.4	Drag, rotate, flip parts	10
13.5	Complex Exercises	11

Chapter 14

“Special functions of the part organisation”

14.1	Insert with transformation	2
14.2	Modifying mother parts	6
14.3	Complex Exercises	7

Chapter 15

“Grade Rule Grading”

15.1	Digitizing the pattern perimeter	2
15.2	Overview on assigning grade rules	7
15.3	Edit grade rules	8
15.4	Save grade rule pattern	11
15.5	Edit grade rule pattern, drag and transfer grade rules	12
15.6	Digitize grade rules	15
15.7	Transfer grade rules from a template pattern	19
15.8	Convert record into grade rule pattern	21
15.9	Create, use and edit grade rule library	22
15.10	Group grade points	24

Chapter 16

“Layplanning”

16.1	Preparations	2
16.2	Open and prepare layplan	3
16.3	Layout of pattern pieces	6
16.4	The marker maker menu	9

Chapter 17

“Various special functions”

17.1	Use of <i>markingline</i> function for generating templates	2
17.2	Export of pattern pieces	3
17.3	Designing the call list	4

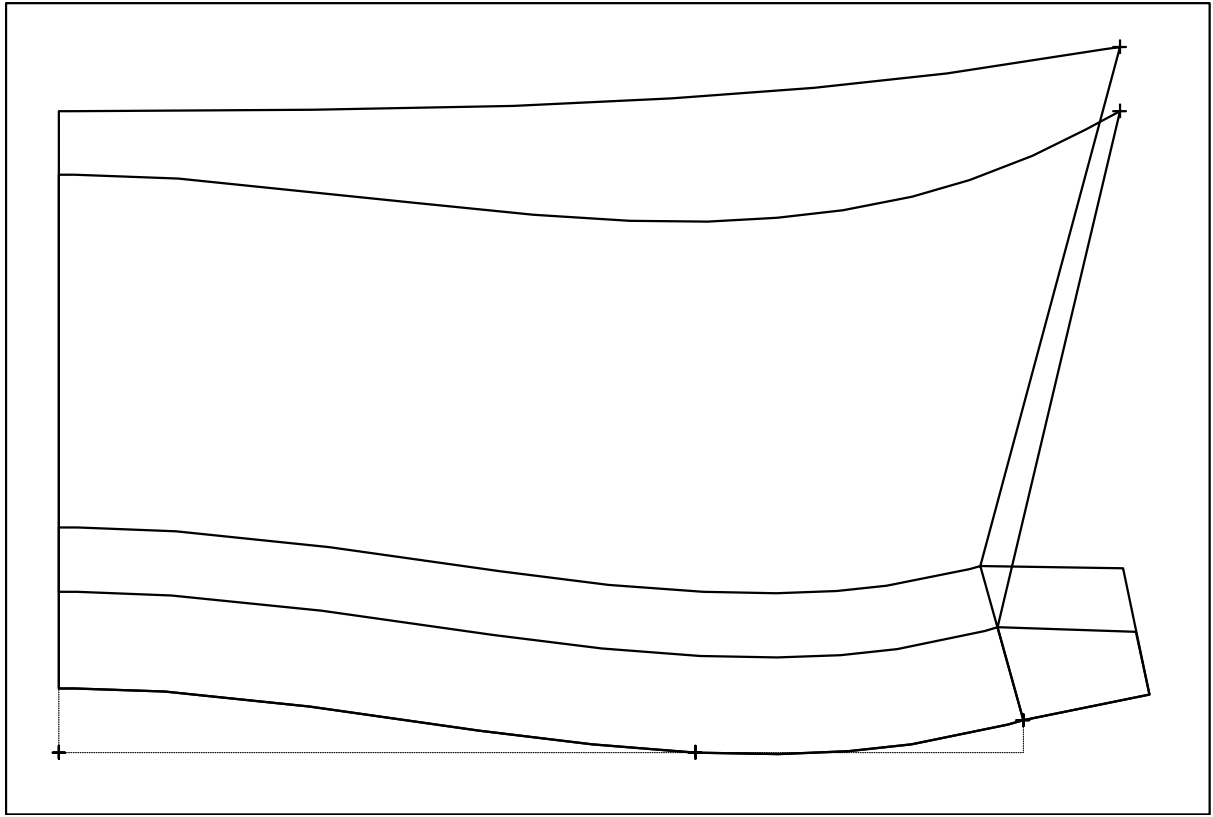
Chapter 11 “The construction parameter x value”

Content

- 11.1 The x values of the basic blocks..... 2
- 11.2 The x values of the construction record..... 7
- 11.3 The x value reference..... 13
- 11.4 Complex Exercises 14

The application of the construction parameter x value and the resulting manifold styling options is one of the outstanding features of GRAFIS. The skilful use of x values allows for creation of style variations or trend adjustments through adjustment of the x values, only. A master in the application of

GRAFIS can be recognised through his creativity and far-sightedness in the application of x values. From the x values in the basic blocks you will learn about the application of pre-set x values. Then, you will generate new individual x values and apply them to your construction. Construction parameters require abstract thinking and ample time for learning their application. Therefore, the emphasis of this chapter, again, lies on the exercises. Take time and complete the exercises. The collar construction displayed is the result of an exercise.



11.1 The x values of the basic blocks

X values are size-related construction parameter. The numerical values are logged in x value tables and can represent lengths, distances, radius or angles, for example. X values can be altered after completion of a style at any time. Thus, later modification of the style is possible in a very effective manner. For example, in the collar construction (title picture of this chapter) the x values “collar stand” and “angle for collar step” were altered.

There are three different types of x values:

- x values of the basic blocks,
- x values of the construction record (section 11.2) and
- x values of all parts (section 13.3).

The difference relates to the validity of the respective type of x value. The application of x values is identical for all types and is elaborated on the x values of the basic blocks.

Step-by-step guide

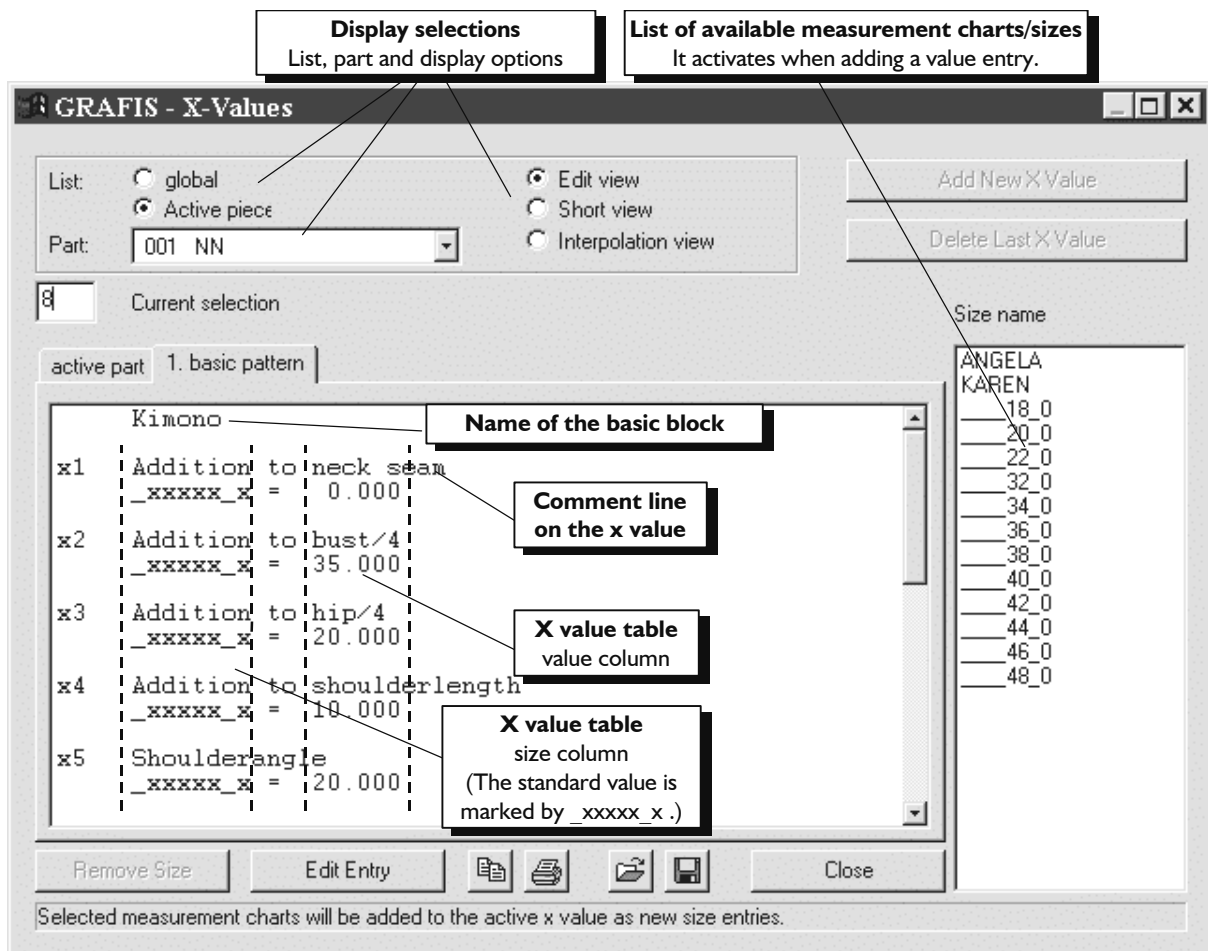
- ⇒ Open the x value table from the “Extras” pull-down menu via “x value table...” or from the toolbox

- ⇒ Select the required x value table (e.g. active part and index card “1. basic block of the part”) in the “List:” selection field.
- ⇒ Adjust one of the view options “Edit”, “Short View” or “Interpolation View”
- ⇒ possibly, scroll the x value table
- ⇒ Add, edit or delete size-related x value assignments

The x values of the basic blocks

Each basic block contains a prepared x value table. The x values represent lengths, percent, or angles which are variable according to the respective construction instruction, e.g. ease or position and length of the darts. The implementation of the x value into the basic block and pre-assignment of an appropriate value ensued by the developer of the basic block. The user has the option to modify the basic block to his own requirements by altering the x values.

Designers of basic blocks such as Prof. Brückner, for example, decided to add ease via x values. In these cases the proportion classes in the size table are invalid.



Picture 11-1

The "GRAFIS x value" window

The „GRAFIS x value window“ offers the following option for display of the required x value table (Picture 11-1).

List and index cards:

For each part one of the following x value tables can be displayed:

- global (the x values of all parts) or
- the x values of the active part offered on a number of index cards. The index cards contain the x values of the basic blocks and the x values of the construction record.

Select the required list under *List*: and then, click the card tag.

Part:

Select the part for which the list of x values is to be displayed. You will learn about work with parts in Chapters 13 and 14.

Display options:

The x value table can be displayed in the options

- "Edit",
- "Short View" or
- "Interpolation View".

The **Edit** view with all size entries is the most detailed option.

In the **Short View** only the x value numbers and description and the standard value `_xxxxx_x` are displayed.

Interpolated values for specific sizes can be viewed in the **Interpolation View** after having clicked the size in the "size" field.

The x value table

Call the basic block 009 "kimono" and open the corresponding x value table from the *Extras | X Value Table...* pull-down menu. Adjust the following display option:

List: active part
 Part: 001 NN
 Index card: 1st basic block of the part
 Display: Edit

You will see Picture 11-1.

The x value table of the basic block "kimono" contains 11 x values with consecutive numbers. The comment line describes the effect of the x value.

The comment line is followed by a line in the form of "`_xxxxx_x = 20.0`" which assigns the x value with a standard numerical value. The size-related values (not shown) follow which the user inserts at his own discretion. The contents of the x value table are explained in detail in picture 11-1.

Call further basic blocks and view the corresponding x value tables. Reset the construction record step-by-step and check which x value tables are available.

Add, edit and delete size-related x value entries

Adding, editing and deleting size-related x values can ensue in the Edit view, only.

To **add x value entries** the x value or one of the corresponding size-related x value entries are to be highlighted. The list of available measurement charts from which measurement charts can be selected by clicking opens to the right. Each selected measurement chart is accepted into the x value table and assigned the standard numerical value.

A size can be assigned a value, only if it is available as a measurement chart on the workstation!

Adding new x value entries is followed by **editing the values** by double-click on the numerical value or clicking on "Edit Value". With "Edit Value" the next numerical value is offered, automatically.

To **delete or edit x value entries** the entry is to be highlighted and „Delete Size“ is to be clicked.

Opening new x values or deleting existing x values is not possible with x values of the basic block.

Exercise

Generate standard measurement charts 38, 40 and 42. Enter these sizes into the size table, size `___38_0` is base size. Activate the three sizes.

Open the list of x values of the basic block "kimono" and page up and down in the x value list or scroll with the scroll bar at the right edge of the list. Enter the following x value entries for x5 "shoulder angle":

x5	shoulder angle	20.0
	<code>_xxxxx_x</code>	= 20.0
	<code>___38_0</code>	= 10.0
	<code>___40_0</code>	= 20.0
	<code>___42_0</code>	= 30.0

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___36_0: [___42_0/ ___46_0]

Exercise

Alter the x value table of basic block "kimono" as follows:

x1 addition to neck seam
 _xxxxx_x = 0.0

x2 addition to bust/4
 _xxxxx_x = 35.0
 ___38_0 = 40.0
 ___40_0 = 45.0

x3 addition to hip/4
 _xxxxx_x = 20.0
 ___36_0 = 20.0
 ___44_0 = 40.0

x4 addition to shoulder
 _xxxxx_x = 20.0
 ___38_0 = 10.0

x5 shoulder angle
 _xxxxx_x = 20.0

Consider which x value is assigned to size ___36_0. Highlight size ___36_0 in the „Size name“ list. The details for size ___36_0 are displayed as in Picture 11-7.

Check the x value calculation for various sizes of the figure type "normal" by highlighting other sizes in the „Size name“ list. Analyse the displayed values with graphic representation like Picture 11-4 to 11-6.

Analyse the values for other figure types. Supplement the x value table with your own entries and check the implications on the x values of other sizes. Start *test run*, *grading* and *measure*.

Exercises on x values of basic blocks1st Exercise

Call the basic block 018 Brü "skirt". Activate the base size 38 and sizes 40 and 42 in the size table.

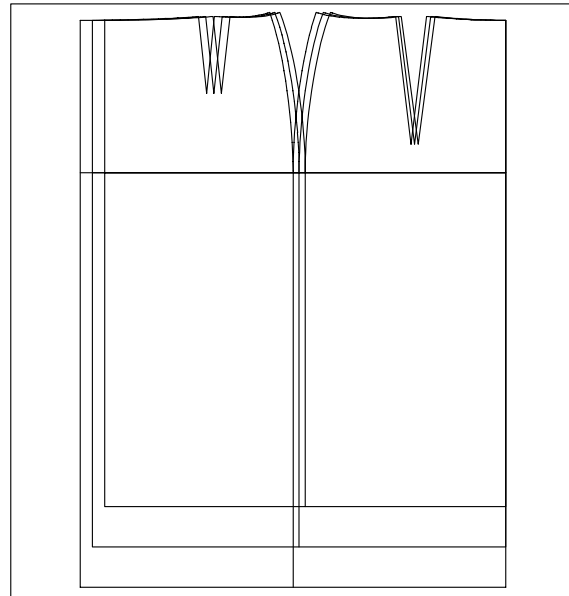
Vary the x value x1:

x1 skirt length
 _xxxxx_x = 600.0
 ___38_0 = 600.0
 ___40_0 = 650.0
 ___42_0 = 700.0

Start *test run* and *grade*. Picture 11-8 contains the result. Check the result by *measuring*.

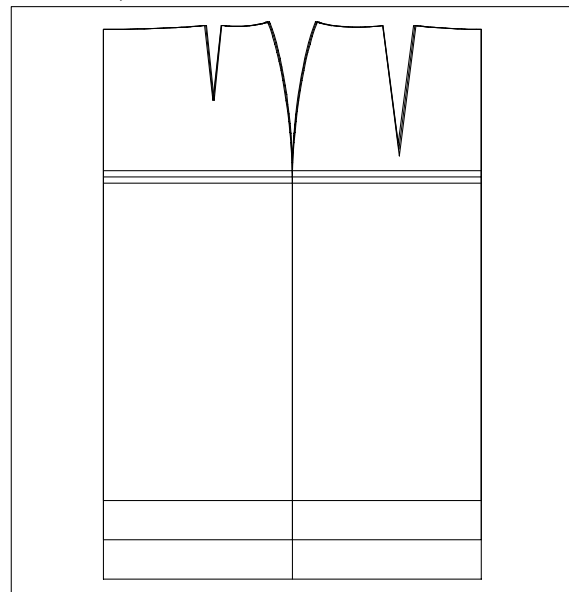
Alter the entries in the x value table so that the skirt length is

- 600 mm for all sizes of the „short“ figure type
- 650 mm for figure type „normal“ and
- 700 mm for figure type „long“.



Picture 11-8

Start *test run*. Grade the sizes 19, 38, 76, 019, 038, 076, 519, 538 and 576 and check the result by *measuring*. Picture 11-9 contains basic block "skirt" in sizes 19, 38 and 76.



Picture 11-9

With the following x value table all sizes of the stated figure types will have the required skirt lengths:

x1 skirt length
 _xxxxx_x = 650.0
 ___019_0 = 600.0
 ___076_0 = 700.0
 ___519_0 = 600.0
 ___576_0 = 700.0
 ___19_0 = 600.0
 ___76_0 = 700.0

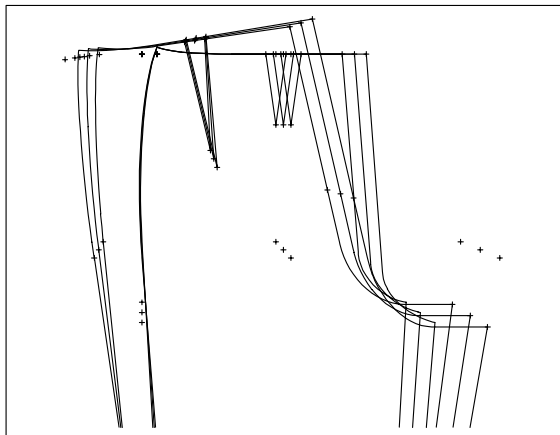
2nd Exercise

Call the basic block 008 “trousers after Hohenstein“. Check the effect of the x values by altering the x values for sizes 38 and starting *test run* each time. Check the result by measuring.

Edit the entries in the x value table so that the “dart position in the back”

- for figure type “narrow hips” is changed gradually from 100mm in size 34 to 120mm in size 42 and
- for the figure type “broad hips” from 120mm in size 34 to 140mm in size 42.

Please note that these requirements are to apply to short and long sizes also. For the figure type “normal hips” the dart length is to be equal to the standard value 120mm in all sizes. Check the calculation of your x values according to “Checking the calculation of x values” on page 5 of this chapter. Start *test run*, *grading* and measure. Picture 11-10 contains the basic block in the sizes 38, 038 and 538.



Picture 11-10

With the following x value table all figure types will have the required dart lengths:

x2	dart length back
_____	_xxxx_x = 120.0
_____	__017_0 = 100.0
_____	__021_0 = 120.0
_____	__034_0 = 100.0
_____	__042_0 = 120.0
_____	__068_0 = 100.0
_____	__084_0 = 120.0
_____	__517_0 = 120.0
_____	__521_0 = 140.0
_____	__534_0 = 120.0
_____	__542_0 = 140.0
_____	__568_0 = 120.0
_____	__584_0 = 140.0

3rd Exercise

Call a basic block of your choice. Check the effectiveness of the x values by editing the x value, *test run* and *grading*. In this context, find criteria for appropriate naming of x values you will use when defining your own x values in the future.

11.2 The x values of the construction record

The x values of the construction record are user defined and implemented during construction. Each numerical entry for a construction function can be assigned with an x value. This is possible in all fields marked in picture 11-11. Thus, the respective construction step can be altered later.

Before starting the construction consider for which construction steps the use of x values would be beneficial for flexible pattern modification.

In the following menus the use of x values offers great modification options:

- *modify* menu ..% of the dart to be relocated
- *spread* menu spacing of the spread line
- *curves* menu
- *transform* menu
- *p+l+c+r* menu
- and others.

Step-by-step guide

⇒ Insert new x value into the x value table:

- *Extras | X Values...*
- Select “List”: active part
- Select index card „active piece“
- Click on “Add New X Value” (a maximum of 80 x values can be opened per part)
- Double-click the comment line and enter the description for the new x value (Be careful to use clear definitions !)
- Double-click on the standard value (to the right of _xxxx_x=), enter the value and <ENTER>
- possibly: insert size-related x value entries as with x value tables for basic blocks (section 11.1)
- possibly: delete the last x value with “Delete Last X Value”
- Quit with in a grey area of the window or with “Close”

⇒ Continue the construction and enter an x value (e.g.: x2) instead of a numerical value

⇒ Further work with new x values corresponds with the procedure in section 11.1.

Exercise

Open the x value table of record values.

Extras | X Values...

List: active part select

index card: active piece

Edit View select

Open a number of x values and then delete them.

“Add New X Value”

click repeatedly

“Delete Last X Value”

Click repeatedly and confirm the security prompt. Open the x value x1 - in case it had already „test value“. Double-click on the comment line and enter the text using the left / right arrow keys.

Now, assign the standard value 20. by double-clicking to the right of _xxxxx_x= and typing 20.0.

Enter „x1“ in some of the fields marked in Picture 11-11. Try using the x value x2 in the same way.

Before an x value can be used during a construction step, it has to be defined. Should this not be the case, GRAFIS refuses to process it.

Learn about application of x values in the following exercises.

Exercises

1st Exercise

Call basic block 001 and open the x value x1 in the x value table of the active part with the name „seam allowance at hem“. The standard value for this x value is to be 40.0.

```
x1      seam allowance at hem
      _xxxxx_x = 40.0
```

Quit the „GRAFIS X Values“ window and construct the seam allowance at the hem with distance x1.

```
parallel
d = x1 and <ENTER>
```

Small and capital letters have the same significance.

+ copy click below the hem of front and back

Close the corners with *transform* and *corners*.

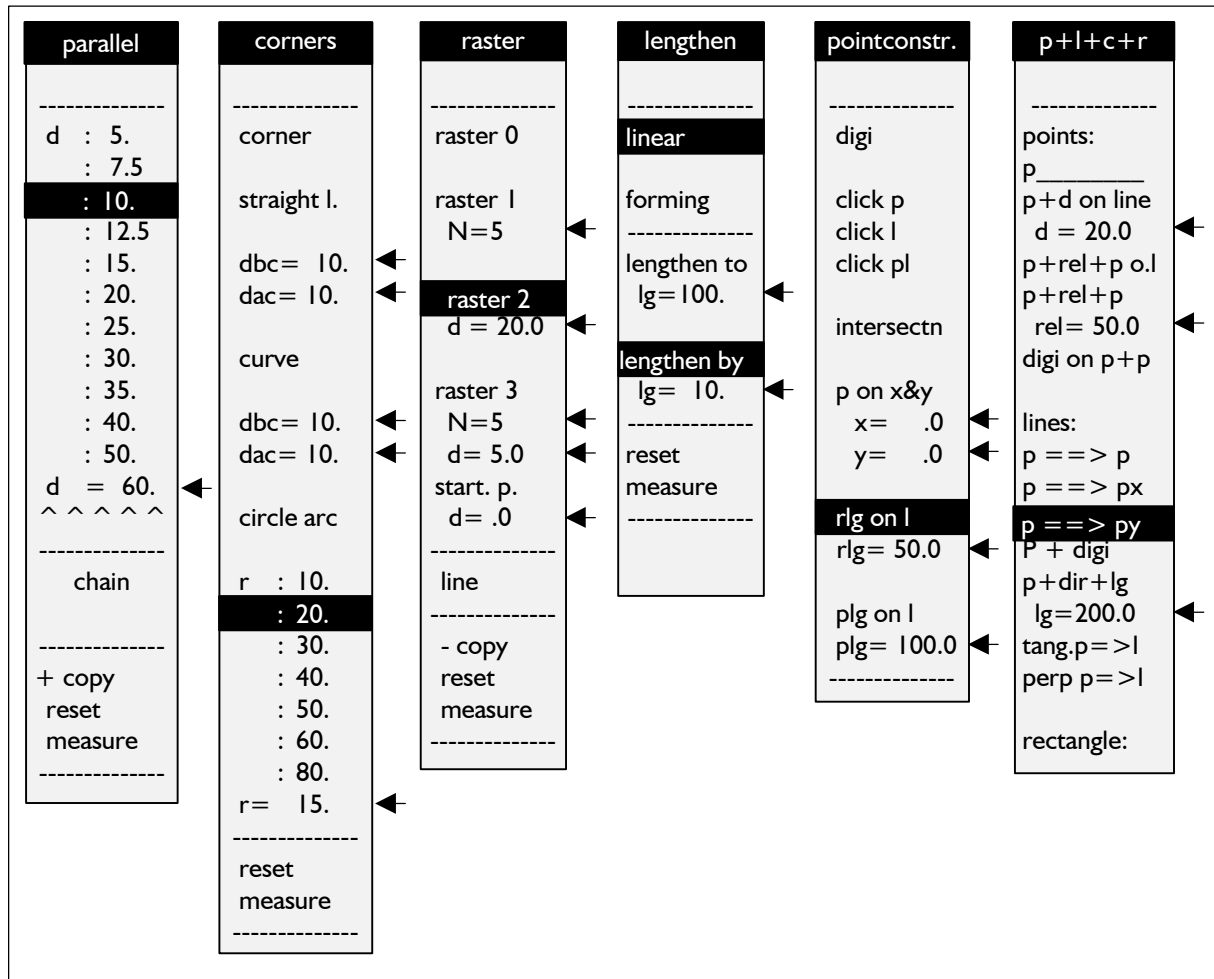
Alter the standard value for the first x value to 60 and start *test run*. The seam allowance at the hem is increased to 60. Without modifying the construction, centre front and side seam were lengthened accordingly.

Edit the x value table as follows

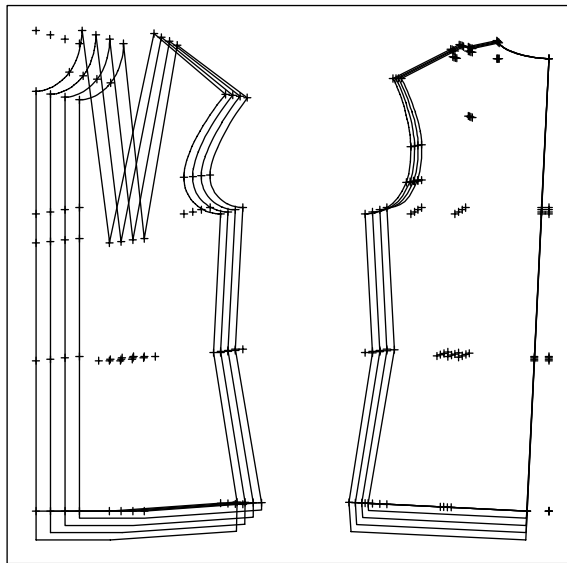
```
x2      seam allowance at hem
      _xxxxx_x = 10.0
      ___38_0 = 10.0
      ___44_0 = 40.0
```

and grade the sizes 38, 40, 42 and 44. The result is contained in Picture 11-12. Size 38 was graded with 10 mm seam allowance at the hem, size 40 with 20 mm, size 42 with 30 mm and size 44 with 40 mm.

Alter the size table and the x value table at your discretion and measure the results to check.



Picture 11-11



Picture 11-12

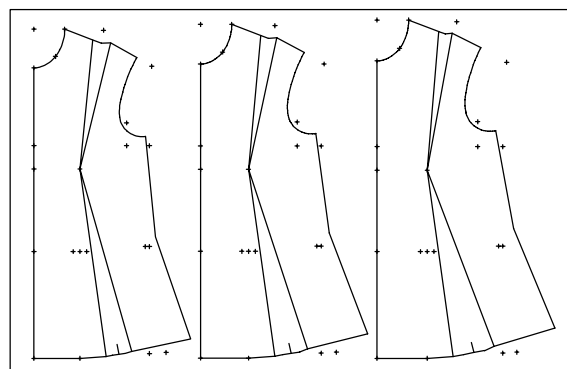
2nd Exercise

Call the basic block 001 and assign the x value table for the active part for sizes 38, 40 and 42 as follows:

x1 bust dart portion in shoulder in %
 _xxxxx_x = 30.0
 ___38_0 = 50.0
 ___40_0 = 40.0
 ___42_0 = 30.0

x2 bust dart portion in hem in %
 _xxxxx_x = 70.0
 ___38_0 = 50.0
 ___40_0 = 60.0
 ___42_0 = 70.0

Relocate x1% of the bust dart into the centre of the shoulder and x2% into the hem. Construct a single dart hood for the shoulder dart and a double hood at the hem. Ensure that the sum of the parts of both bust darts is always 100%.



Picture 11-13

call
 Extras | X Values...
 Add New X Value
 Enter the comment line and the size-related values

modify
 x1% of the dart
 automatic
 rlg on l with rlg = 50%
 x2% of the dart
 automatic
 click l

pleats
 dart hood single
 dart hood double

Grade the sizes 38, 40 and 42. Picture 11-13 shows the result.

Edit the x value entries for x1 and x2 and grade with other sizes.

3rd Exercise

Call basic block 001 and generate the displayed x value table for the active part.

x1 bust dart portion in shoulder in %
 _xxxxx_x = 20.0
 ___38_0 = 33.3
 ___40_0 = 20.0
 ___42_0 = 10.0

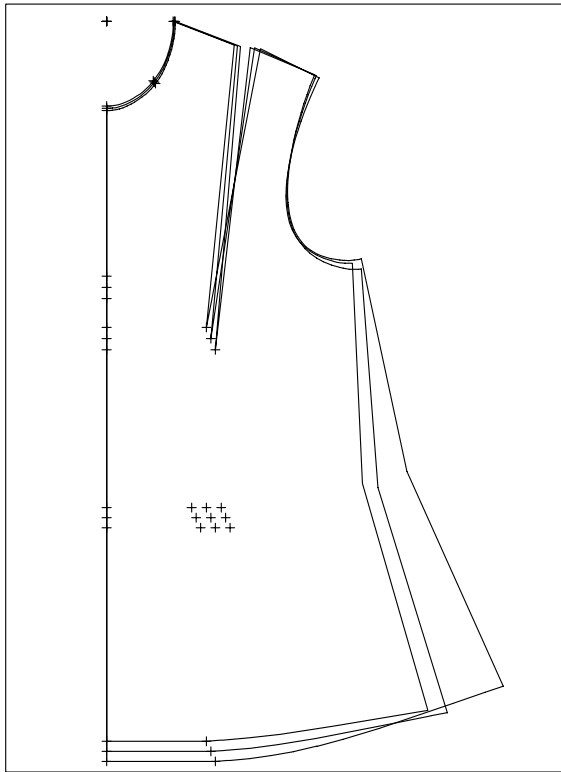
x2 bust dart portion in sleeve notch in %
 _xxxxx_x = 40.0
 ___38_0 = 33.3
 ___40_0 = 40.0
 ___42_0 = 10.0

x3 bust dart portion in hem in %
 _xxxxx_x = 40.0
 ___38_0 = 33.4
 ___40_0 = 40.0
 ___42_0 = 80.0

Relocate x1% of the bust dart into the centre of the shoulder, x2% into the sleeve notch and x3% into the hem. Link lower and upper armhole curve and the hem. Ensure that the sum of the three portions of the bust dart is always 100%.

call
 Extras | X Values...
 Add New X Value
 modify
 x1% of the dart
 automatic
 rlg on l with rlg = 50%
 x2% of the dart
 automatic
 click p
 -dart line
 x3% of the dart
 automatic
 click l
 -dart line

link
 link with curve armhole and hem



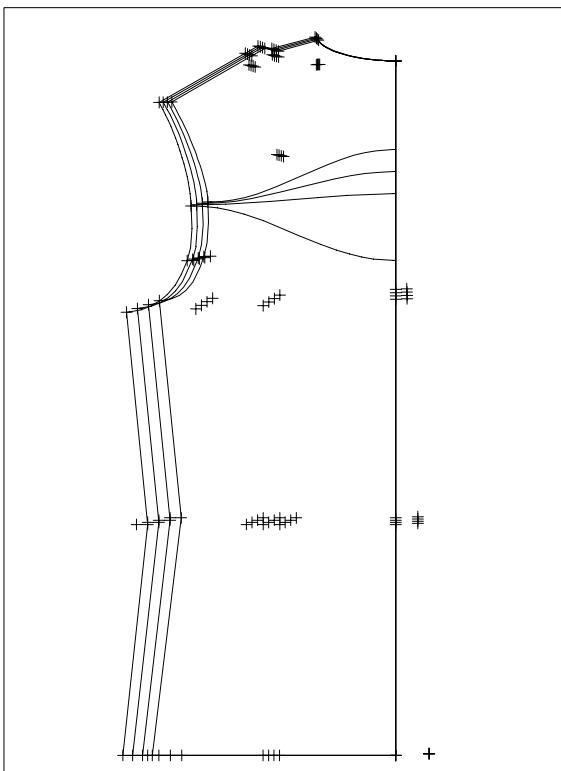
Picture 11-14

Grade base size 38.0 and sizes 40.0 and 42.0. Picture 11-14 shows the result.

Edit the entries for x values x1, x2 and x3 and grade with other sizes.

4th Exercise

Construct a curve for a yoke in the back of basic block 001. The curve is to start horizontally at the sleeve notch and to run vertically into the centre



Picture 11-15

back. The position of the curve at the centre back is to be variable via an x value.

Grade the sizes 38.0, 40.0, 42.0 and 44.0 with position 80 mm, 100 mm, 120 mm and 180 mm, measured from the neck, respectively. The result is shown in Picture 11-15.

Before following the steps described below, you should try to achieve the outcome in your own way.

call

delete

Extras | X Values...

Add New X Value

and enter values as shown

x1 yoke position centre back in mm

_____x = 80.0

_____38_0 = 80.0

_____42_0 = 120.0

_____44_0 = 180.0

NB: It is not absolutely necessary to assign size 40 the value 100 mm (see also “value assignment for different sizes”, Picture 11-6).

curves

click p

plg on l with plg=x1

direction: constr.

direction: constr.

Extras | Size Table

grading

5th Exercise

Continue the 4th Exercise and construct a yoke in front and back. The beginning of the curve at the centre front is to be variable via an x value. It ends at the waist point of the side seam. At the back, the curve is also to start at the waist point of the side seam and to end at the centre back, the position being variable via an x value.

Grade sizes 38.0, 40.0, 42.0 and 44.0 with positions 50 mm, 70 mm, 90 mm and 150 mm, measured from the hem. The curves are to be vertical at centre front, centre back and side seams. The result is shown in Picture 11-16.

Before you read on, please try to get the result in your own way!

Extras | X Values...

edit as displayed

x2 yoke position centre front in mm

_____x = 50.0

_____38_0 = 50.0

_____42_0 = 90.0

_____44_0 = 150.0

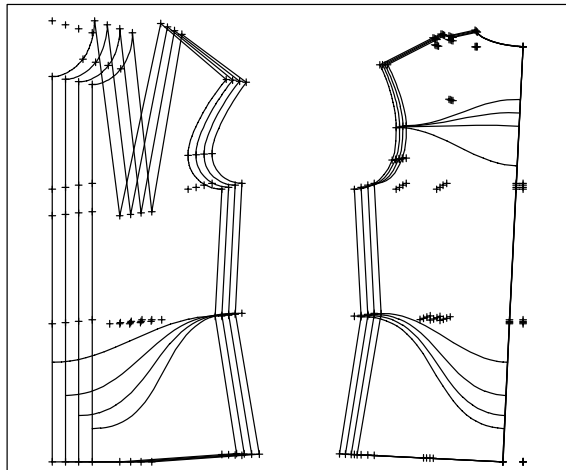
x3 yoke position centre back in mm

_____x = 150.0

_____38_0 = 150.0

_____42_0 = 90.0

_____44_0 = 50.0



Picture 11-16

curves

plg on l with plg=x2 click CF
 click p side seam
 direction: constr.
 direction: constr.

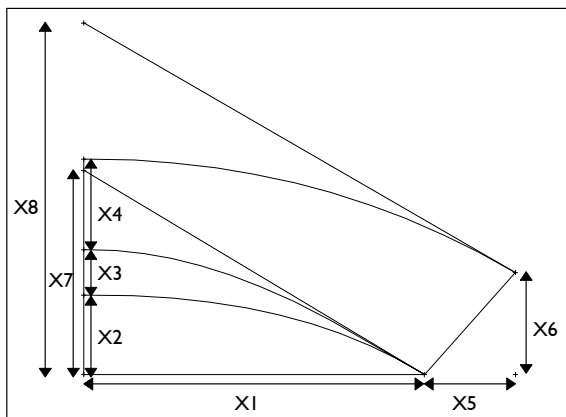
curves

plg on l with plg=x3 click CB
 click p side seam
 direction: constr.
 direction: constr.

Extras | Size Table
 grading

6th Exercise

Construct a simple collar with distances variable via x values where indicated.



Picture 11-17

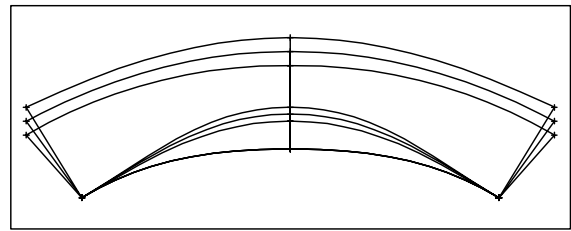
The pre-assignment for the x values is to be as follows:

X1=150.0 X2=35.0 X3=20.0 X4=40.0
 X5=40.0 X6=45.0 X7=90.0 X8=155.0

With these assignments the collar in picture 11-17 can be created.

Mirror the collar and delete superfluous points and lines. Alter the x values x3 and x4 to 5mm increments per size and x6 to 10mm increments per size. Grade the collar in the sizes 38.0, 40.0 and 42.0. With the x value x1 the length of the neck seam can be adjusted. All other x values mainly alter the shape

of the collar. The result is contained in picture 11-



Picture 11-18

18.

Suggestion for construction steps:

N*reset reset record to 000

or open new style

Extras | X Values...

enter values as shown

x1 constr. point for collar seam in mm
 _xxxxx_x = 150.0

x2 collar width in mm
 _xxxxx_x = 35.0

x3 collar stand width in mm
 _xxxxx_x = 20.0
 ___38_0 = 20.0
 ___42_0 = 30.0

x4 top-collar fall width in mm
 _xxxxx_x = 40.0
 ___38_0 = 40.0
 ___42_0 = 50.0

x5 x distance collar corner in mm
 _xxxxx_x = 40.0

x6 y distance collar corner in mm
 _xxxxx_x = 45.0
 ___38_0 = 45.0
 ___42_0 = 65.0

x7 direction p for collar fold and seam in mm
 _xxxxx_x = 65.0

x8 direction p for collar step in mm
 _xxxxx_x = 155.0

p+l+c+r

p _____
 p on x & y with x=y=0

p+dir+lg with lg=x1

p _____
 click pl

p+dir+lg with Lg=X2

p _____
 click pl

p+d on l with d=x3

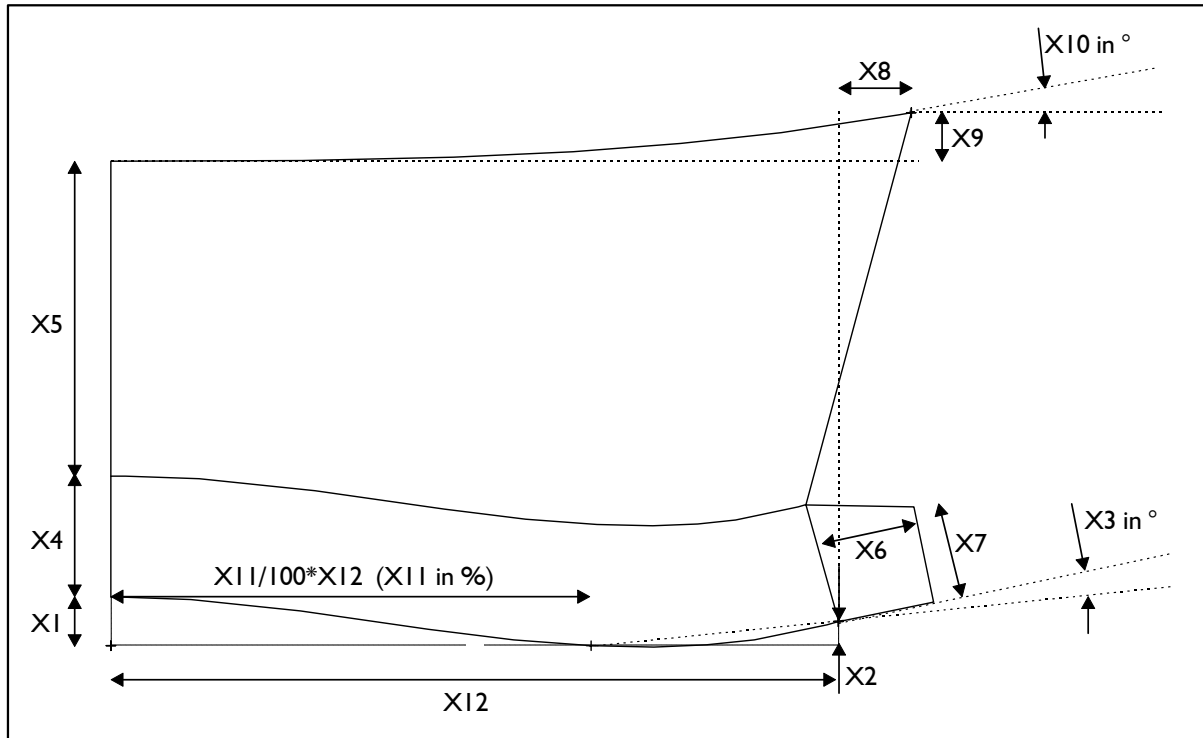
p+d on l with d=x4

p==>p draw CB

p+d on l with d=x5

p+dir+lg with lg=x6

p _____



Picture 11-19

click pl
 p+l+c+r
 p+d on l with d=x7
 p=>p construct aux. line
 p+d on l with d=x8
 p=>p construct aux. line
 attributes dash aux. line
 curves
 delete delete lines
 transform
 mirror with click l click CB
 Extras | Size Table
 grading

7th Exercise

Construct a shirt collar with indicated measurements variable via x values.

The pre-assignment for x values is to be as follows:

X1=10.0 X2=5.0 X3=10.0 X4=25.0
 X5=65.0 X6=20.0 X7=20.0 X8=15.0
 X9=10.0 X10=10.0 X11=66.0 X12=150.0

With this pre-assignment the shirt collar shown in Picture 11-19 is created:

Assign all x values as the standard value indicated.

Suggestion for construction steps:

p+l+c+r
 p _____ starting point for CB
 p on x&y with x=y=0.
 p+dir+lg with lg=x12
 click p
 p _____
 rlg on l with rlg=x11 (right principle!)
 p+dir+lg with lg=x1
 click p and diff=90°
 p+dir+lg with lg=x2

click pl and diff=90°
 p+dir+lg with lg=x6 aux. line for overlap CF
 click pl
 p=>p
 transform rotate overlap about x3
 turn with turnp. +ang
 click pl
 ang=x3
 -copy
 curves collar seam
 click pl
 click pl
 insert aux. p
 basic point: construct
 direction: constr.
 direction: constr.
 click l
 insert aux. point shape curve
 deposit
 p+l+c+r
 p+dir+lg with lg=x4 CB
 p+dir+lg with lg=x4 CF
 parallel construct collar crease
 d=x4 click collar seam
 (corners tidy up collar crease)
 p+l+c+r
 p+dir+lg with lg=x5
 p+dir+lg with lg=x7
 p=>p close overlap
 p+dir+lg with lg=150. construct dashed auxiliary line for corner of the collar
 p+dir+lg with lg=150.
 parallel
 d=x8 vertical auxiliary line
 d=x9 horizontal auxiliary line

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According to the size table in Picture 11-22 size 38.0 is graded in

- the first position with its original x values,
- the second position with the x values of size 40.0 and
- the third position with the x values of size 42.0.

A graded nest with three sizes 38 appears, graded with different x values.

When entering an individual measurement chart into the size table the x value reference is assigned by default with the standard size on which the individual measurement chart is based.

If no x value reference is entered the rules for “value assignment for different sizes” (section 11.1) for standard sizes apply. In this case the standard value applies to individual measurement charts.

Editing the x value reference

Entering, editing and deleting the x value reference ensues analogous to editing the measurement chart column.

Exercise

Drop the neck and reduce the shoulder seam with x values in “bodice after Hohenstein” (see Pictures 11-23 and 11-24).

- x1 drop neck front in mm
 _xxxx_x = 50.0
 ___46_0 = 75.0
- x2 drop neck back in mm
 _xxxx_x = 20.0
 ___46_0 = 35.0
- x3 drop armhole in mm
 _xxxx_x = 15.0
 ___46_0 = 25.0
- x3 shoulder reduction neck in mm
 _xxxx_x = 20.0
 ___46_0 = 30.0
- x4 shoulder reduction armhole in mm
 _xxxx_x = 10.0
 ___46_0 = 20.0

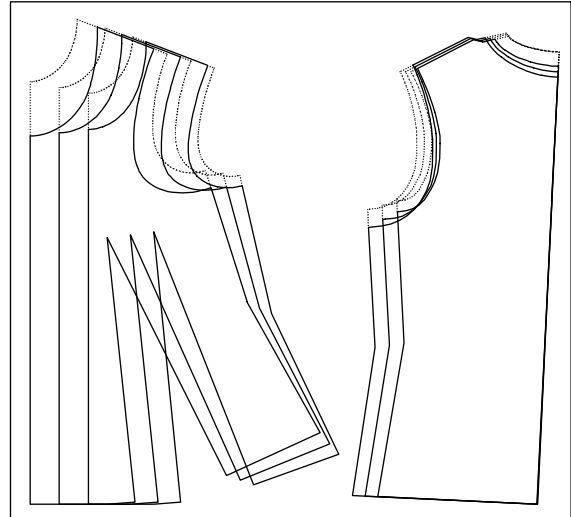
Grade the sizes 38, 42 and 46 with the following size table:

- > 01 ___38_0
 > 02 ___42_0
 > 03 ___46_0

and you obtain a graded nest according to Picture 11-23.

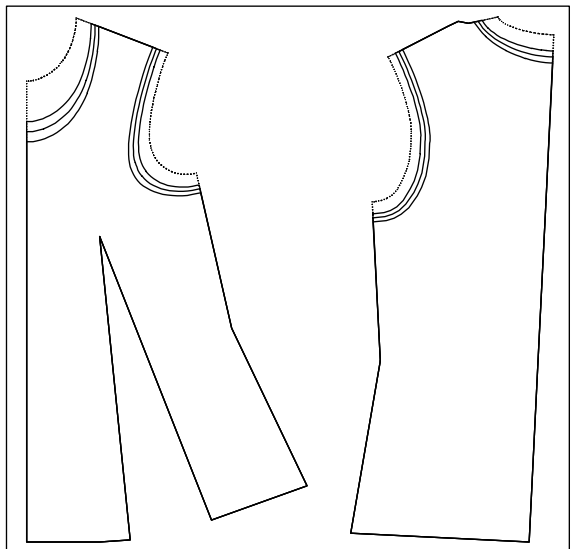
Now alter the size table as follows

- > 01 ___38_0
 > 02 ___38_0 => ___42_0
 > 03 ___38_0 => ___46_0



Picture 11-23

and you obtain a graded nest according to Picture 11-24.



Picture 11-24

Size 38 was now calculated with the x values of size 42 and 46.

11.4 Complex Exercises

1st Exercise

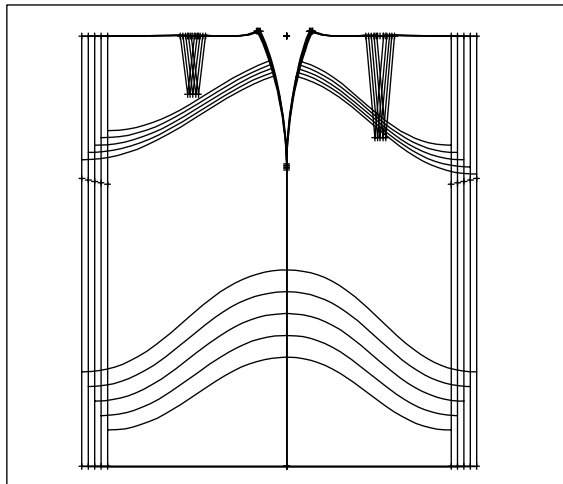
Call the basic block "skirt after Hohenstein", design a yoke and a separate panel in the lower part of the skirt which can be modified via x values with the curves function.

call
 Extras | X Values...
 curves
 grading

Suggestion for x value assignment:

- x1 yoke hip
 _xxxx_x = 60.0
- x2 yoke centre front
 _xxxx_x = 130.0

- x3 yoke centre back
_xxxxx_x = 150.0
- x4 lower skirt part centre front from hem
_xxxxx_x = 50.0
- x5 lower skirt part side seam from hem
_xxxxx_x = 150.0
- x6 lower skirt part centre back from hem
_xxxxx_x = 50.0



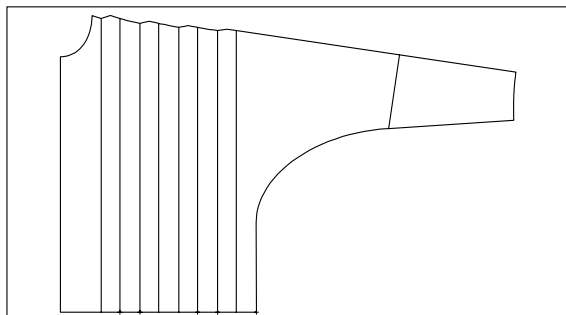
Picture 11-25

2nd Exercise

Call the basic block "kimono", delete the back and construct three pleats in the front. The spread amount of the pleats is to be adjustable via x values. Suggestion for x value assignment:

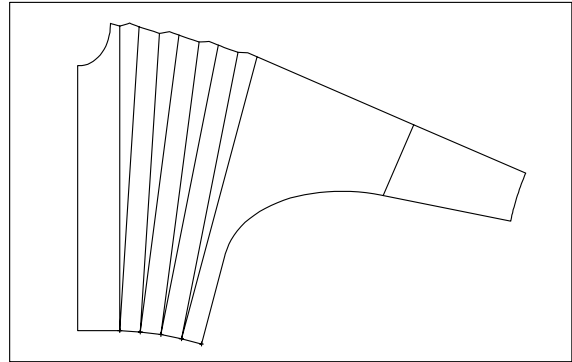
- x1 spacing shoulder
_xxxxx_x = 40.0
- x2 spacing hem
_xxxxx_x = 40.0

call
delete
Extras | X Values... edit x values
pleats
spread
test run and grading

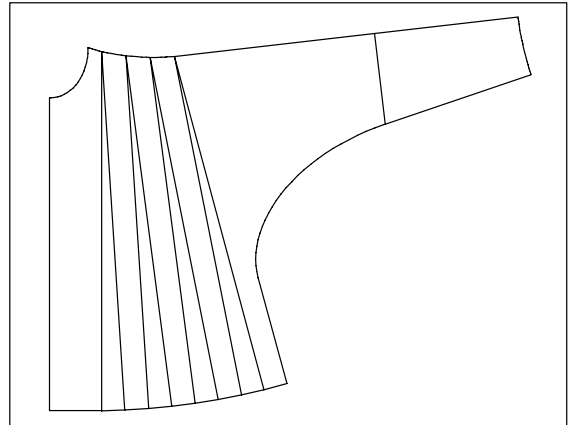


Picture 11-26

Alter the x values and set x1 and x2 to zero, also. Start test run, grade and plot the construction, if required.



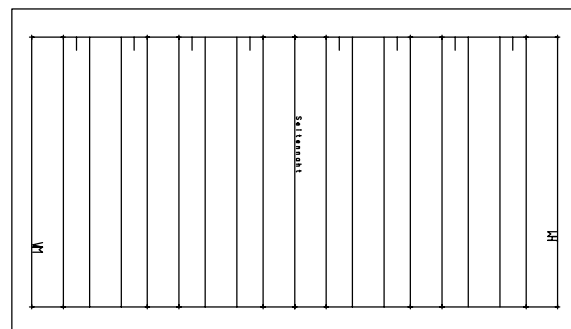
Picture 11-27



Picture 11-28

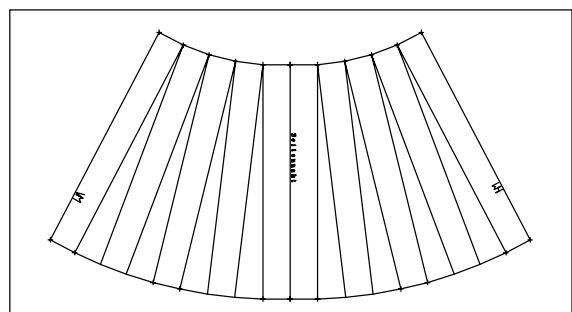
3rd Exercise

Call the basic block "skirt" by Prof. Brückner, delete the upper part of the skirt and design a pleated skirt with x values.



Picture 11-29

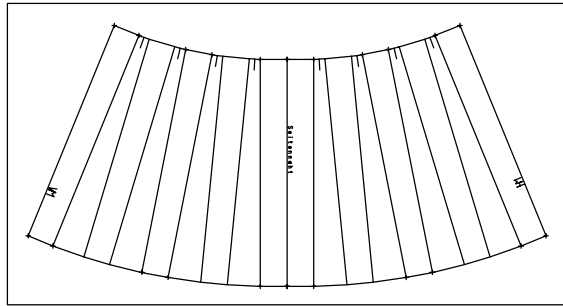
Edit the x values to increase width in the hem.



Picture 11-30

Create a skirt with less width in the hip area and more width in the hem.

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Picture 11-31

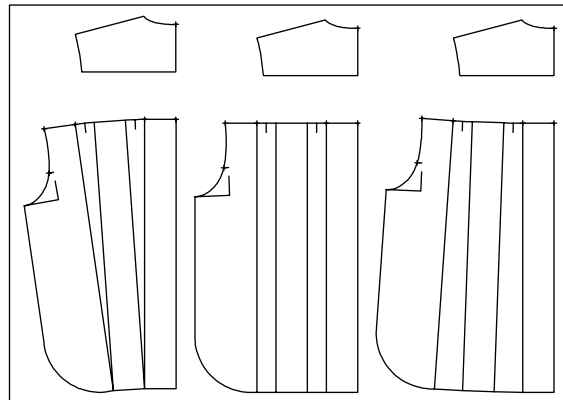
call
 delete
 Extras | X Values... edit x values
 pleats
 spread
 test run
 grading

4th Exercise

Construct a pocket which can be modified via x values.

5th Exercise

Call the basic block "shirt blouse", delete the front and construct a yoke in the back. Move the yoke or delete it. Construct two pleats with spacing variable via x values at yoke and hem.



Picture 11-32

Suggestion for x value assignment:

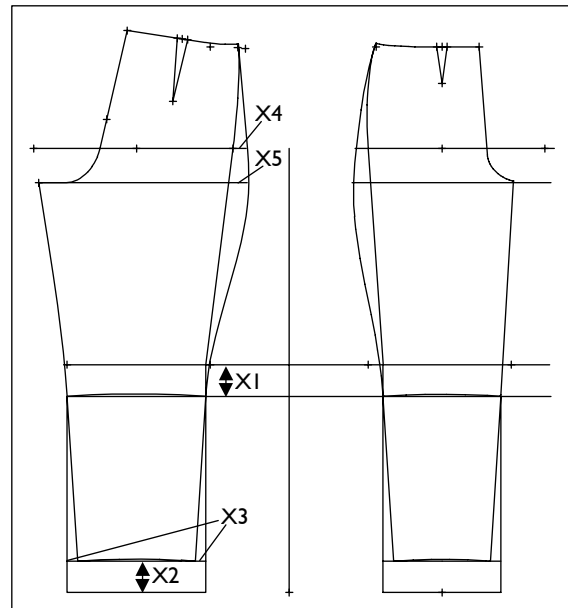
X1 spacing yoke in mm (30, 40, 35)
 X2 spacing hem in mm (0, 40, 70)

6th Exercise

Call the basic block "trouser after Hohenstein", mirror the trouser back and construct fashionable riding breeches with cuffs adjustable via x values.

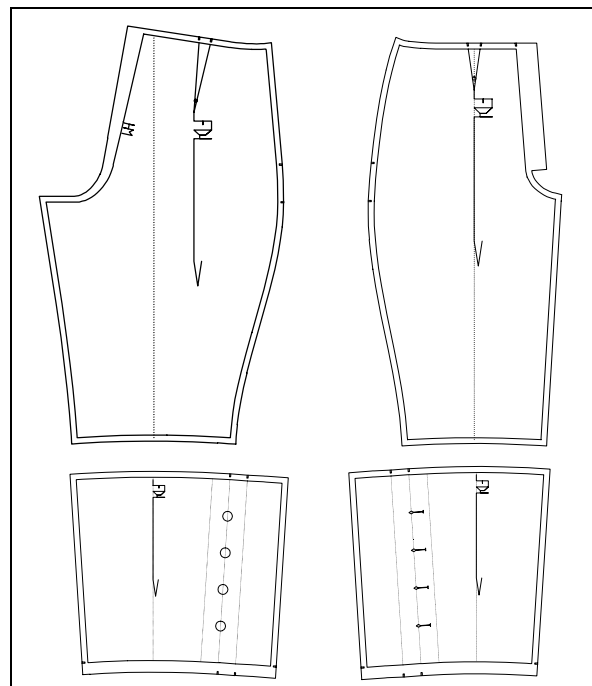
Suggestion for x value assignment:

X1 trouser cuffs from knee in mm (60.)
 X2 cuff reduction from hem in mm (60.)
 X3 cuff inset hem in mm (20.)
 X4 curve bow hip in mm (25.)
 X5 curve bow seat in mm (35.)



Picture 11-33

Move the cuffs away from the trousers. Design the breeches, set symbols and add seam allowance.



Picture 11-34