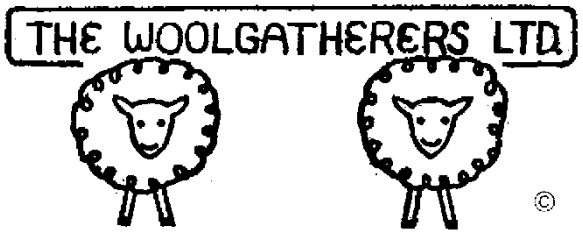
Systematic Weave Drafting and Derivation – Bindungslehre



Sara von Tresckow

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www.woolgatherers.com

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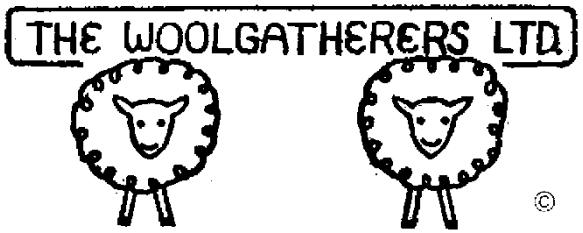

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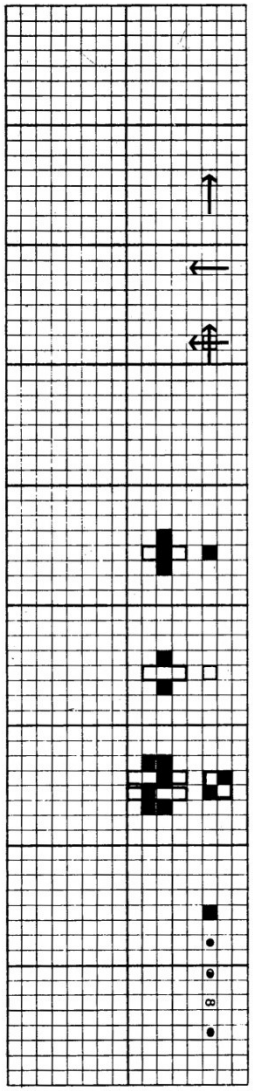
Drafts are the roadmaps for weaving – set up clearly, they lead to solid results on the loom. Drafts are the technical drawings that weavers use to produce fabric.



The graphical illustration of interlacings between warp ends and weft picks is marked on point (design- or graph-) paper.
The standard point paper is ruled in groups of 8 x 8, separated by thicker bar lines.

Each vertical space represents a warp end.

Each horizontal space represents a weft pick

Each square indicates an intersection point of 1 end and 1 pick.

MARKS

These give a precise representation of the thread interlacing on the face of the fabric and can be made with various symbols.

Warp floats = warp over weft.
Only warp floats or lifts are indicated.

Weft floats = warp under weft.
Blanks represent weft floats.

Warp floats and weft floats.
Warp over and under weft.

In some structures several different marks are used simultaneously.
It is important to give a clear indication of the key to a diagram.
All marks = warp up.

Before beginning a weave draft,
as with mapmaking, the symbols
must be determined.
As the draft is developed, the
symbols make the details clear
to anyone who has studied the
conventions laid out by the author.

Doris Goerner,
“Woven Structure and Design, Part 1”

Warp ends or threads are wound on to a warp beam in the required length, density and width. The first end in a warp is on the left hand side facing the loom.

Lease rods separate the ends to facilitate correct drawing-in through the healds on each shaft.

A shaft is a frame with wire or string healds having eyelets in the centre through which the warp ends are drawn, for the purpose of forming a shed during weaving operations. Each differently interlacing end in a repeat requires an extra shaft. Usually identical working ends are drawn on the same shaft.

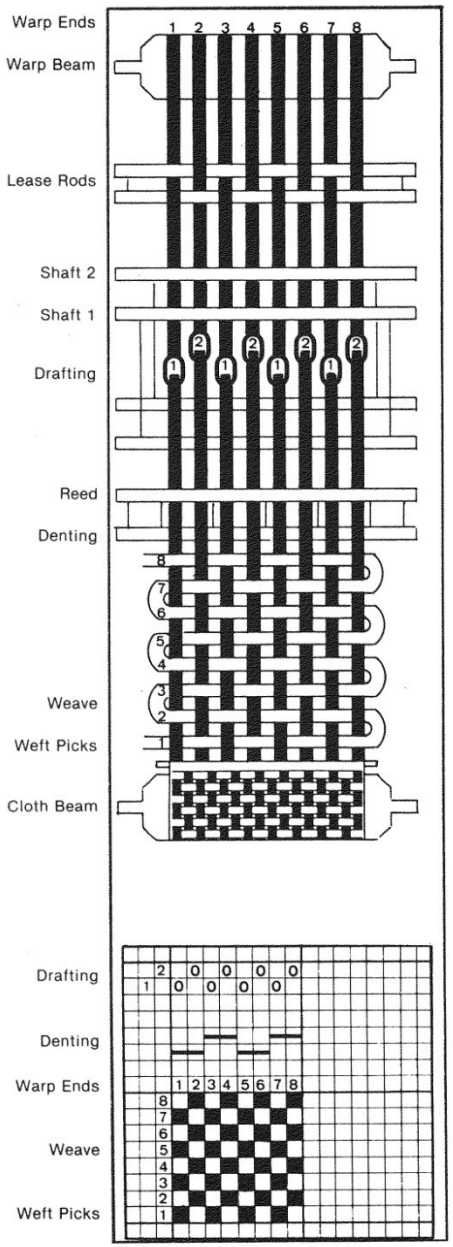
To achieve the required density in a fabric the warp ends are spaced out across the width by the reed, metal wires separating the ends according to the denting plan. The reed also has the function of guiding the shuttle across the loom and serves to beat up the last inserted pick aginst the cloth already woven.

A weave is constructed by the interlacing between warp ends and weft picks. The weft is positioned according to the required pick spacing.

SPECIFICATIONS

Details of weave, draft and sleying or denting should be drawn on point paper.

Horizontal lines above the weave are used to represent the shafts and the reed.



A weave draft is shorthand to demonstrate how the threads are arranged and manipulated to form a particular fabric.

The square that shows how the warp and weft threads intersect is called the “binding”.

1. Introduction:

Weave drafting is ancient – the computer software we use today is the evolved representation of centuries of work.

Basics:

A weave draft is a mathematical or pictorial representation of fabric to be woven. In this lecture we are covering only single layer weaves for handloom or dobby loom.

Conventions for creating drafts within this session are as follows:

1. A **woven textile** is the result of binding 2 thread systems at right angles to one another. These systems are called warp and weft.
2. **Bindungslehre** is the methodical representation and creation of the various forms of intersection as they occur in weaving.

3. A **binding** refers to the rules governing intersecting warp and weft threads for a woven textile.

4. A **binding point** “Bindepunkt” is the actual intersection.

5. **Floats** are free floating warp or weft threads

6. A **pattern or patrone (draft)** is the graphed representation of binding of warp and weft .

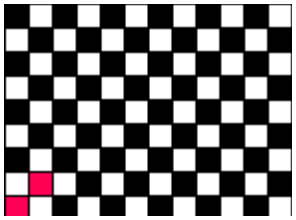
7 The draft is represented on graph paper (or an electronic version).

8. **Filled squares** represent raised warp threads.

9. A **rapport or repeat** is the smallest number of warp and weft threads needed to duplicate the binding.

The Three ground binding systems from which all weaves are derived.

1. **Plain weave** - Weaving consists of interlacements of two thread systems – warp and weft. Plain weave in its simplest form is raising all even numbered warp ends followed by raising all odd numbered threads. A method for making two sheds is necessary – we'll use 2 shafts on a horizontal loom here.



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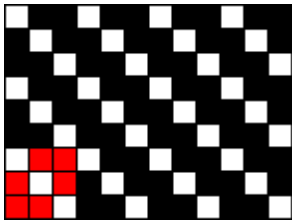
2. Twill weave- in twill weaves, the intersections are set over one thread and proceed in a diagonal fashion, min. 3 ends/3 picks



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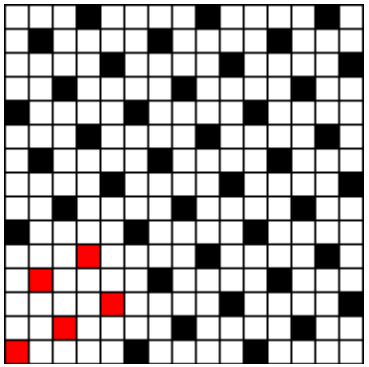
<u>3. Satin weave</u> – in satin weaves the intersections are not contiguous min. 5 ends/5 picks



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The most prominent exceptions to ground bindings are barleycorn (lace spot weave) and rosepath (similar to twill but bends the rules). Curiously, exceptions seem to fall into the favorite weave structures of 4-shaft handloom weavers.

There are many ways to represent a weave draft. Computer technology now allows us to use a virtual graph and not need to be as accurate as when drafts were drawn by hand.

I have included some examples of the various ways that weavers have, over time, depicted their projects.

And yes, when I first began weaving, I did my first drawdowns completely by hand, using only notebook paper with squares rather than lines.

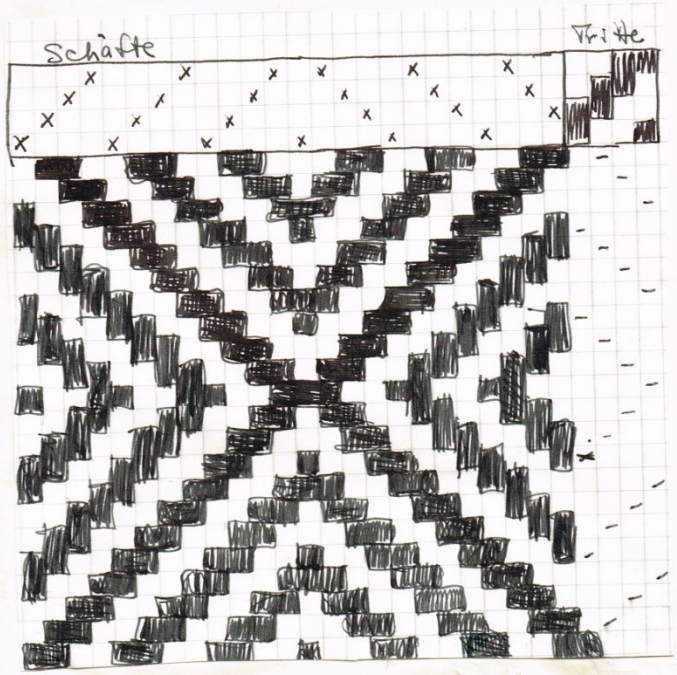
Hand/Geschirrtücher - Halbleinen - March 1983

Webstuhl 12 F./cm. Kamm 40/10 3 F./Riet

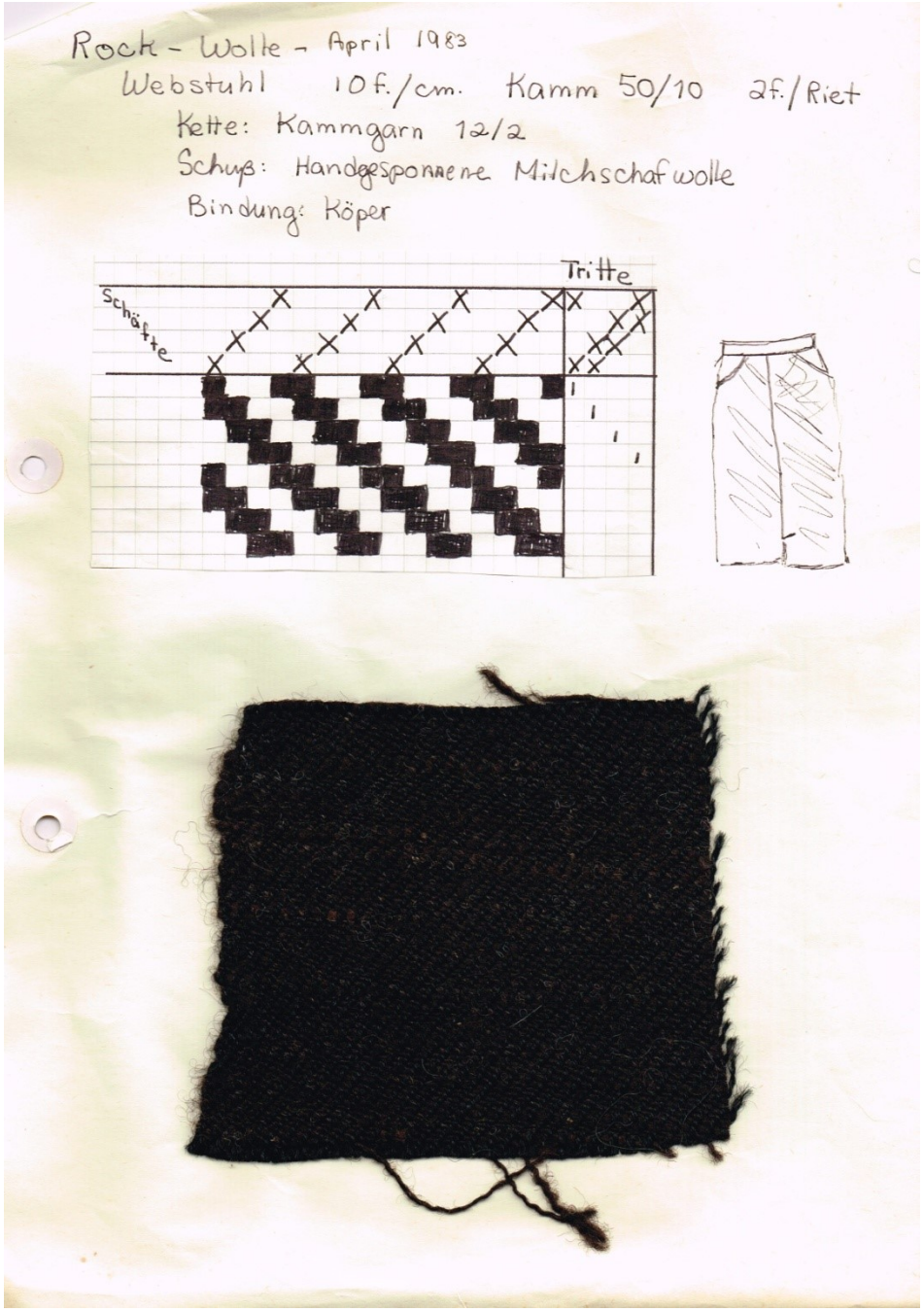
Kette: Baumwolle 20/2

Schuß: Lintow (Leinen, Kurzfaser) 10/1

Bindung: Gänseaugenköper



Streifen:
Kett wie Schuß
4 Blau
8 Weiß
10 Blau
12 Weiß
10 Blau
8 Weiß
4 Blau



Early examples of handwritten drafts

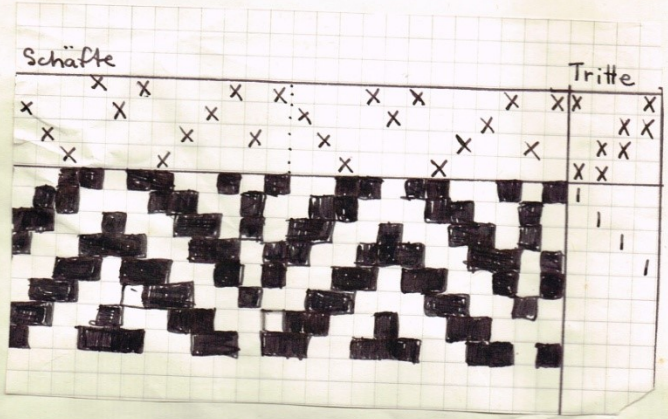
Jacke - Wolle - April 1983

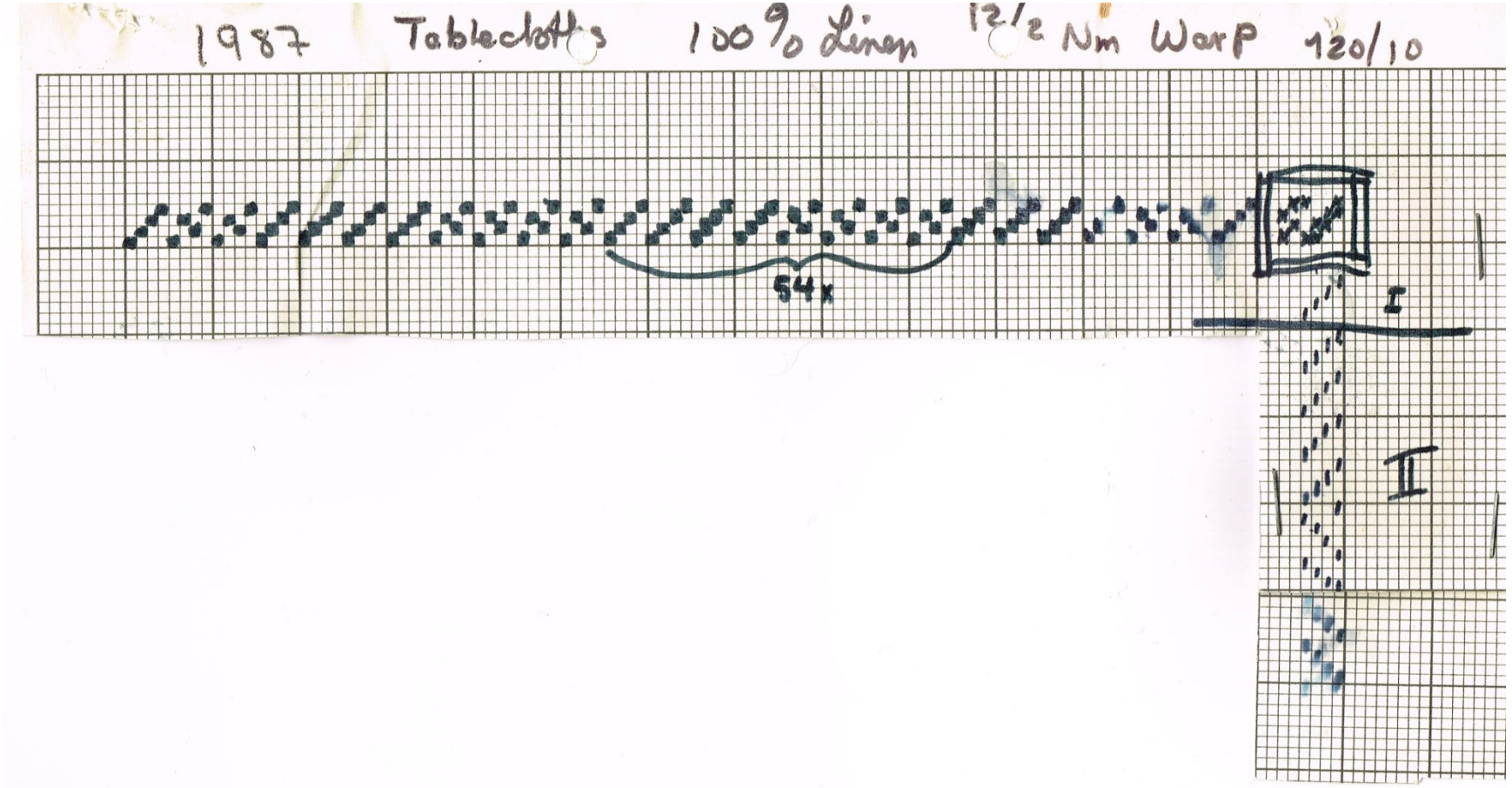
Webstuhl 5 f./cm. Kamm 50/10 — 1 f./Riet

Kette: Natur Webwolle 6/2

Schuß: Handgesponnene Wolle mit Faulbaumrinde gefärbt

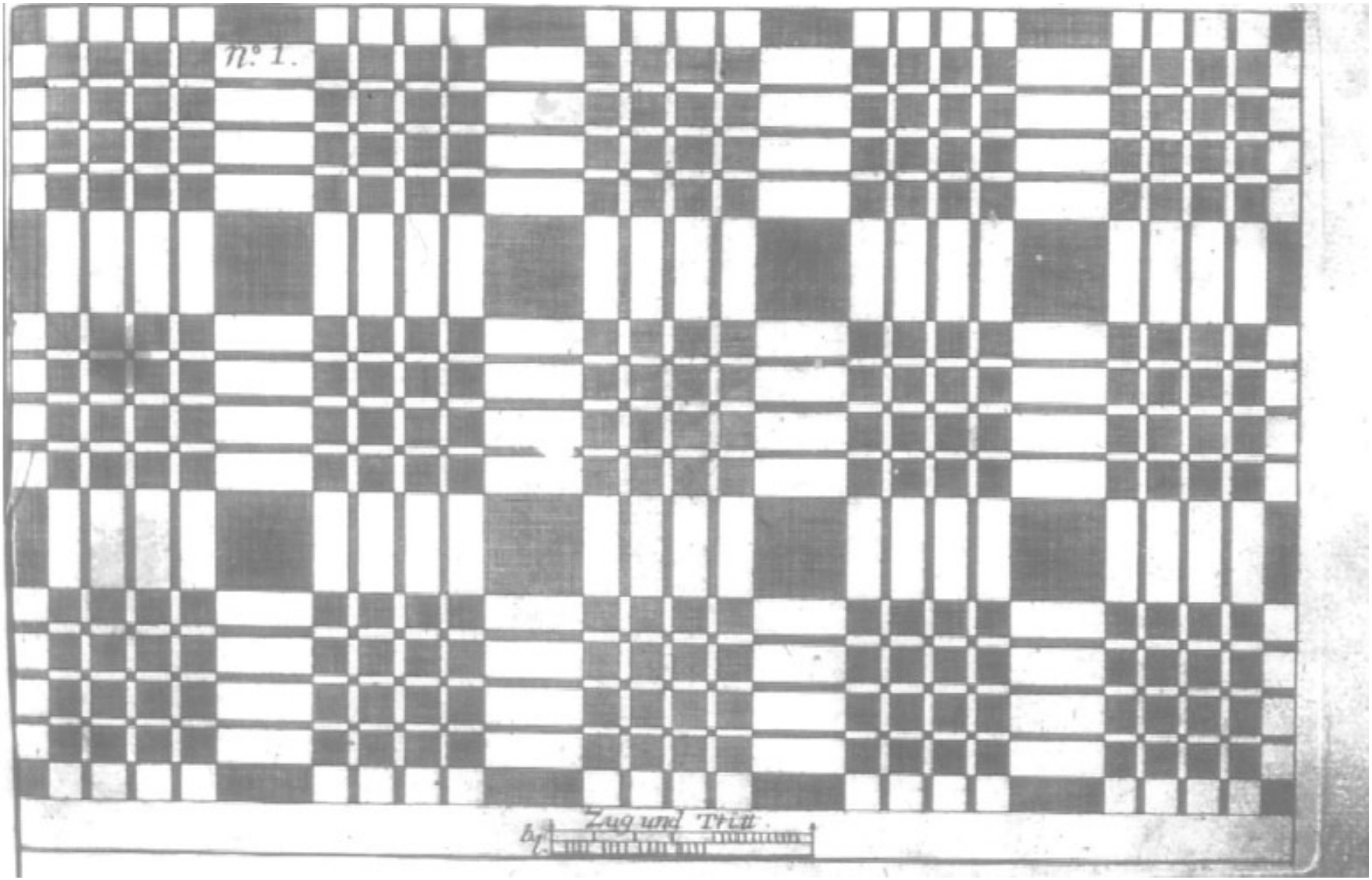
Bindung: Vogelauge - M. P. Davison Handweaver's Pattern Book, p. 20





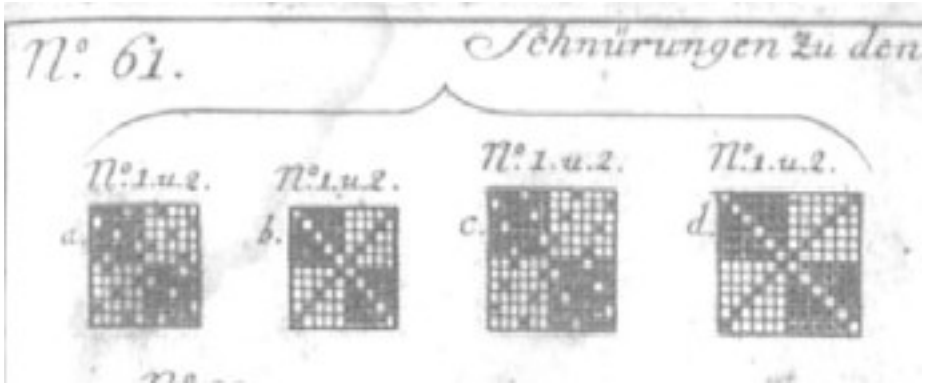
Draft done in ink on patron paper – 8 x 8 – at the time, required for publication in Webe mit-

Johann Michael Kirschbaum – book of profile geometries for handweavers

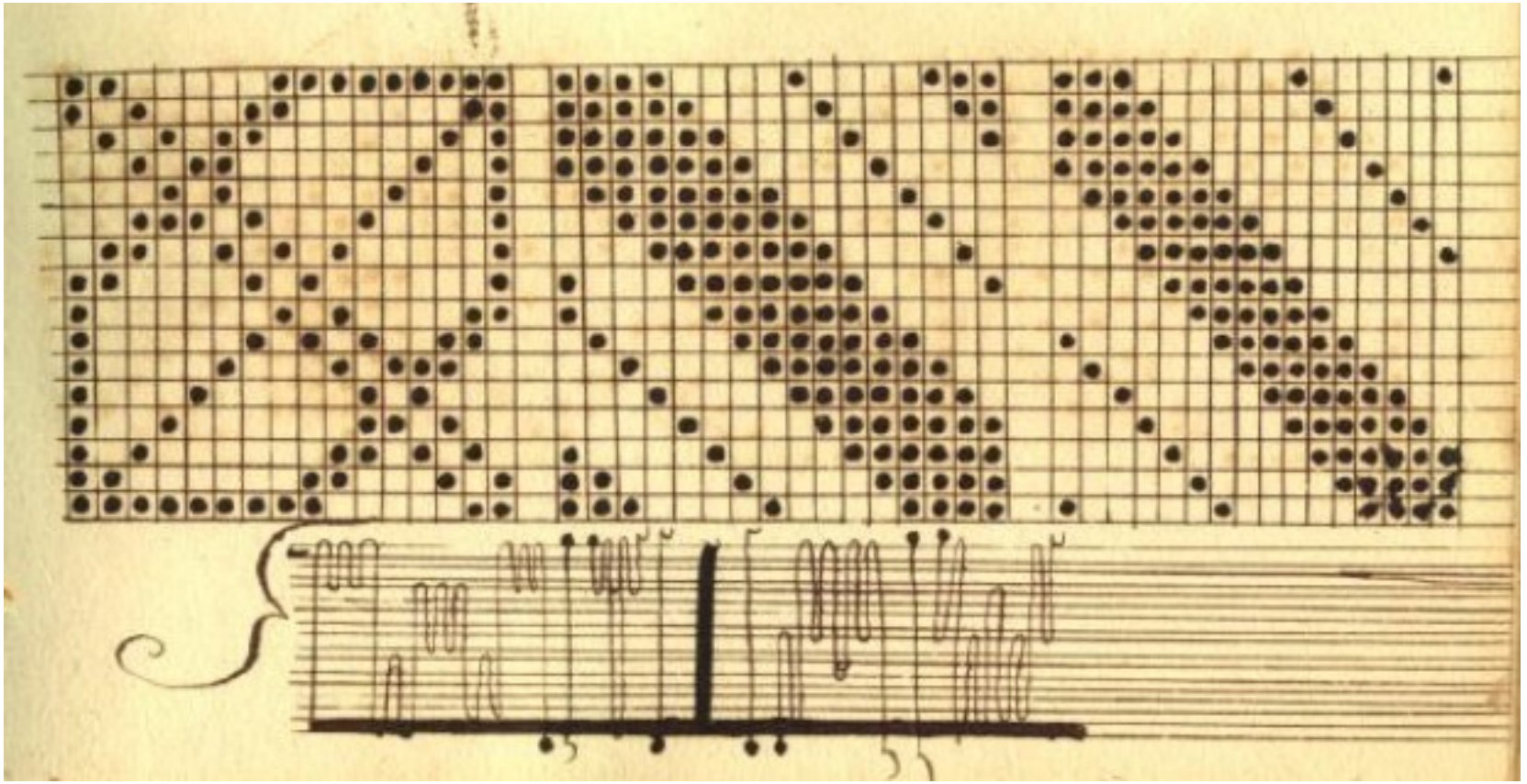


Shows both the block design and the arrangement of blocks for threading/treadling.

Sample tieups from Kirschbaum – showing possibilities for 2 block designs. The weaver then mixed and matched as desired when designing his fabric.



Note that the number of shafts and choice of structure were not present in the first design – here are suggestions for looms with 10 or 12 shafts.



Cyrus Uhler – 16 shaft threadings with assorted tieups note that the undulations indicate how many times that group of shafts should be threaded – point draw over those shafts.

Fig. 262.

16bindig. $\frac{4\ 2\ 2}{4\ 2\ 2}$

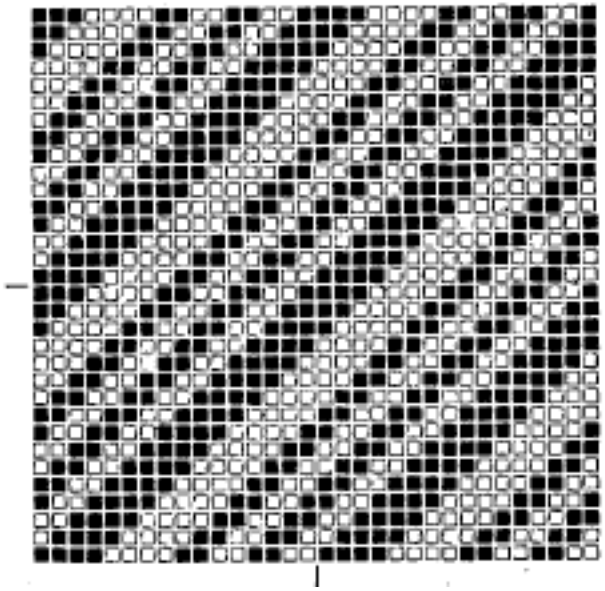
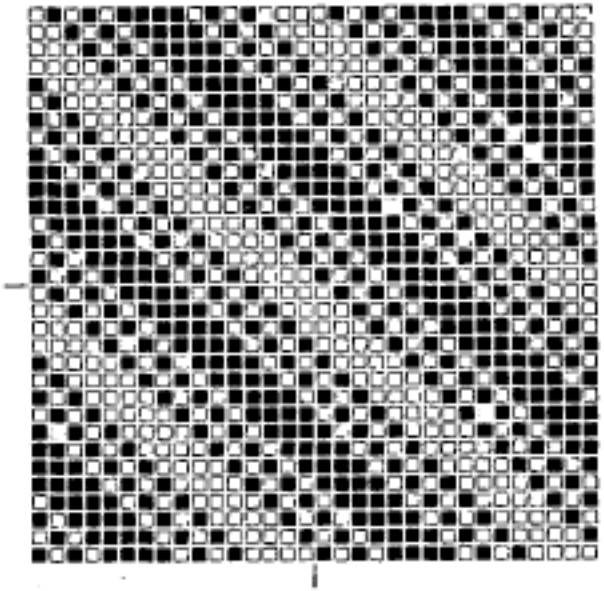


Fig. 263.

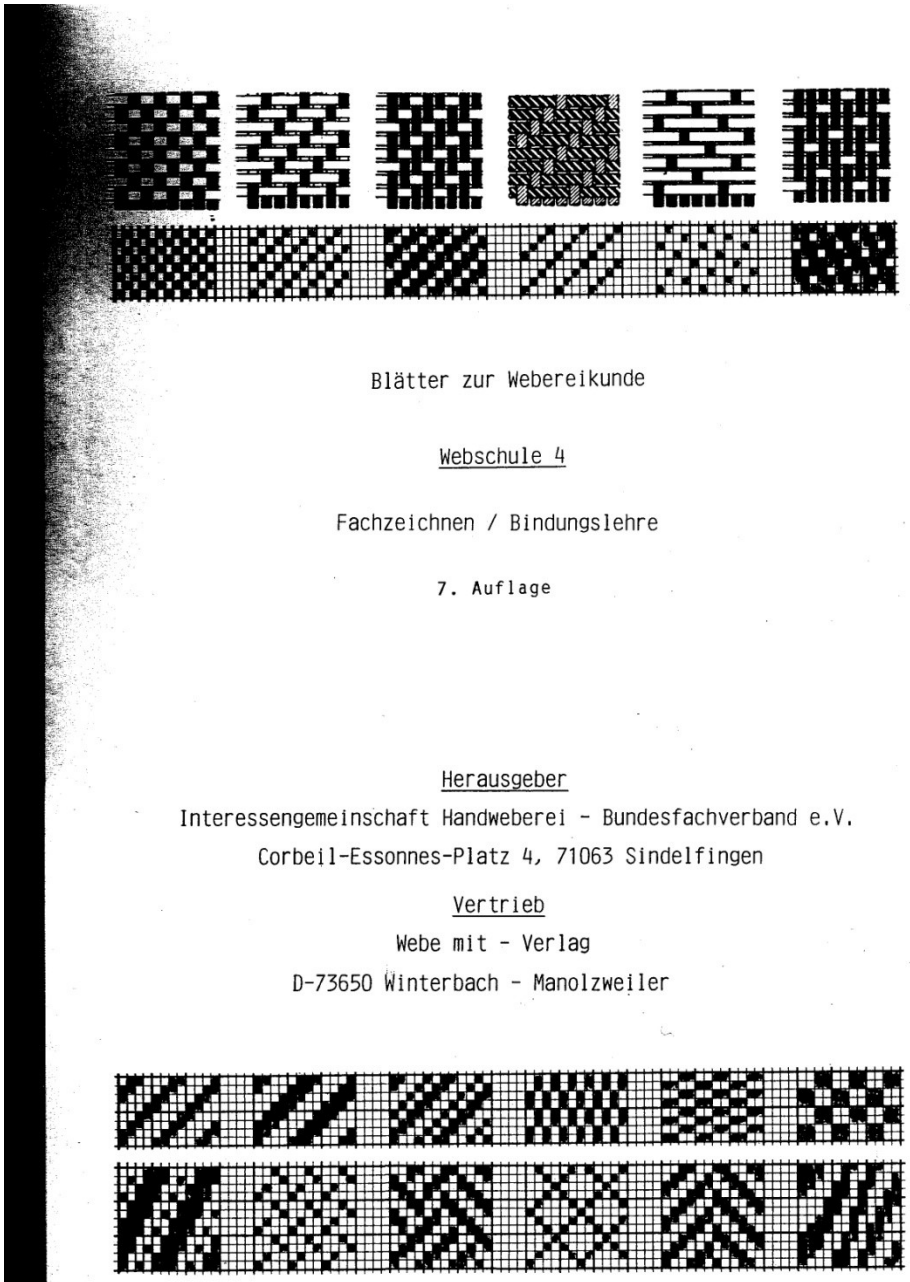
16bindig. $\frac{1\ 1\ 4\ 1\ 1}{1\ 1\ 1\ 1\ 4}$



G H Oelsner – bindings. Note, the hash marks show the rapport (smallest single repeat). Beginning at the lower left corner, the number of shafts is indicated by counting up to the hash mark. Number of treadles is indicated by counting from that lower left corner right to the hash mark.

Course of Study for Weaving (Germany)

- Fachkunde/Werkstoffkunde – Study of fibers, spinning techniques, textile finishing, care of textiles
- Fachkunde/Arbeitskunde – Technology of handlooms, power looms, Jacquard looms – loom setup and operation including ancillary tools and equipment
- Fachrechnen – Math for weavers – yarn calculations, sett, reed measurements – from simple warp length to estimating quantities for production runs
- Fachzeichnen/Bindungslehre – technical drawing - bindings and drafting
- Gewebe Analyse/Musterzerlegung – Fabric Analysis and pattern decomposition
- Grundlagen der Textilgestaltung – principles of textile design



Blätter zur Webereikunde

Webschule 4

Fachzeichnen / Bindungslehre

7. Auflage

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Interessengemeinschaft Handweberei - Bundesfachverband e.V.

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The study of Bindungslehre was traditional for the education of weavers, headed to become independent handworkers.

This is the title page of the volume (4 of 6 total) dedicated to this topic from the Weaving School in Sindelfingen Germany, actively educating professional weavers until it closed in 2000.

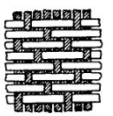
Nina Jacoby and Barbara Knupper studied there, as well as a few other weavers now active in N. America.

Discussion of Satin bindings and basic variations.

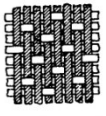
Note the diagram showing "S" and "Z" directions with a little binding square.

Note also the questions for the student at the bottom of the page.

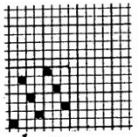
3. Die Atlasbindung (A)



Schußatlas 5



Kettatlas 5



$A\frac{1}{6}(3)$

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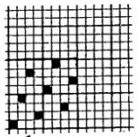

$A\frac{1}{7}(3)$

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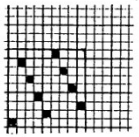

$A\frac{1}{8}(7)$

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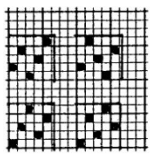
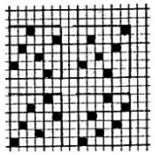
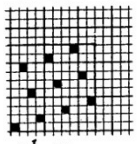




Atlas 5 und Atlas 6 auf 4 Arten



$A\frac{1}{8}(7)$

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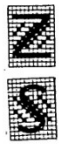
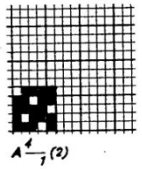
Atlas	Steigungszahlen
5bindig	2 3
7bindig	2 3 4 5
8bindig	3 5
9bindig	2 4 5 7
10bindig	3 7
11bindig	2 3 4 5 6 7 8 9
12bindig	5 7

Die Atlasbindungen haben unzusammenhängende Z- oder S-Grate im Rapport. Die einzelnen Hebungen bei Schußatlas berühren sich nicht. Gewebe in Atlas sind ungleichseitig = schuß- und kettseitig. Der kleinste Atlas ist fünfbindig. Der fünfbindige Atlas heißt auch Elementaratlas. Sein Kurzzeichen heißt $A\frac{1}{4}(2)$. A = Atlas, eine Hebung und vier Senkungen des 1. Kettfadens = Kennfadens, die Steigungszahl ist 2.
Für alle anderen Atlasbindungen gilt das Kurzzeichen sinngemäß gleich.
Die Bindungspunkte werden mit Steigungszahlen (SGZ) regelmäßig im Rapport verteilt. Die Steigungszahl gibt die Anzahl der Schußlinien an, um welche der Bindungspunkt in der nächsten Kettlinie höher rückt.
Die kleinste Steigungszahl für Atlas ist zwei. Die für einen Atlas geeignete Steigungszahl ist einer der Posten für die Rapportsumme. Z.B.:
Fünf läßt sich in die Posten 1 + 4 und 2 + 3 zerlegen. Die Auswahl geeigneter Steigungszahlen = Posten erfolgt nach vier Regeln:
1. die Posten müssen größer als eins sein,
2. die Posten müssen verschieden groß sein,
3. die Posten dürfen nicht ineinander teilbar sein,
4. die Posten dürfen nicht durch eine dritte Zahl teilbar sein.

Für Atlas 5 sind demnach die Steigungszahlen 2 und 3 geeignet.
Für Atlas 6 sind demnach keine Steigungszahlen möglich. Atlas 6 ist ein unregelmäßiger Atlas = Kreuzatlas mit verschiedenen Steigungszahlen.
Atlas 6 wird mit den Steigungszahlen 2, 2, 3, 4 und 4 patroniert.
Für Atlas 7 sind die Steigungszahlen 2, 3, 4 oder 5 möglich.
Je größer die Steigungszahl, desto steiler verläuft der Grat.

Gewebe in Atlas sind glatt und glänzend. Sie haben klare Kett- und Schußeffekte, da Fadenflottungen einzelne Bindungspunkte verdecken.
Der Blatteinzug muß gewählt werden, daß er im Kettrapport aufgeht. Andernfalls können sich Schußfadenflottungen köpergratähnlich aneinanderreihen, was zu Scheinköper oder Scheingraten führt.
Gewebe in Atlas werden für Kleider- und Futterstoffe verwendet.
Handelsnamen sind: Satin und Duchesse





$A\frac{1}{7}(2)$

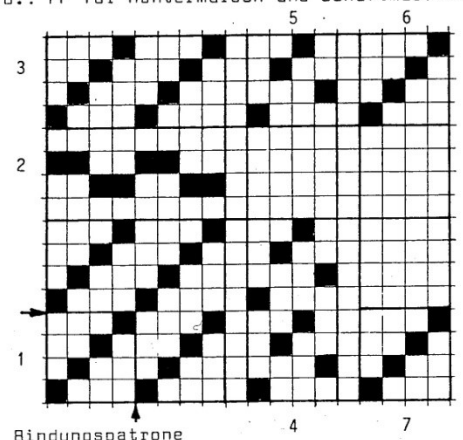
Erkenntnisfragen

1. *Welche Merkmale haben Gewebe in Leinwand?*
2. *Welche Bedeutung hat die Gewebeformel L 1/1?*
3. *Welche Merkmale haben Gewebe in Elementarköper?*
4. *Warum wird köper meist schußseitig gewebt?*
5. *Welche Leistenbindung wird für Köper 3 verwendet?*
6. *Welche Merkmale haben Gewebe in Elementaratlas?*
7. *Was versteht man unter Steigungszahl?*
8. *Wie werden geeignete Steigungszahlen für Atlas gefunden?*
9. *Welche besonderen Merkmale hat Atlas 6?*
10. *Was versteht man unter Flottung und wie wirkt sie bei Atlas?*

Fertigungspatrone
==========

WS/Fz Blatt 3 a

Z.B.: FP für Kontermarsch und Schaftmaschine von Köper 1/3



Bestandteile

Allgemeine Bestandteile

1 = Bindungspatrone 8:8 aus Bindungsrapport 4:4 und Erweiterung

2 = Blatteinzug

3 = Geschirreinzug

Spezielle Bestandteile für Kontermarsch (KM)

4 = Trittfolge

5 = Schnürung (Anschnürung)

Spezielle Bestandteile für Schaftmaschine (SM)

6 = Platinenfolge

7 = Kartenschlagpatrone

1. Bindungspatrone
Die Bindungspatrone ist die technische Zeichnung der Gewebebindung auf dem Patronenpapier. Sie besteht aus dem Bindungsrapport (schwarz) und der Erweiterung (rot). Ausgefüllte Linienquadrate zeigen Kettheben und leere Linienquadrate Kettsenkungen.

2. Blatteinzug (Rieteinzug)
Der Blatteinzug zeigt die Kettfadenzahl pro Riet (Rohr).

3. Geschirreinzug (Schafteinzug)
Der Geschirreinzug zeigt die Reihenfolge, in der die Kettfäden in die Litzen auf den Schäften eingezigen werden müssen.
- Jeder andersbindende Kettfaden erfordet einen neuen Schaft.
- Gleichbindende Kettfäden werden auf denselben Schaft eingezogen.
Die Schäfte werden von vorn nach hinten numeriert.

4. Trittfolge (Tretweise)
Die Trittfolge zeigt die Reihenfolge, in der die Tritte beim Weben mit der Kontermarsch-Vorrichtung getreten werden müssen.
- Jeder andersbindende Schußfaden erfordert einen neuen Tritt.
- Gleichbindende Schüsse haben denselben Tritt = dasselbe Webfach.
Die Tritte werden von links nach rechts numeriert.

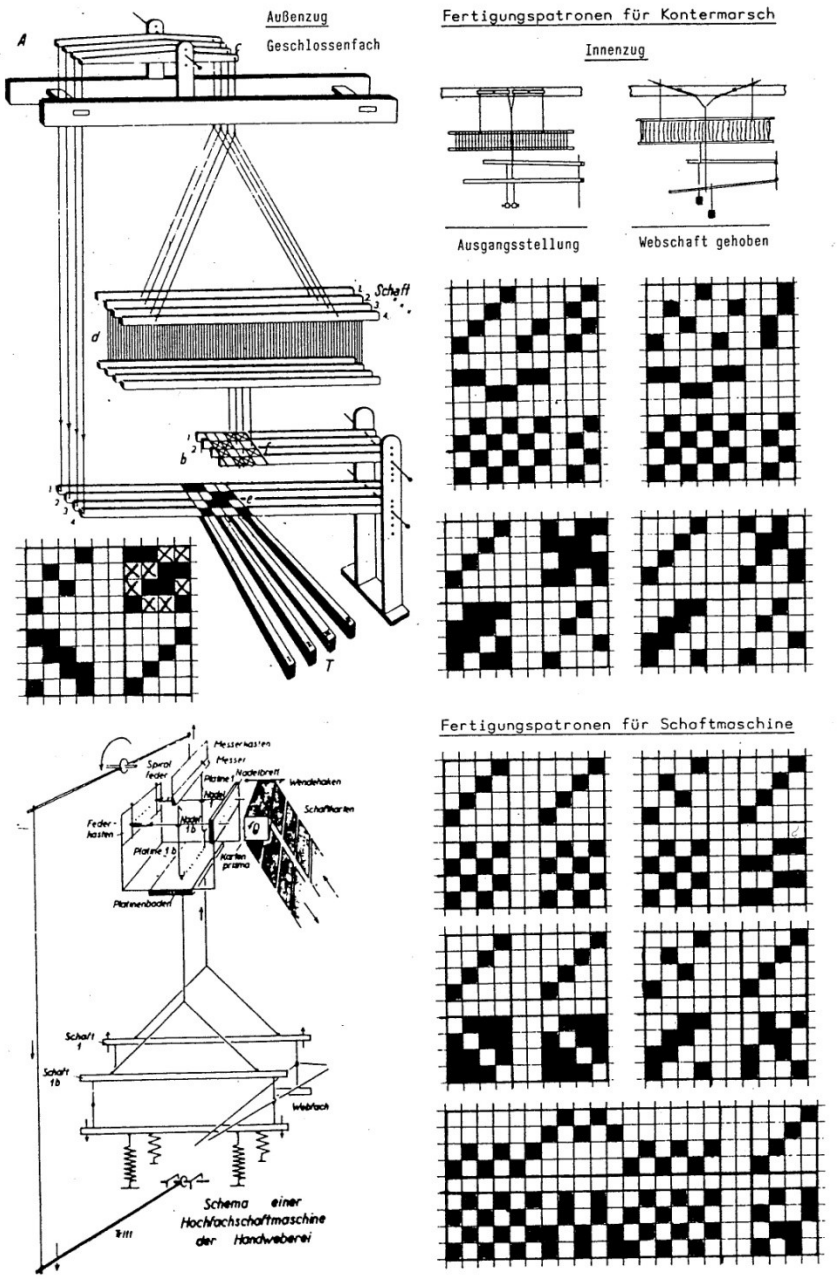
5. Schnürung (Anschnürung)
Die Schnürung zeigt, wie die Tritte mit den Schemeln beim Weben mit der Kontermarsch-Vorrichtung verbunden werden müssen.
Das Linienquadrat wird bei Hochzug ausgefüllt, z.B. Tritt 1 bei Schuß 1 hebt Kettfaden 1 in Schaft 1 = Hochzug bei Kreuzung Tritt und Schaft 1.

6. Platinenfolge
Die Platinenfolge zeigt die Reihenfolge der Platinen für das Bewegen der Schäfte mit Schaftmaschine. Die Reihenfolge wird in Form der Z-Diagonale dargestellt. Die Platinen werden von vorn nach hinten numeriert.

7. Kartenschlagpatrone
Die Kartenschlagpatrone (Schlagpatrone) ist die Anweisung für das Schlagen der Schaftkarten. Für jeden Schuß ist eine Karte erforderlich. Ausgefüllte Linienquadrate bedeuten Hochzug der Schäfte. Leere Linienquadrate bedeuten Tiefzug der Schäfte. Allgemein werden die Hochzüge auf der Kartenschlagpatrone gezeichnet und in die Karte geschlagen = positive Schlagweise, z.B. Karte 1 bei Schuß 1 hebt Kettfaden 1 in Schaft 1 = Hochzug bei Kreuzung Karte 1 mit Platine 1.
Die Karten werden in der Reihenfolge des Schußeintrages numeriert.

Depiction of a simple twill binding and the various representations to create this fabric.

This page is translated in your handout and will be handled later in the presentation.



Diagrammatic representation of bindings and how they are shown in weave drafts for both countermarche and dobby looms.

Note that the lower lams mark the black tieup squares, indicating rising warp threads. In much European weaving literature, the black square indicates a rising warp – check the draft – a black square on the tieup indicates a rising shed.

The plans for the dobby, in the lower half of the page equate to lift plans today.

ISO Weaves – ISO Standard 9354

A naming system for basic weaves

Prior to adopting this standard in 1976, there had been a German DIN norm 61101. This German standard was adopted internationally.

The DIN norm 61101 was the collection of the systematic notation developed by German weavers in the mid 18th and early 19th centuries.

ISO nomenclature for bindings. There are four groups, separated by a hyphnen.
Within the group, there can be one or more two digit numbers separated by spaces.

1. Kind of weave, or binding art. A single, 2-digit number.

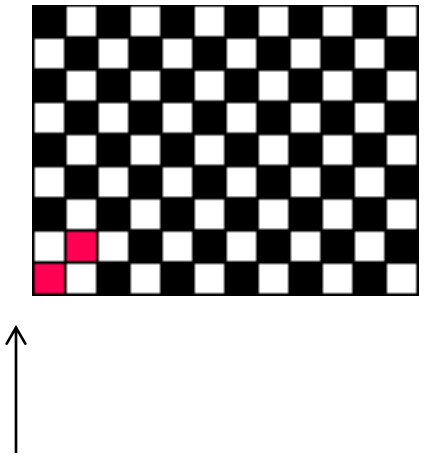
2. **Interlacing** – a description of the raised and lowered warp threads in numeric terms. Can be more than one 2-digit number separated by a space.

3. **Sequence of interlacing**. This shows the number of warp threads acting together – again with one or more 2-digit numbers separated by a space.

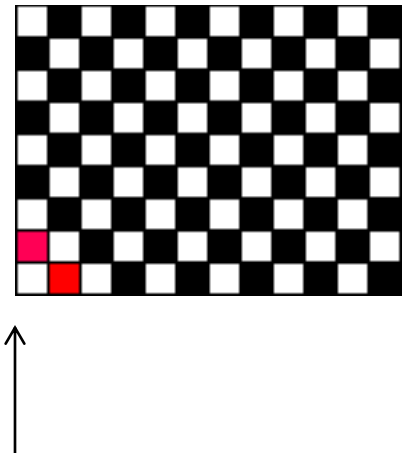
4. **Step or move number**, from the German the rise.
Once more this is represented with one or more 2-dig numbers separated by a space.

Note: the starting point for all diagrams that follow is the lower left hand corner.
The interlacing is calculated on the column, moving from bottom to top.
The sequence of interlacing is done left to right.
The step number is calculated bottom to top.

ISO Notation for the basic binding systems.
The first two digit number designates the binding system – here we have 1 for plain weave and 0 or 1 as the second digit to designate the position of the first warp thread, located in the lower left-hand corner of the binding diagram.

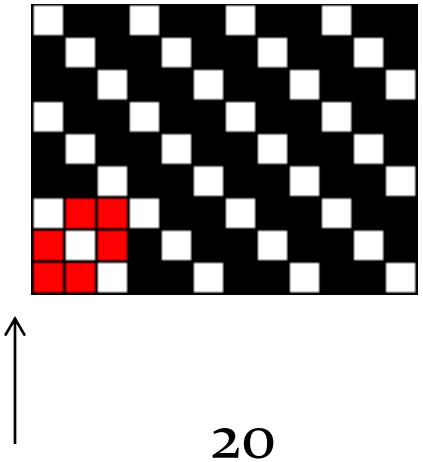


10
Plain

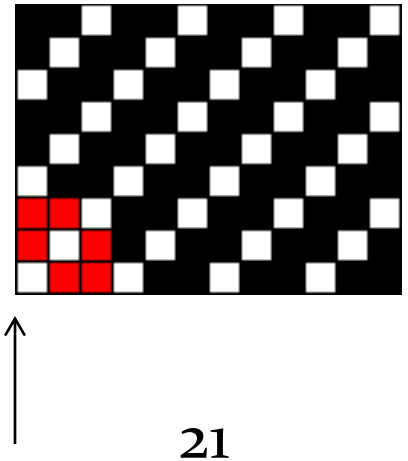


11
Plain

Here are examples for twill – showing the derivation of the first two digit portion of the ISO designation.

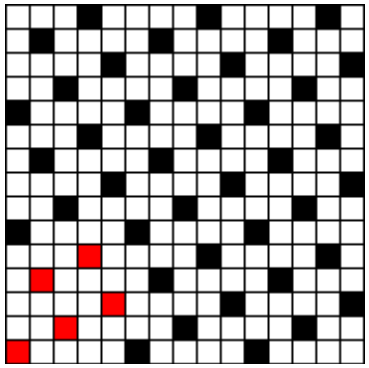


20
Twill

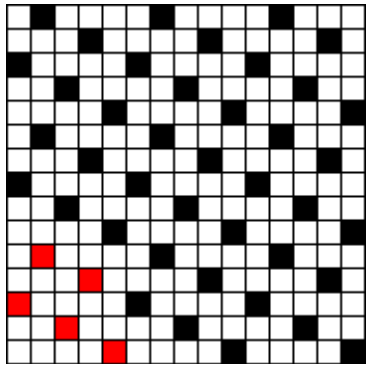


21
Twill

5-end satin, showing options for first warp up or down. Using the old nomenclature, S designates a sateen or weft satin and A designates “atlas” or warp faced satin.

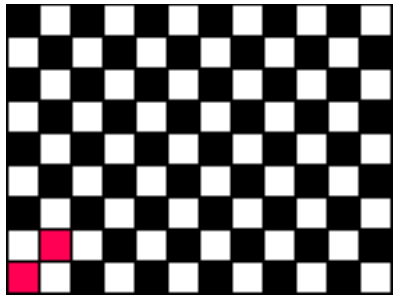


30
Sateen

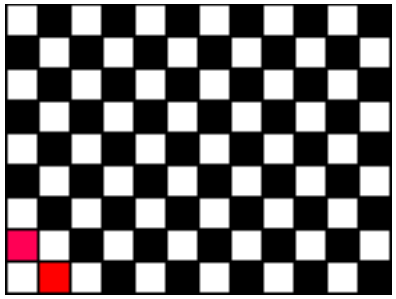


31
Sateen

ISO Notation for the basic binding systems.
The second two digit number designates the interlacing, a description of the raised and lowered warp threads in numeric terms.
Can be more than one two digit number.

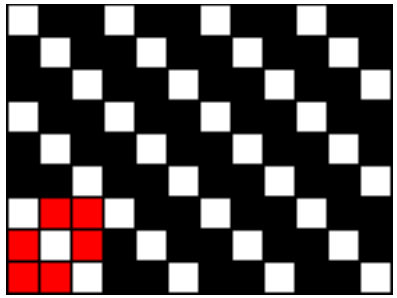


10-01 01

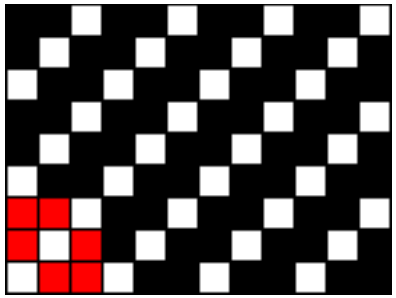


11-01 01

Here are examples for twill – showing the derivation of the second two digit portion of the ISO designation. Note that when the direction of the twill changes, so does the binding.

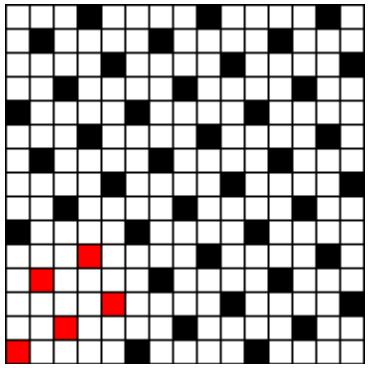


20-02 01

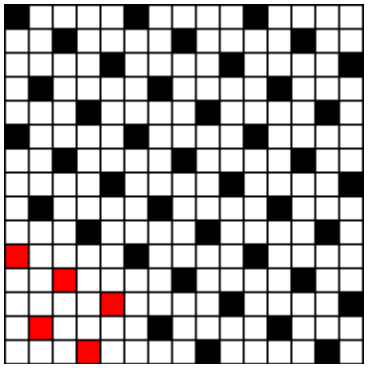


21-01 02

5-end satin, showing options for the second portion of the ISO description, 1 thread up and 4 down in the left example, reversed on the right

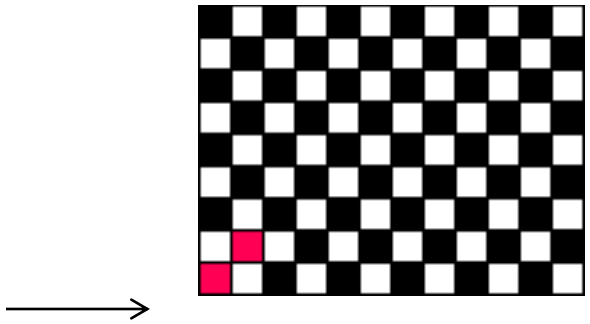


30-01 04

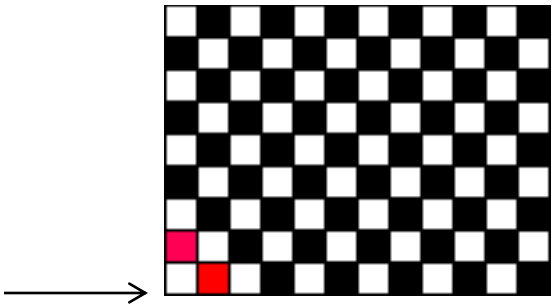


31-04 01

ISO Notation for the basic binding systems.
The third portion of the ISO description describes the sequence of interlacing. In the most common weaves, this is single threads alternating to form the binding. These examples are all simple alternations.

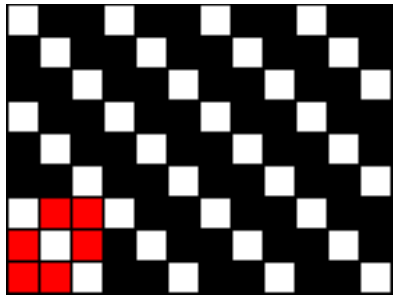


10-01 01-01

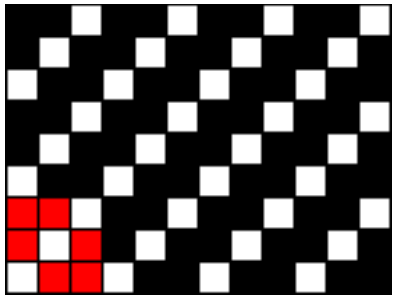


11-01 01-01

Here are examples for twill – showing the third two digit portion of the ISO designation.
Note that both bindings alternate single threads hence the value of this portion is the same for both.

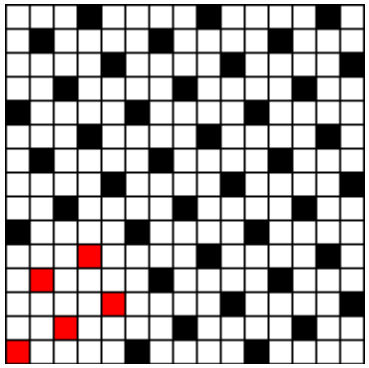


20-02 01-01

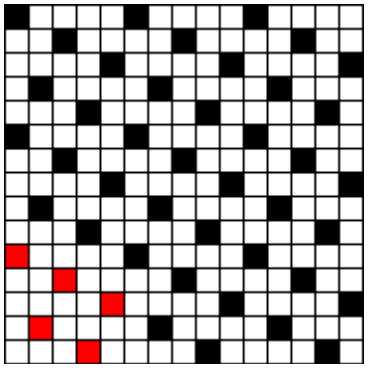


21-01 02-01

5-end satin, showing options for the third portion of the ISO description, both bindings alternating single threads to make the fabric. Here, also, the third portion is the same.

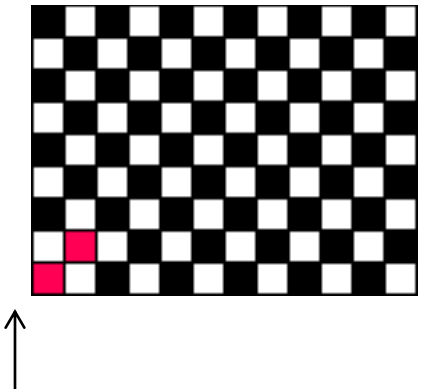


30-01 04-01

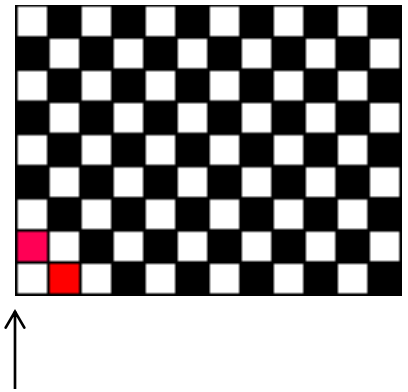


31-04 01-01

ISO Notation for the basic binding systems.
This is the complete notation for plain weave with alternating single threads – for both conditions – first warp up and first warp down.
The oo in the 4th element indicates a straight alternation of single weft picks that is common to plain weaves and their derivatives.
For more complex bindings, this 4th element indicates the "rise" in the progression of interlacements .

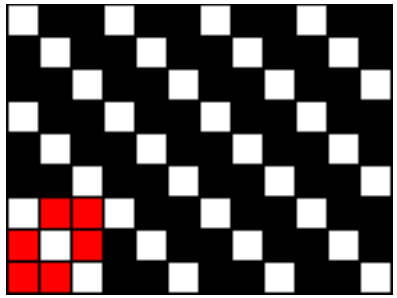


10-01 01-01-00

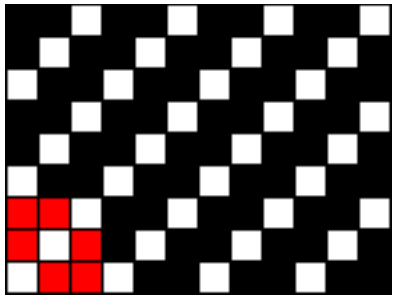


11-01 01-01-00

Here are examples for twill – showing the final notation. The “rise” is computed by counting the number of weft threads passed over before the intersection of the next thread to the right.

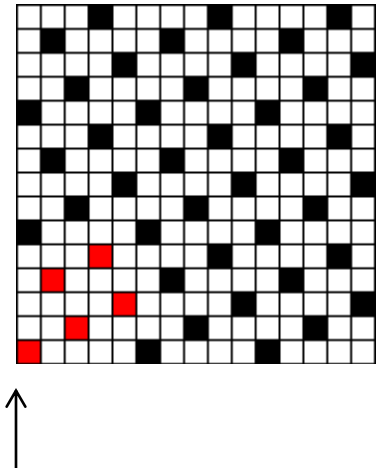


20-02 01-01-02

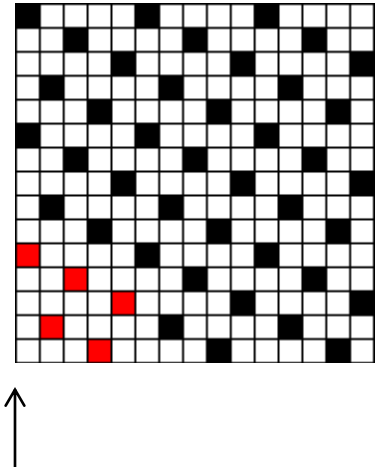


21-01 02-01-01

5-end satin, showing the final description.
As one browses the binding, there is a skip upward in weft threads of 2 or 3 as the warp threads progress from left to right



30-01 04-01-03



31-04 01-01-02

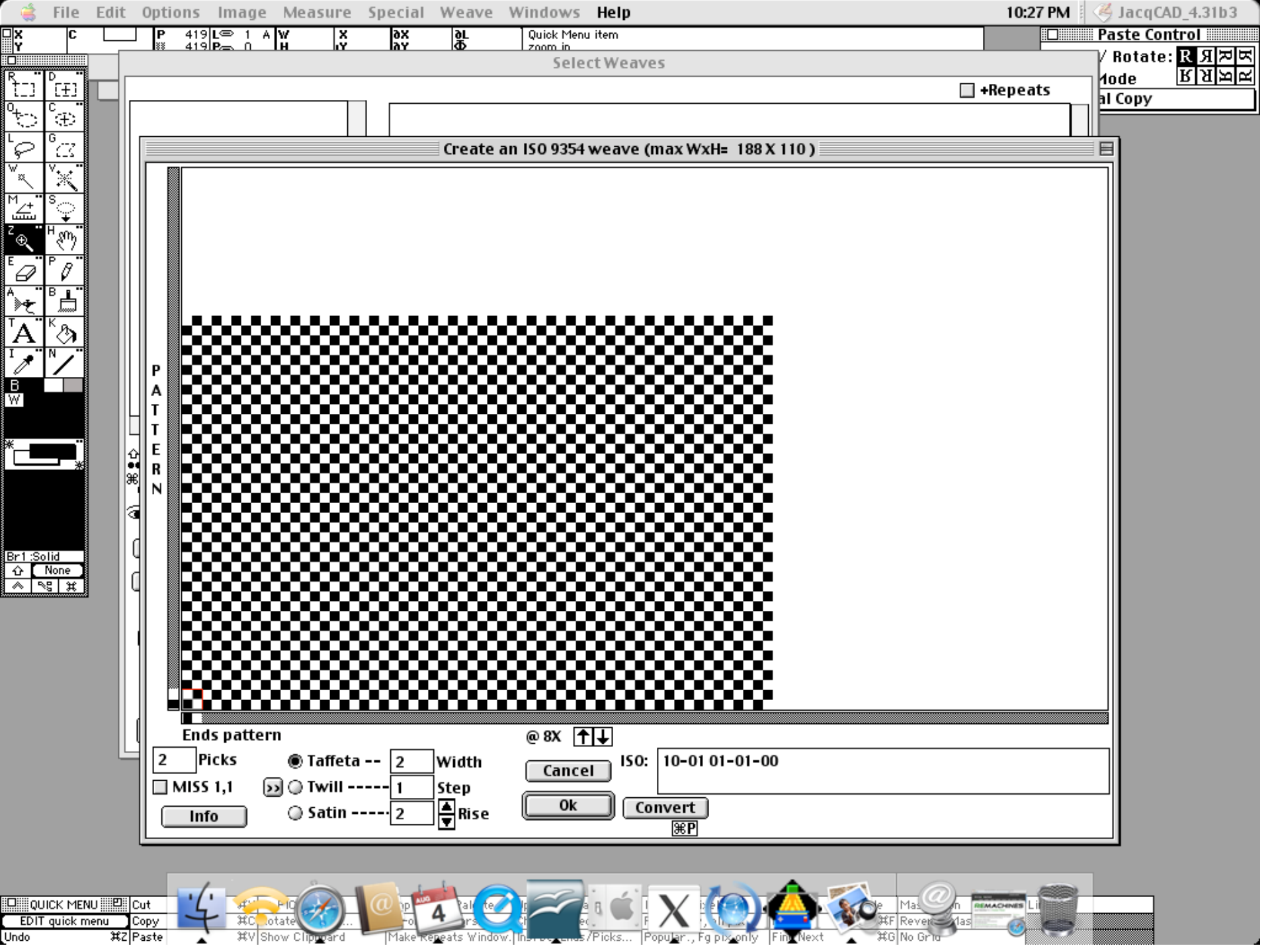
The following slides accompany the examples on page 3 and show an expanded version of the bindings there.

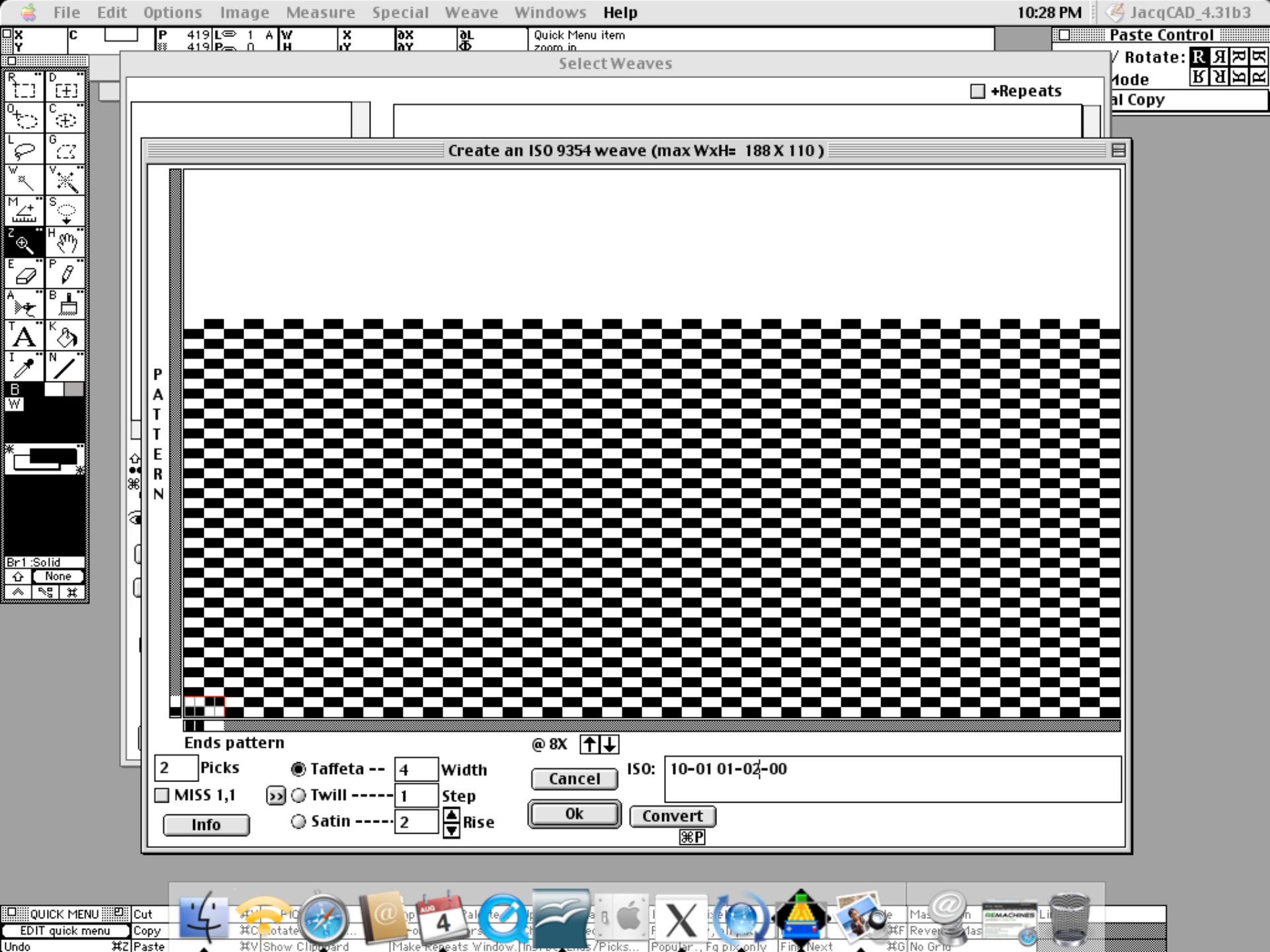
The following examples show the binding in its smallest form, the ISO description, and the older German notation that formed this system.

L = Leinwandbindung or plain weave
K = Koeper or twill
A = Atlas or satin

What looks like a fraction is the order of warp ends up or down rather than the ISO depiction with multiple two digit numbers. The S or Z at the end indicates the direction of twill weaves.

To illustrate how these weaves look when tiled across a screen, there is an accompanying JacqCAD screen for each ISO number.
All have been verified by typing the ISO number into the blank on the JacqCAD screen -


File Edit Options Image Measure Special Weave Windows Help
10:27 PM
JacqCAD_4.31b3
Quick Menu item
zoom in
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
Ends pattern
@ 8X
2 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
2 Width
1 Step
2 Rise
Cancel
Ok
ISO:
10-01 01-01-00
Convert
⌘P
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste
⌘V Show Clipboard
Make Repeats Window
Popular., Fg pix only
Find Next ⌘G
No Grid


File Edit Options Image Measure Special Weave Windows Help
10:28 PM
JacqCAD_4.31b3
Quick Menu item
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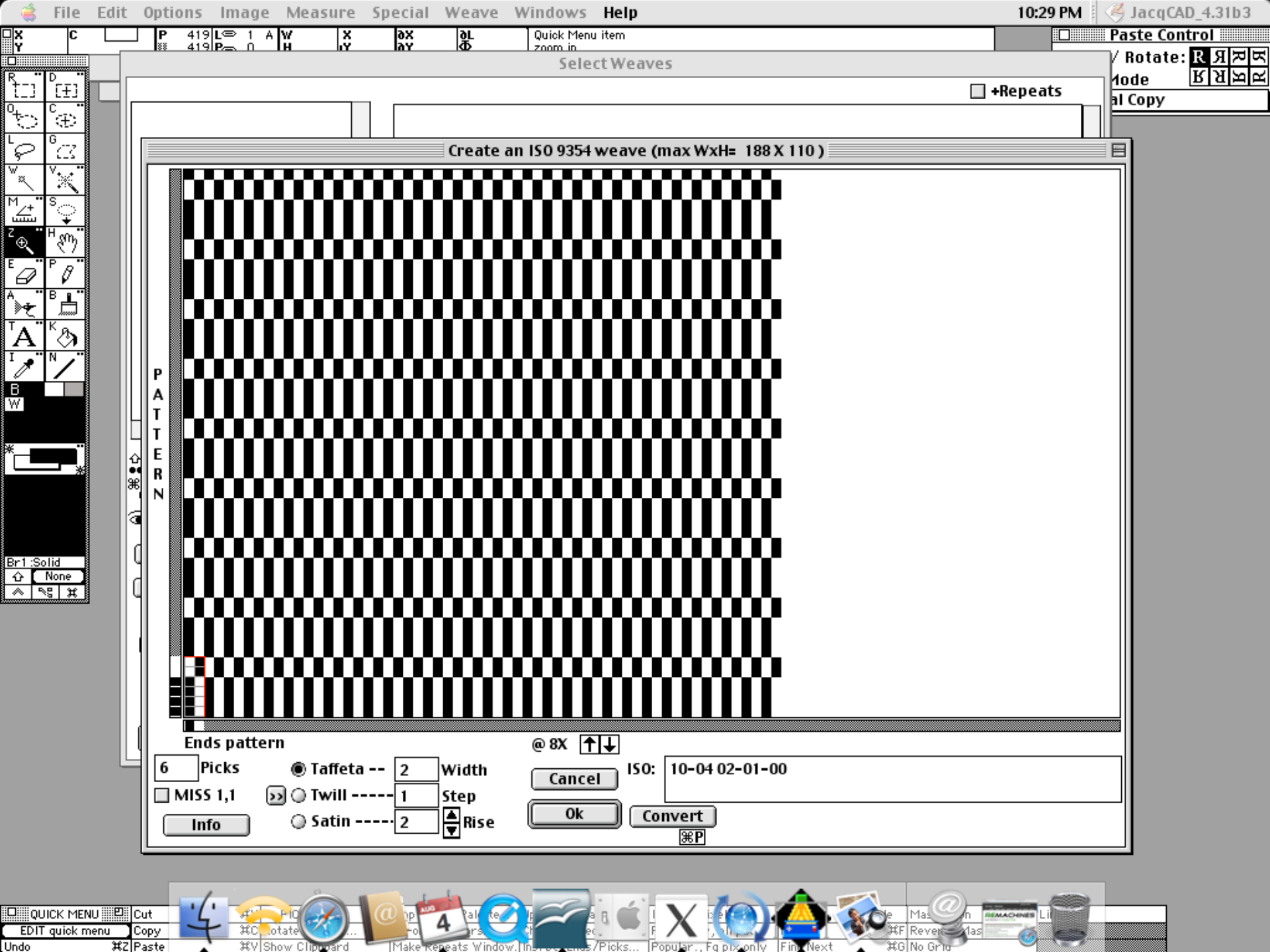
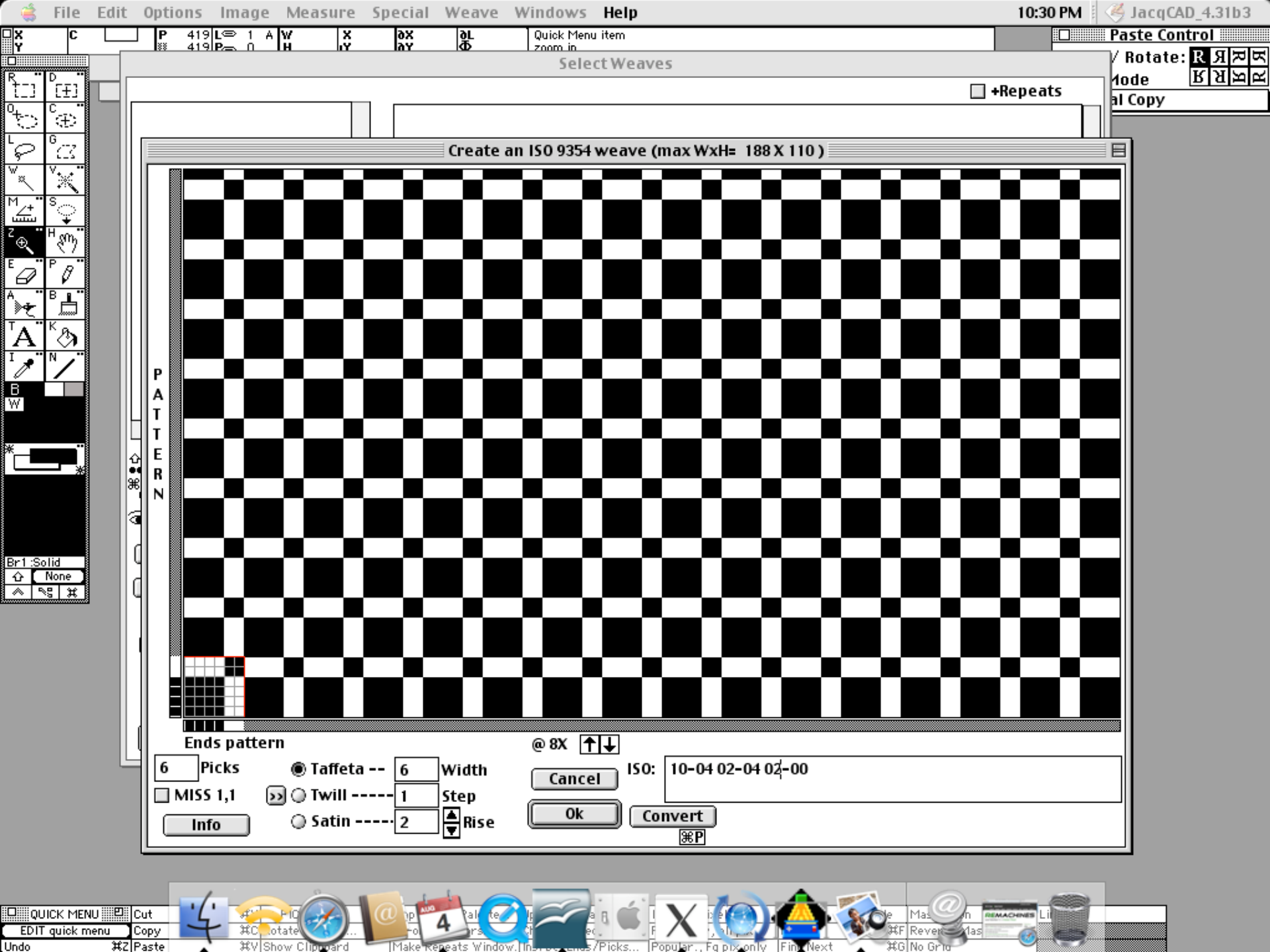
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
Ends pattern
@ 8X
2 Picks
Taffeta -- 4 Width
MISS 1,1
Twill ----- 1 Step
Satin ----- 2 Rise
Info
Cancel
Ok
ISO: 10-01 01-02-00
Convert
⌘P
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste


File Edit Options Image Measure Special Weave Windows Help
10:29 PM
JacqCAD_4.31b3
Quick Menu item
zoom in
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
Ends pattern
@ 8X
6 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
2 Width
1 Step
2 Rise
Cancel
Ok
ISO:
10-04 02-01-00
Convert
⌘P
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste
Show Clipboard
Make Repeats Window
Popular..
Fq pix only
Find Next ⌘F
No Grid ⌘G


File Edit Options Image Measure Special Weave Windows Help
10:30 PM
JacqCAD_4.31b3
Quick Menu item
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Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
Ends pattern
@ 8X
6 Picks
Taffeta --
6 Width
MISS 1,1
Twill -----
1 Step
Satin -----
2 Rise
Info
Cancel
Ok
ISO:
10-04 02-04 02-00
Convert
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Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
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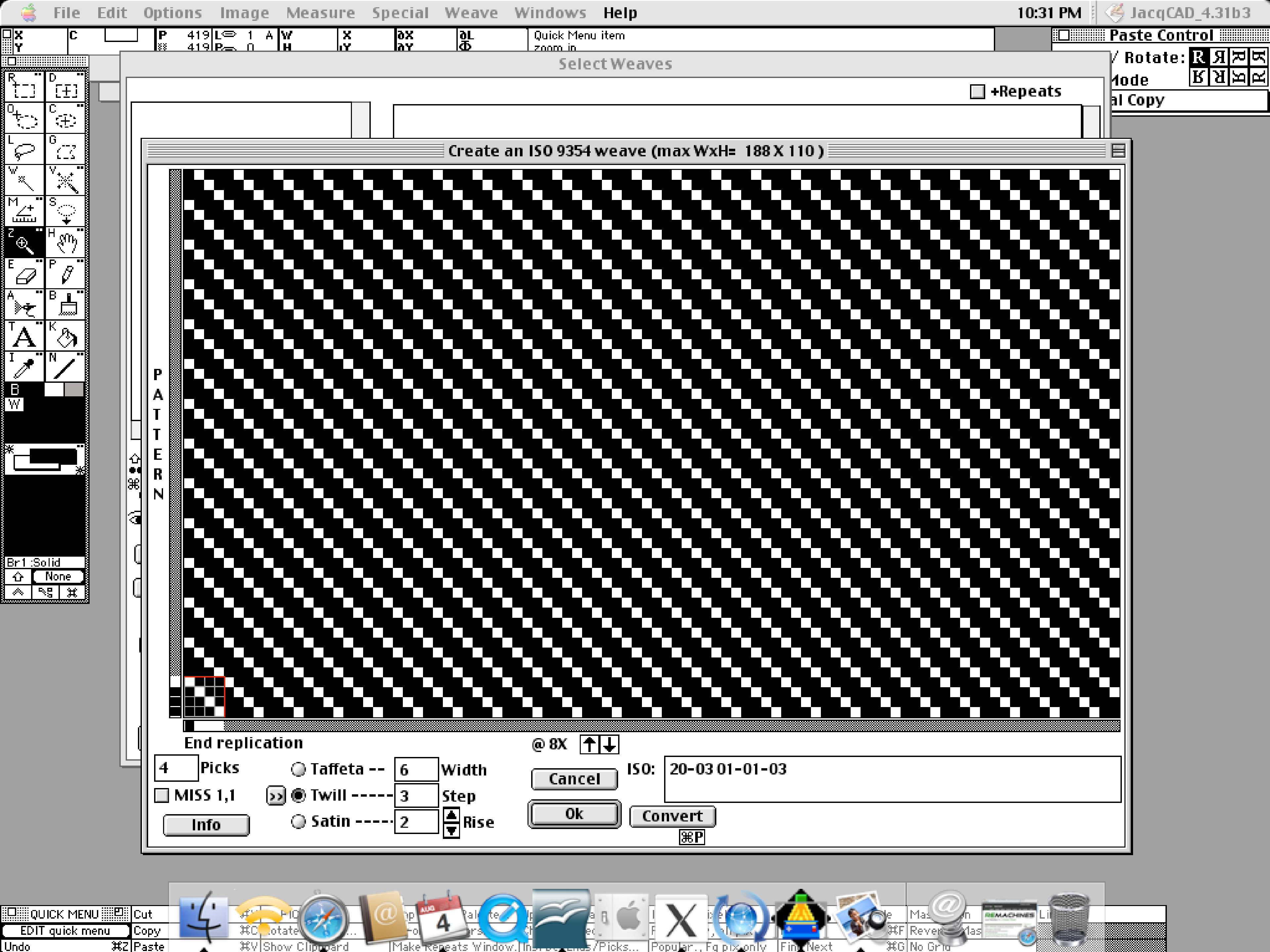
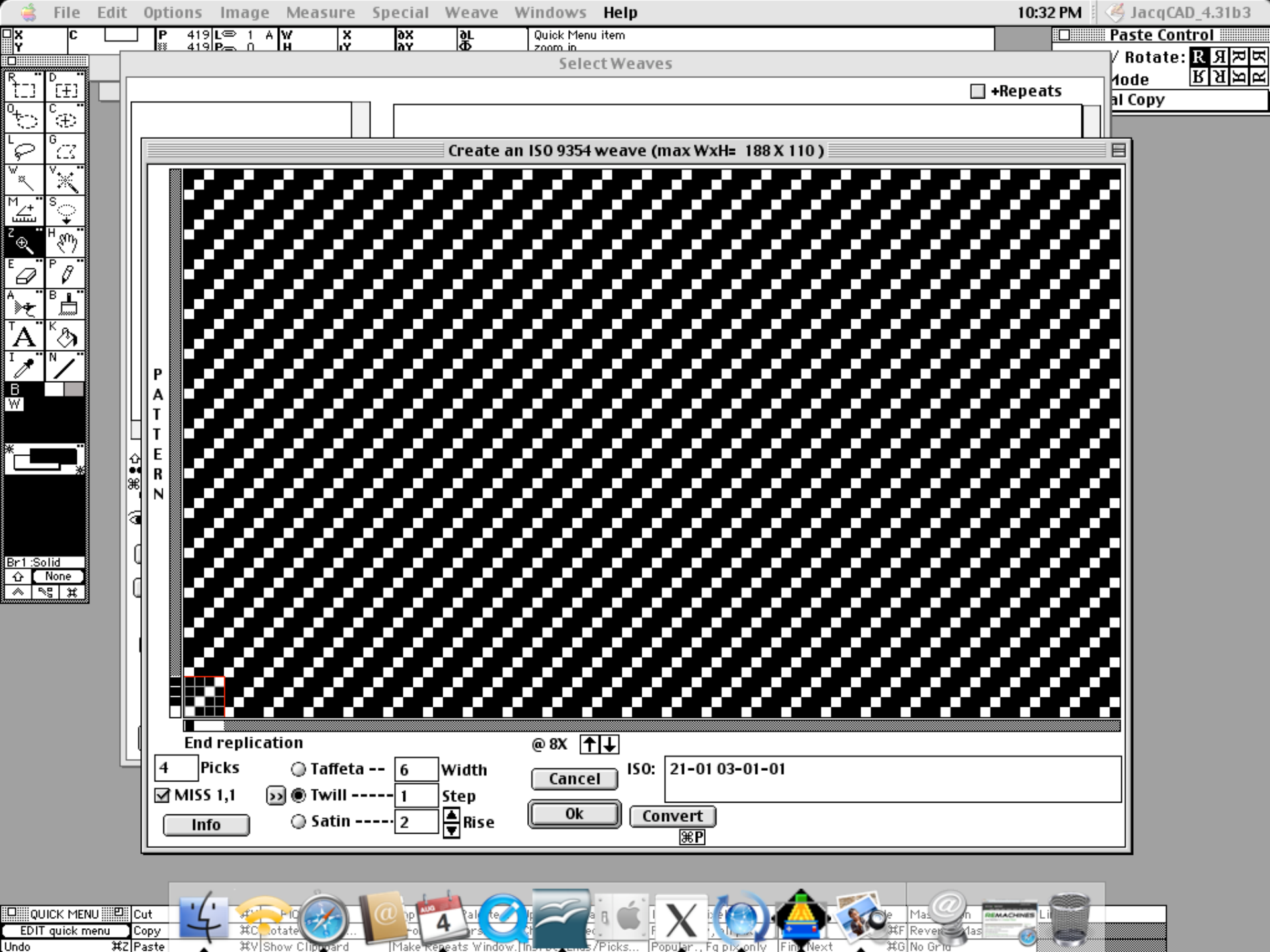
Copy
Paste


File Edit Options Image Measure Special Weave Windows Help
10:31 PM
JacqCAD_4.31b3
Quick Menu item
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
End replication
@ 8X
4 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
6 Width
3 Step
2 Rise
Cancel
Ok
Convert
⌘P
ISO:
20-03 01-01-03
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste
Show Clipboard
Make Repeats Window
Find Next
No Grid


File Edit Options Image Measure Special Weave Windows Help
10:32 PM
JacqCAD_4.31b3
Quick Menu item
zoom in
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
End replication
@ 8X
4 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
6 Width
1 Step
2 Rise
Cancel
Ok
ISO:
21-01 03-01-01
Convert
⌘P
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste
Show Clipboard
Make Repeats Window
Popular...
Fq pix only
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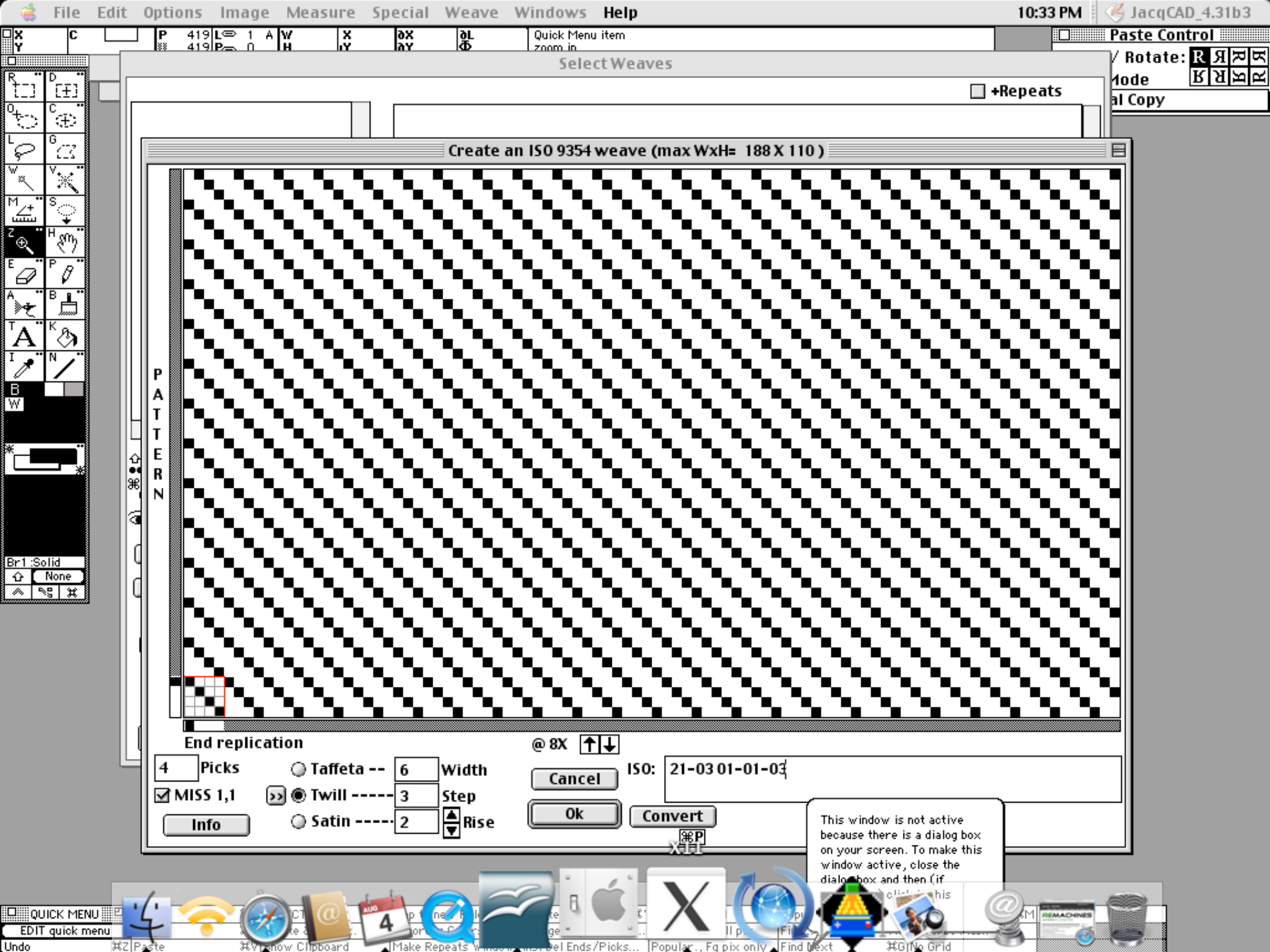
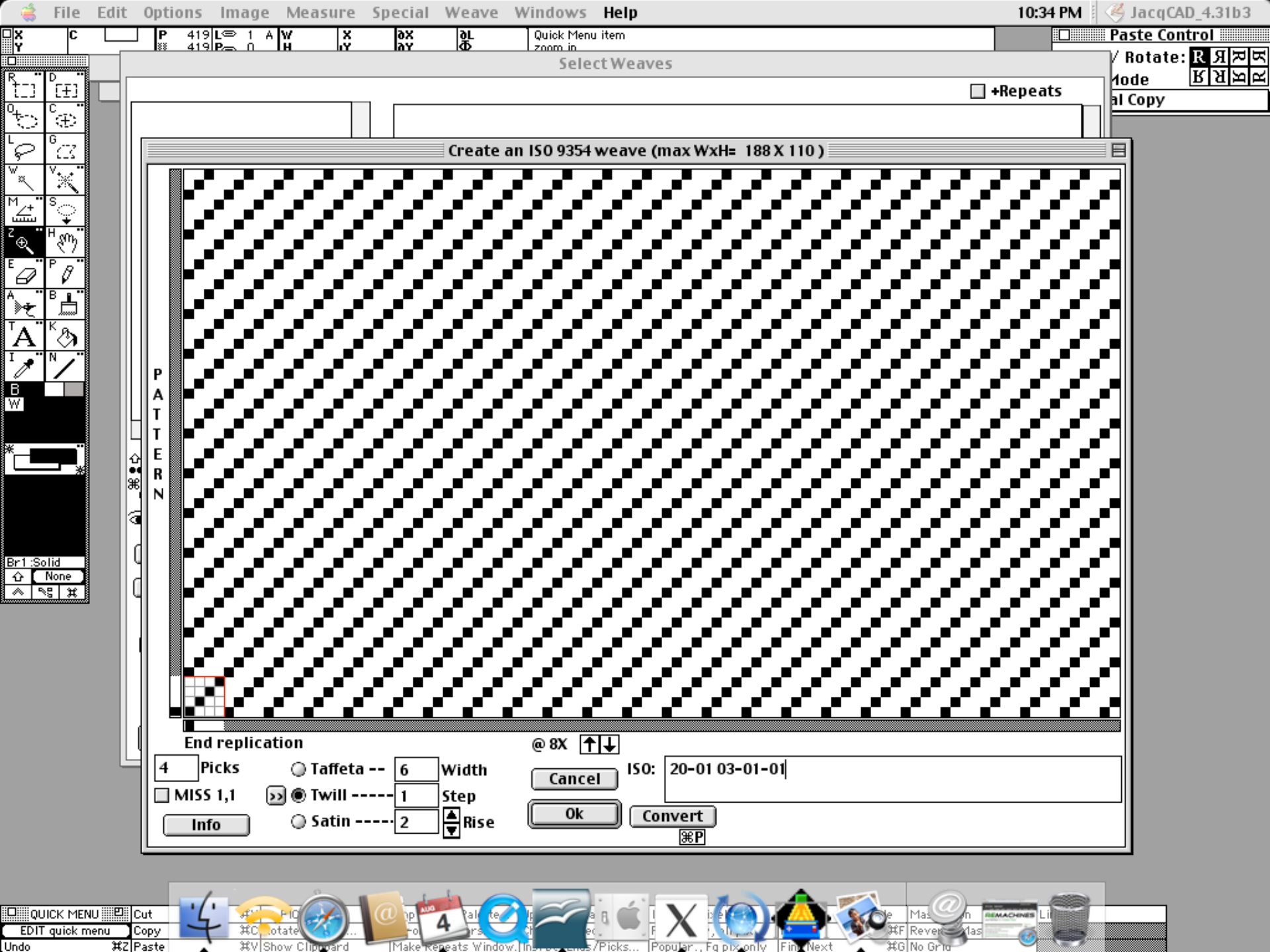

File Edit Options Image Measure Special Weave Windows Help
10:33 PM
JacqCAD_4.31b3
Quick Menu item
zoom in
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
End replication
@ 8X
4 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
6 Width
3 Step
2 Rise
Cancel
Ok
ISO:
21-03 01-01-03
Convert
⌘P
This window is not active because there is a dialog box on your screen. To make this window active, close the dialog box and then (if
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo
⌘Z Paste
⌘V Show Clipboard
Make Repeats
Popular.., Fq pix only
Find Next
⌘G No Grid


File Edit Options Image Measure Special Weave Windows Help
10:34 PM
JacqCAD_4.31b3
Quick Menu item
zoom in
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
End replication
@ 8X
4 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
6 Width
1 Step
2 Rise
Cancel
Ok
ISO:
20-01 03-01-01
Convert
⌘P
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste
Show Clipboard
Make Repeats Window
Picks...
Popular...
Fq pix only
Find Next ⌘F
No Grid ⌘G

File Edit Options Image Measure Special Weave Windows Help 1:47 PM JacqCAD_4.31b3

Paste Control

Rotate:

Select Weaves

+Repeats

Create an ISO 9354 weave (max WxH= 188 X 110)

PATTERN

End replication

@ 8X

7 Picks

MISS 1,1

Info

Taffeta -- 4 Width

Twill ----- 6 Step

Satin ----- 2 Rise

Cancel

Ok

ISO: 20-03 04-01-06

Convert ⌘P

Br1 :Solid

None

Finder

QUICK MENU

EDIT quick menu

Undo ⌘Z

Cut

Copy

Paste

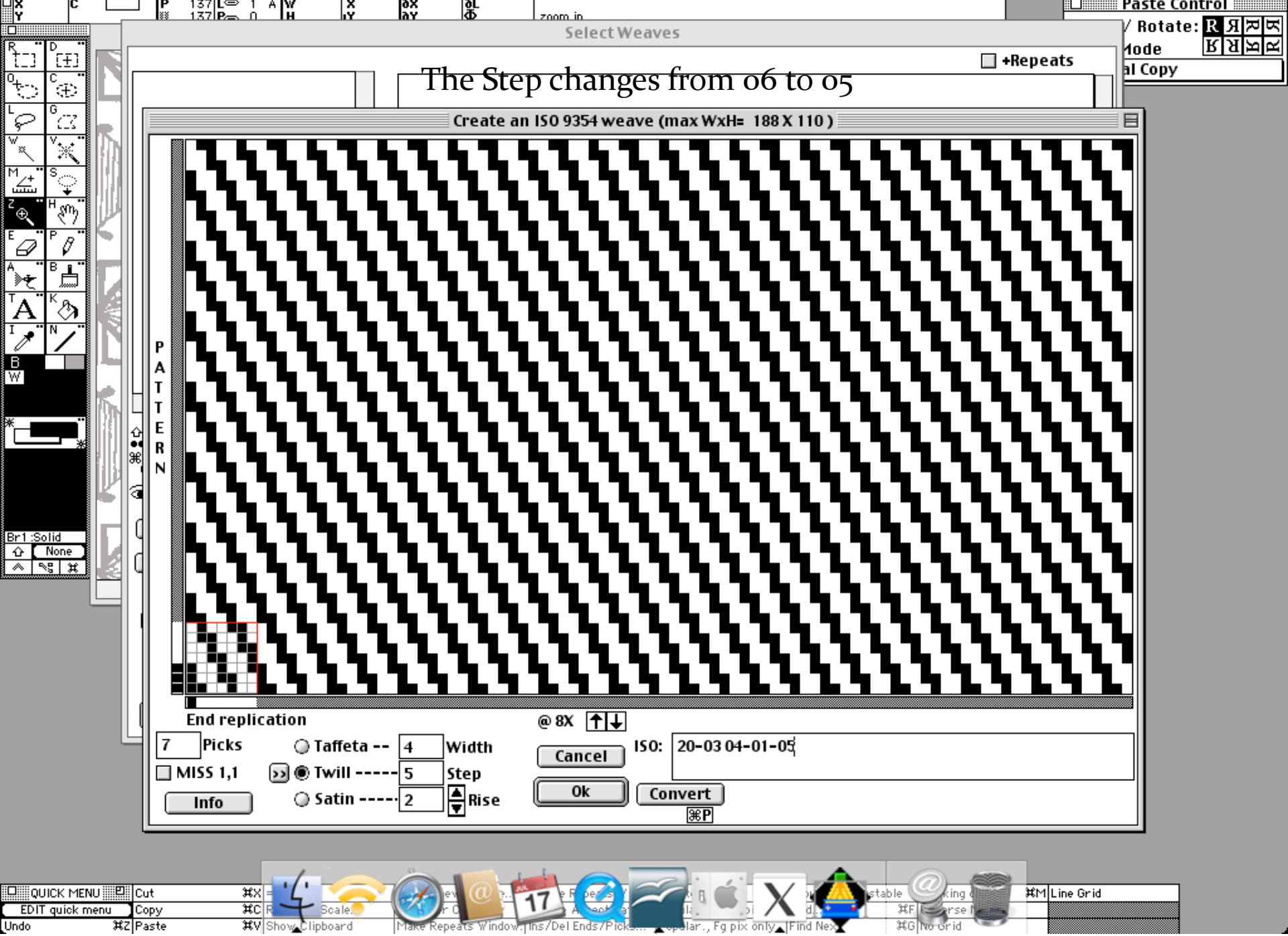
Show Clipboard

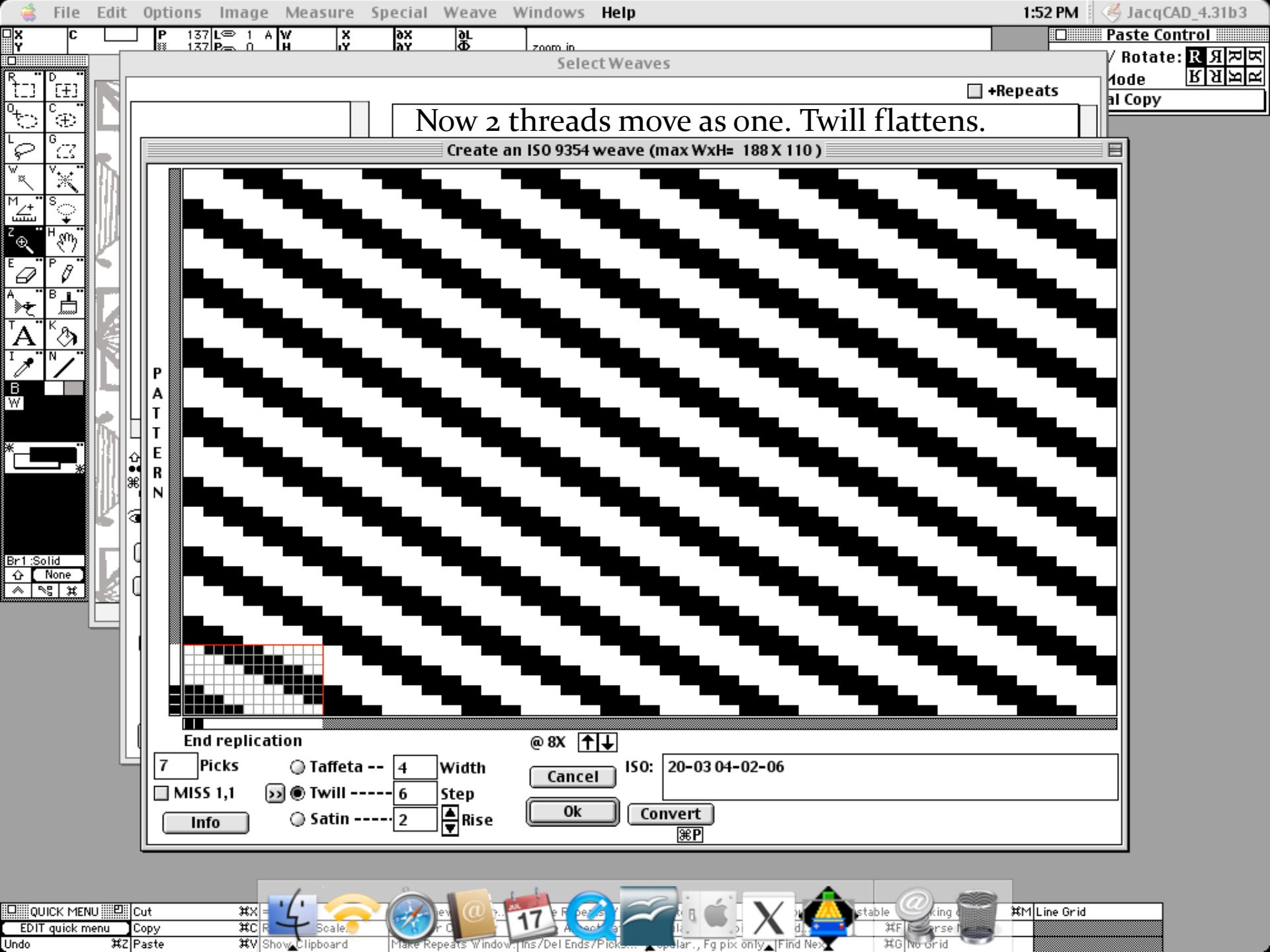
Make Repeats Window

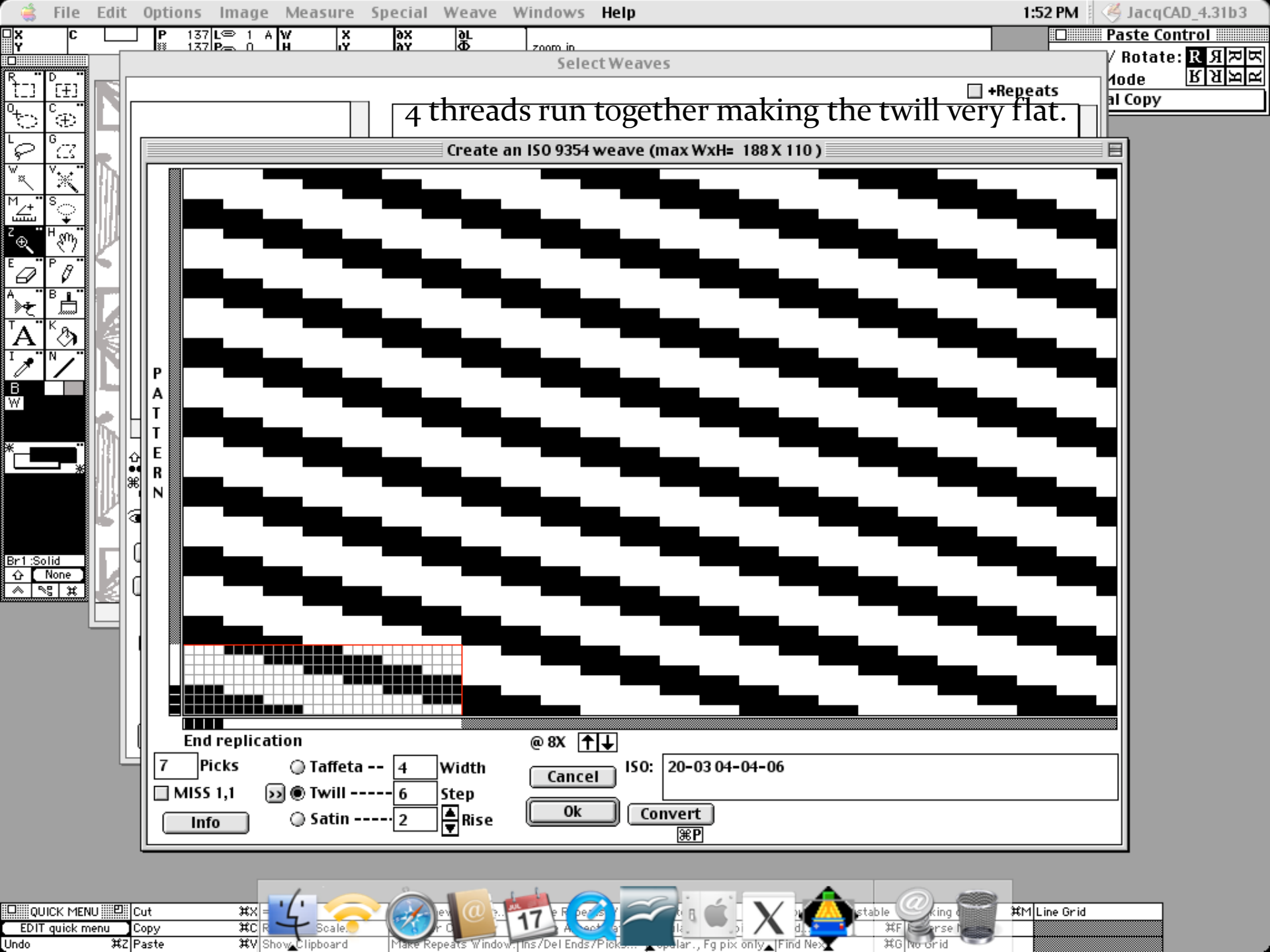
Ins/Del Ends/Picks...

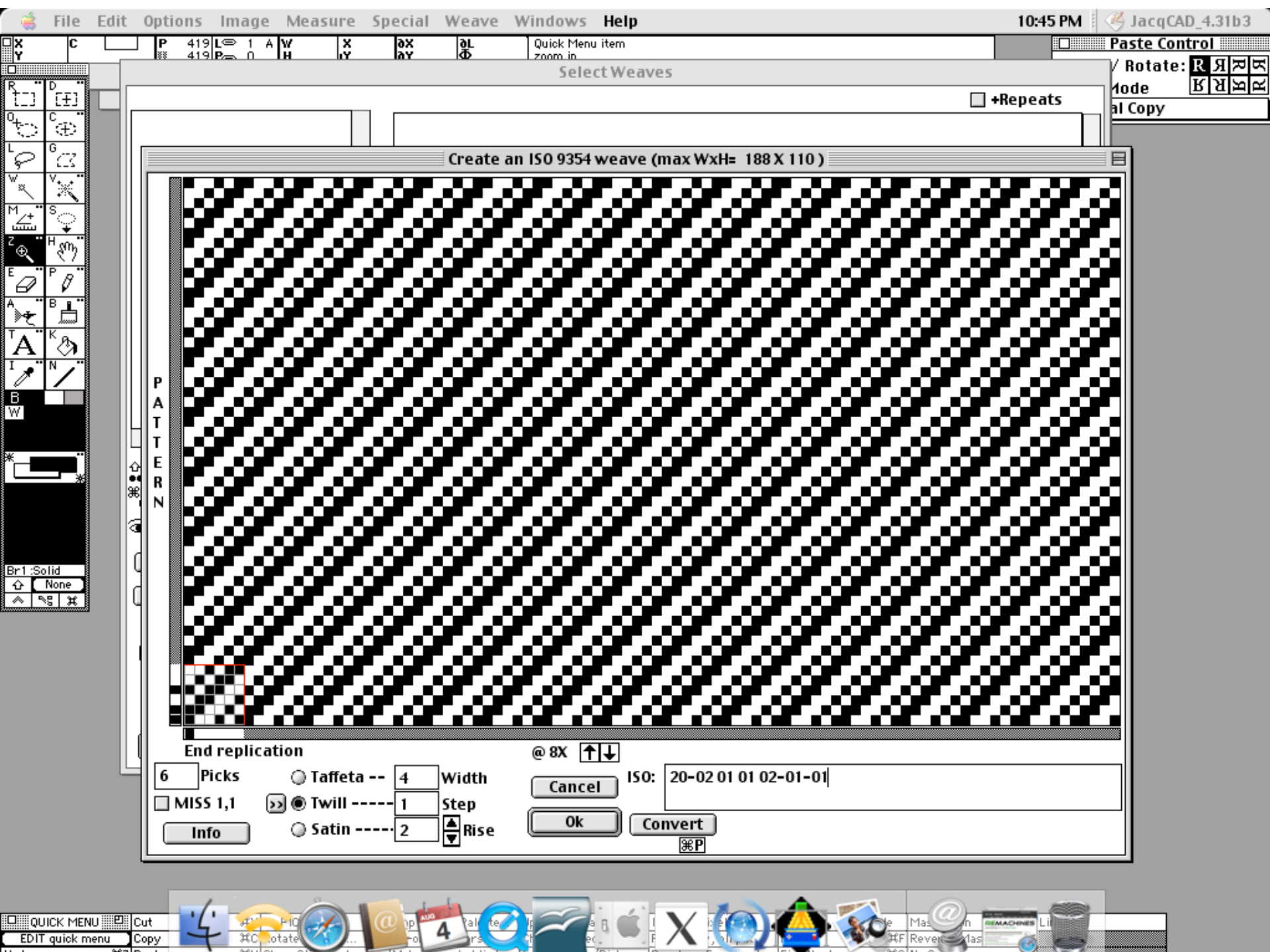
Find Next

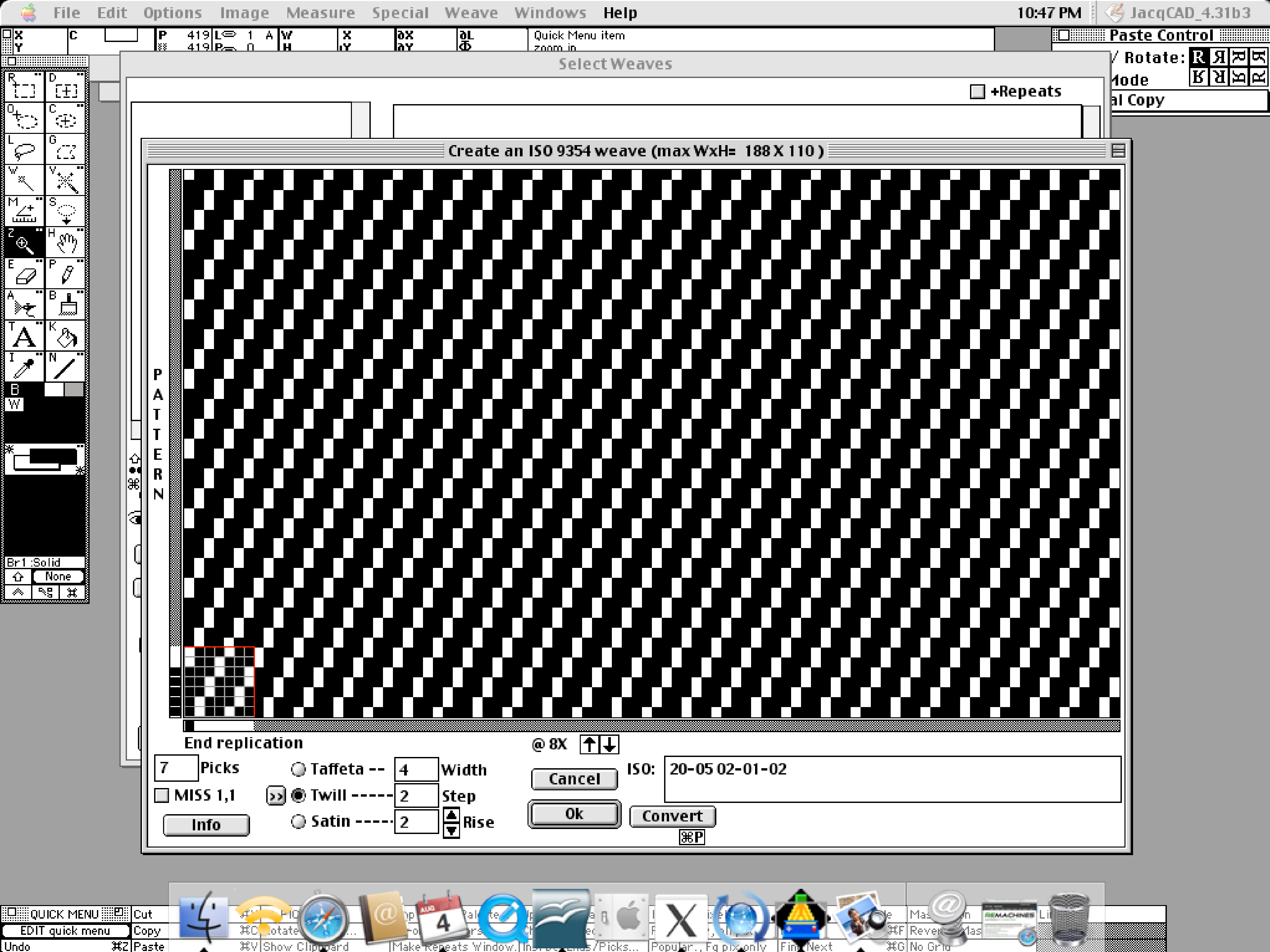
No Grid

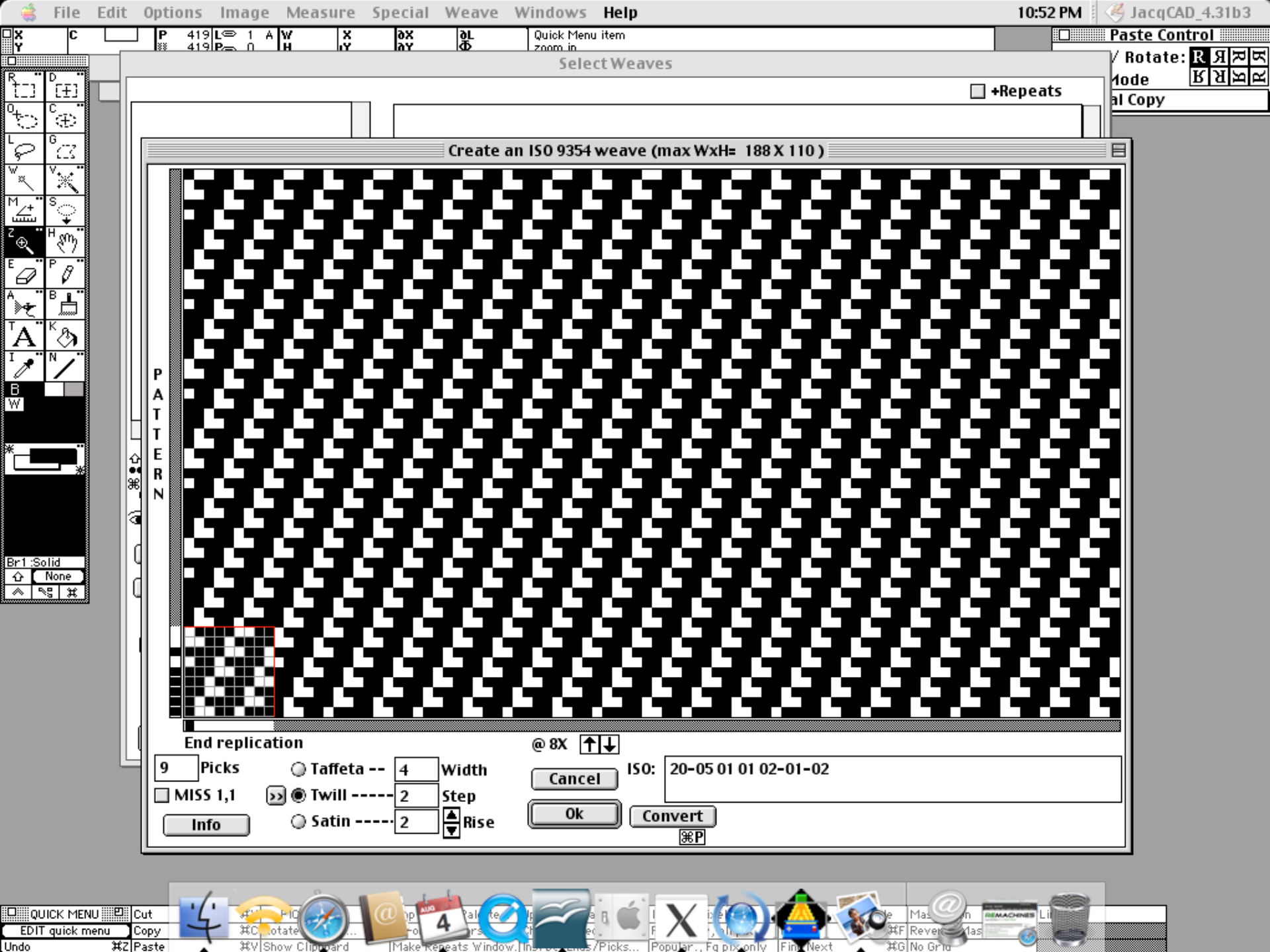

Select Weaves
+Repeats
The Step changes from 06 to 05
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
End replication
@ 8X
7 Picks
Taffeta --
4 Width
MISS 1,1
Twill -----
5 Step
Satin -----
2 Rise
Info
Cancel
ISO: 20-03 04-01-05
Ok
Convert
⌘P
Paste Control
Rotate:
Mode
al Copy
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut ⌘X
Copy ⌘C
Paste ⌘V
Show Clipboard
Make Repeats Window
Ins/Del Ends/Picks
Find Next
⌘G No Grid
⌘M Line Grid

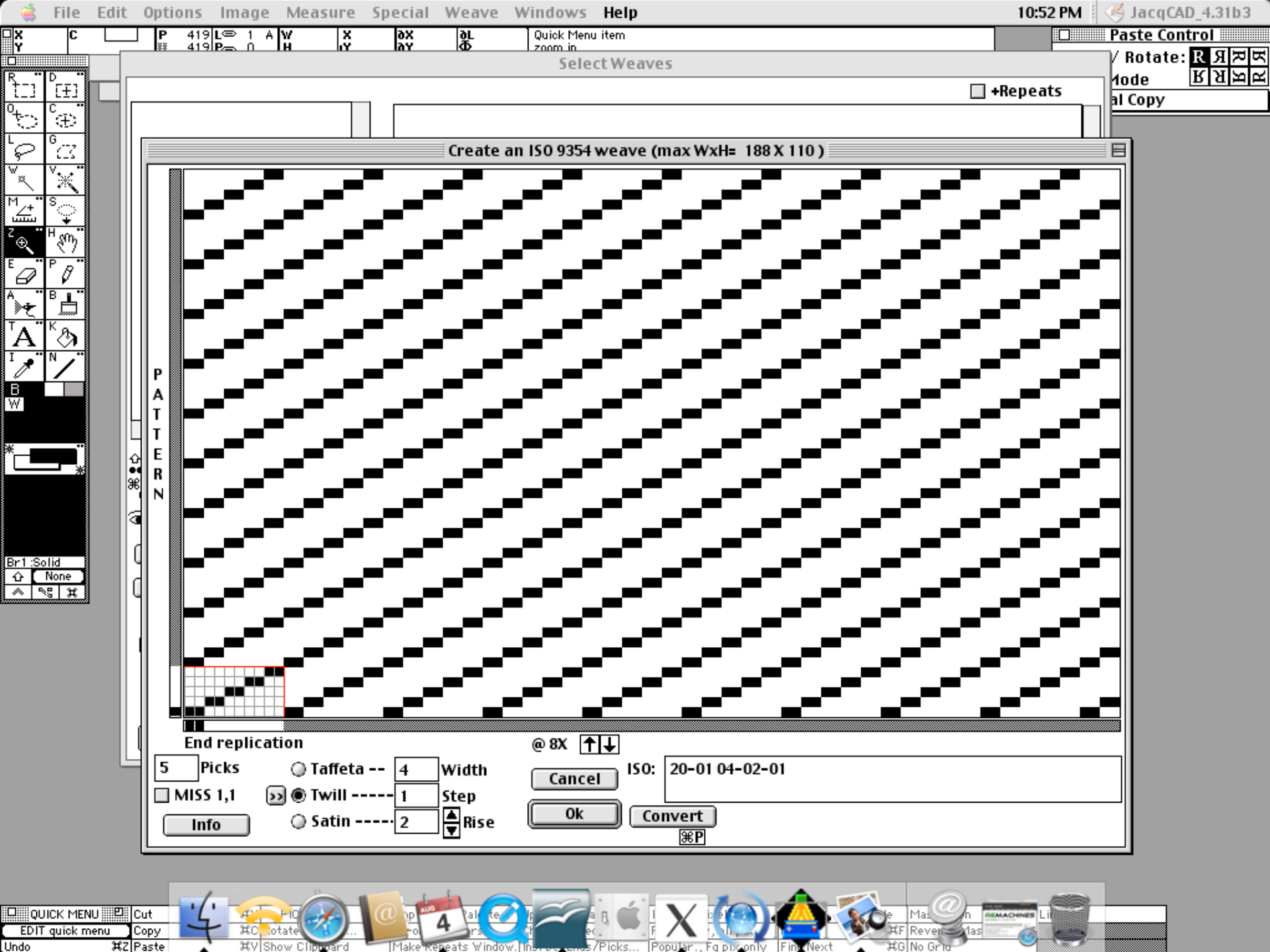

File Edit Options Image Measure Special Weave Windows Help
1:52 PM
JacqCAD_4.31b3
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Now 2 threads move as one. Twill flattens.
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
End replication
@ 8X
7 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
4 Width
6 Step
2 Rise
Cancel
Ok
ISO:
20-03 04-02-06
Convert
⌘P
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut ⌘X
Copy ⌘C
Paste ⌘V
Show Clipboard
Line Grid
No Grid

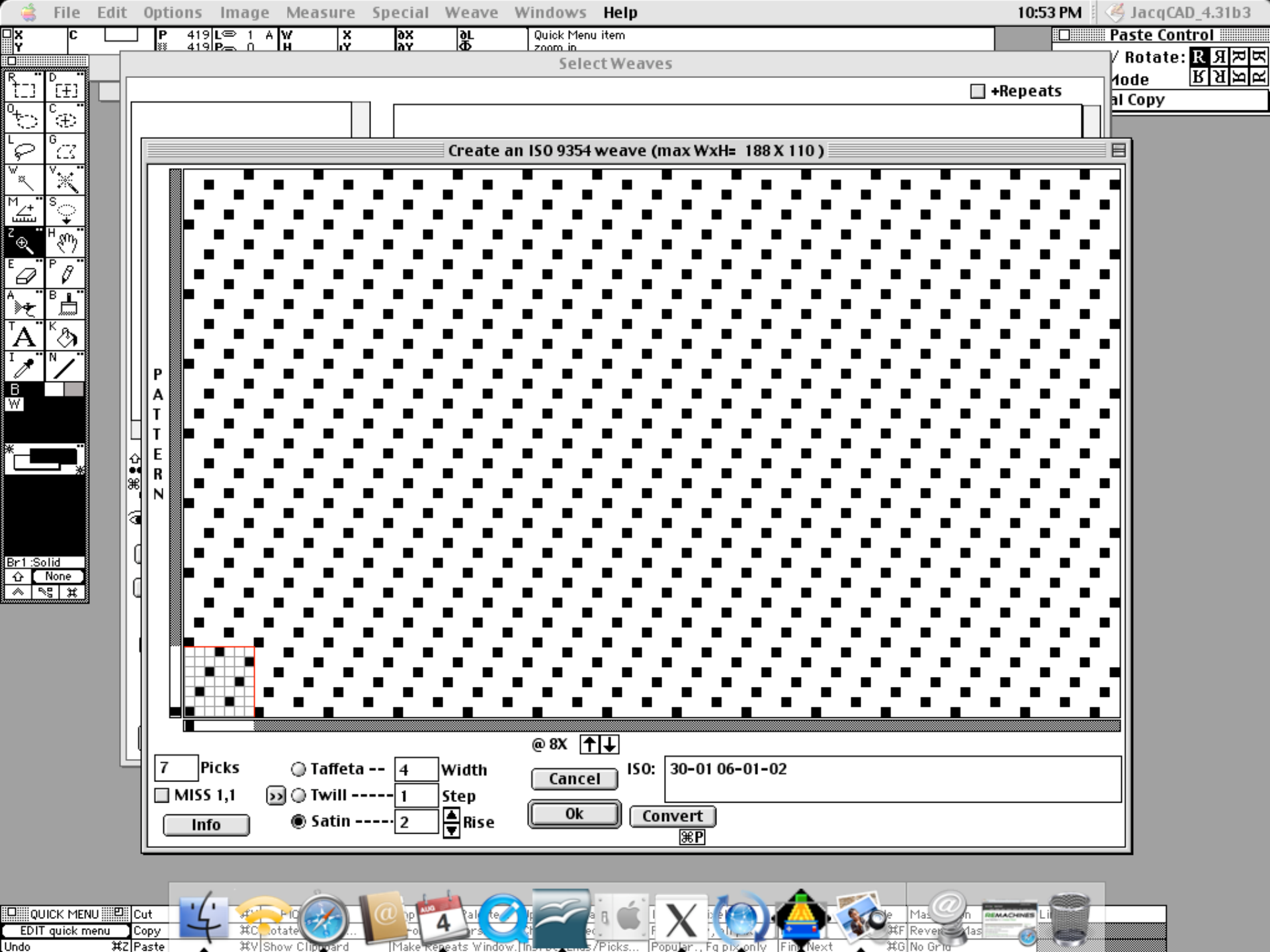

File Edit Options Image Measure Special Weave Windows Help
1:52 PM
JacqCAD_4.31b3
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
4 threads run together making the twill very flat.
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
End replication
@ 8X
7 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
4 Width
6 Step
2 Rise
Cancel
Ok
ISO:
20-03 04-04-06
Convert
⌘P
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut ⌘X
Copy ⌘C
Paste ⌘V
Line Grid

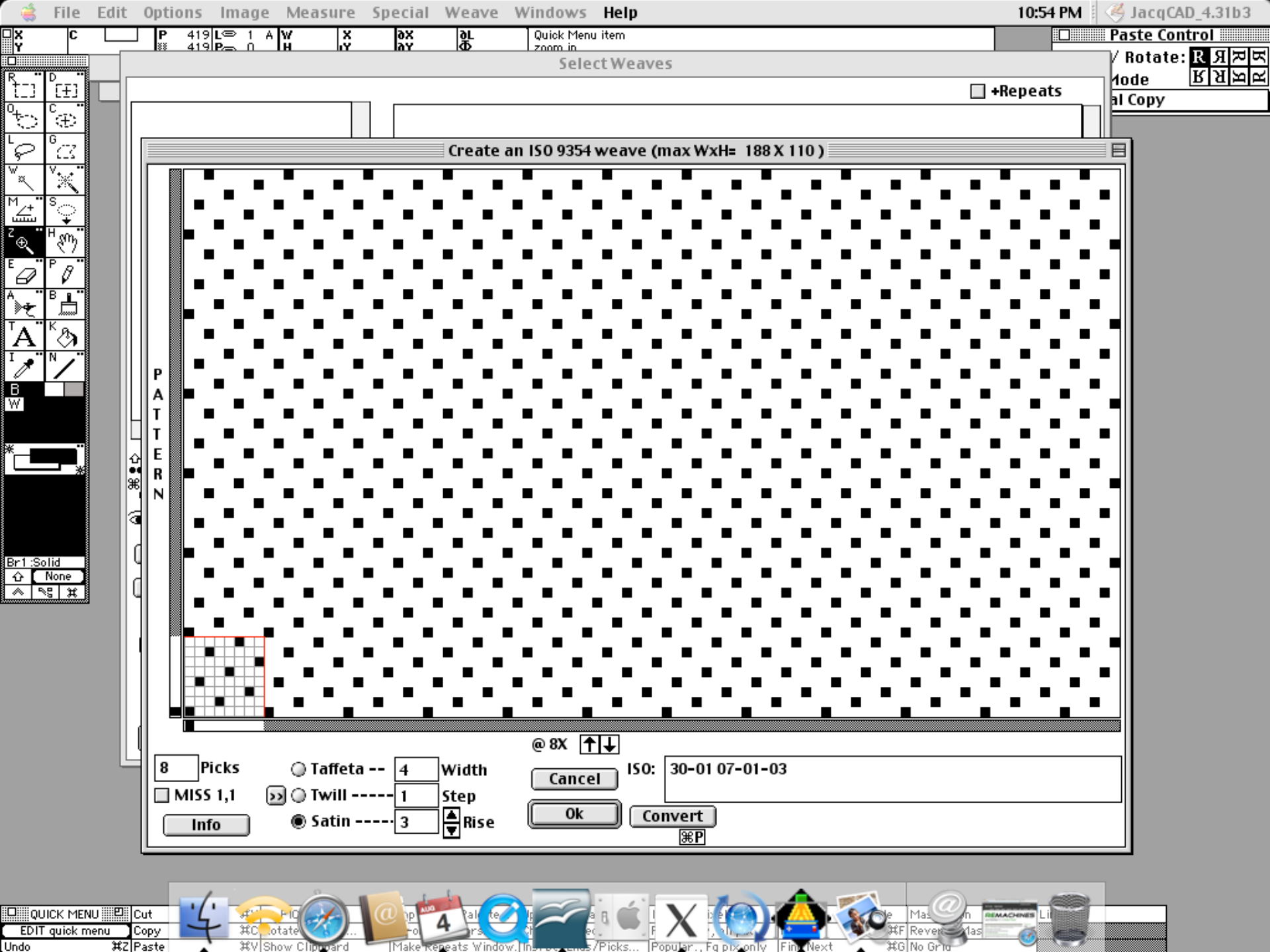

File Edit Options Image Measure Special Weave Windows Help
10:45 PM
JacqCAD_4.31b3
Paste Control
Rotate:
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
End replication
@ 8X
6 Picks
MISS 1,1
Info
Taffeta -- 4 Width
Twill ----- 1 Step
Satin ----- 2 Rise
Cancel
Ok
ISO: 20-02 01 01 02-01-01
Convert
⌘P
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Cut
Copy

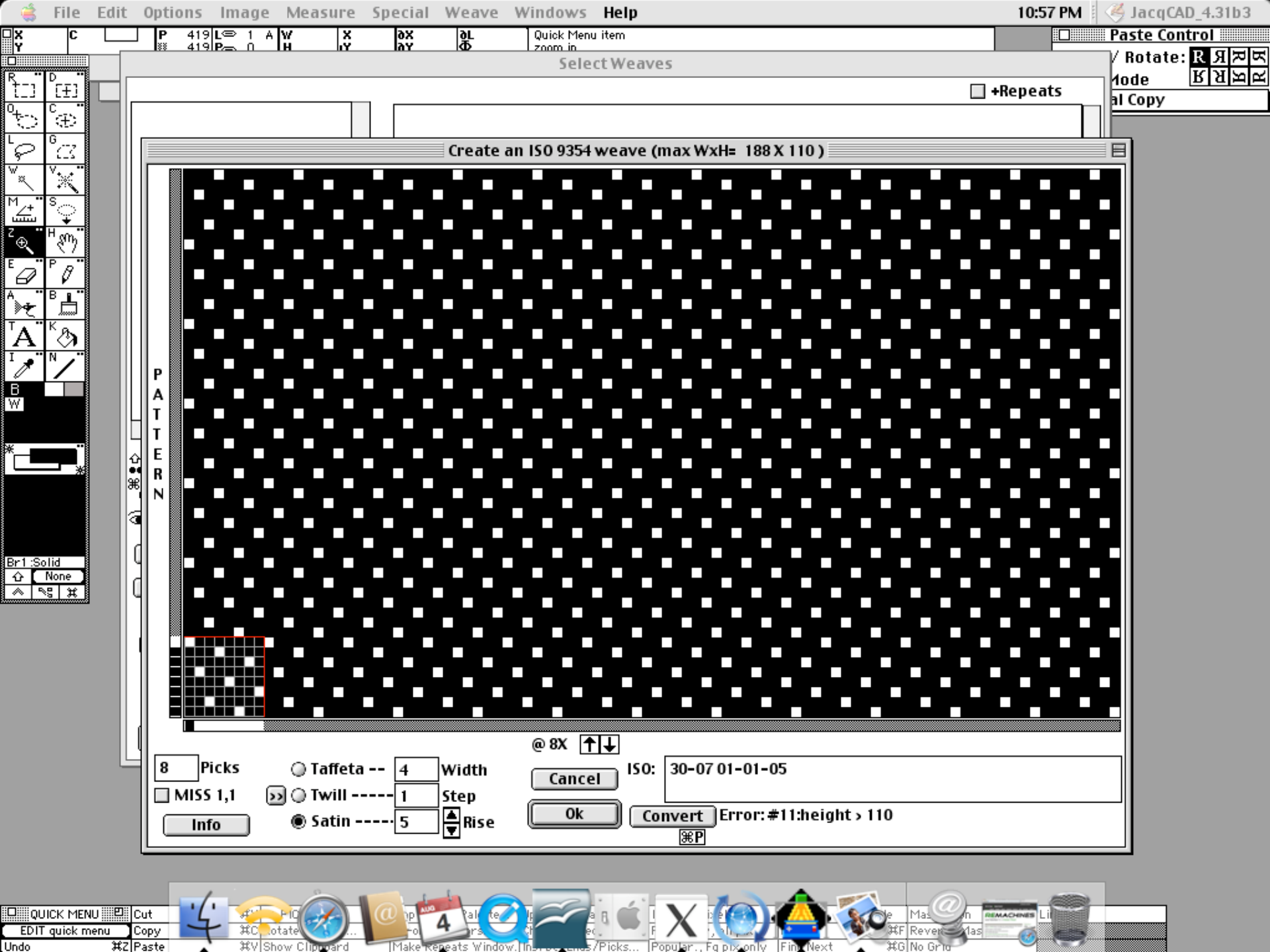

File Edit Options Image Measure Special Weave Windows Help
10:47 PM
JacqCAD_4.31b3
Quick Menu item
Paste Control
Rotate:
Mode
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
P A T T E R N
End replication
@ 8X
7 Picks
MISS 1,1
Info
Taffeta -- 4 Width
Twill ----- 2 Step
Satin ---- 2 Rise
Cancel
Ok
Convert
⌘P
ISO: 20-05 02-01-02
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste


File Edit Options Image Measure Special Weave Windows Help
10:52 PM
JacqCAD_4.31b3
Quick Menu item
zoom in
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
End replication
@ 8X
9 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
4 Width
2 Step
2 Rise
Cancel
Ok
ISO:
20-05 01 01 02-01-02
Convert
⌘P
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste

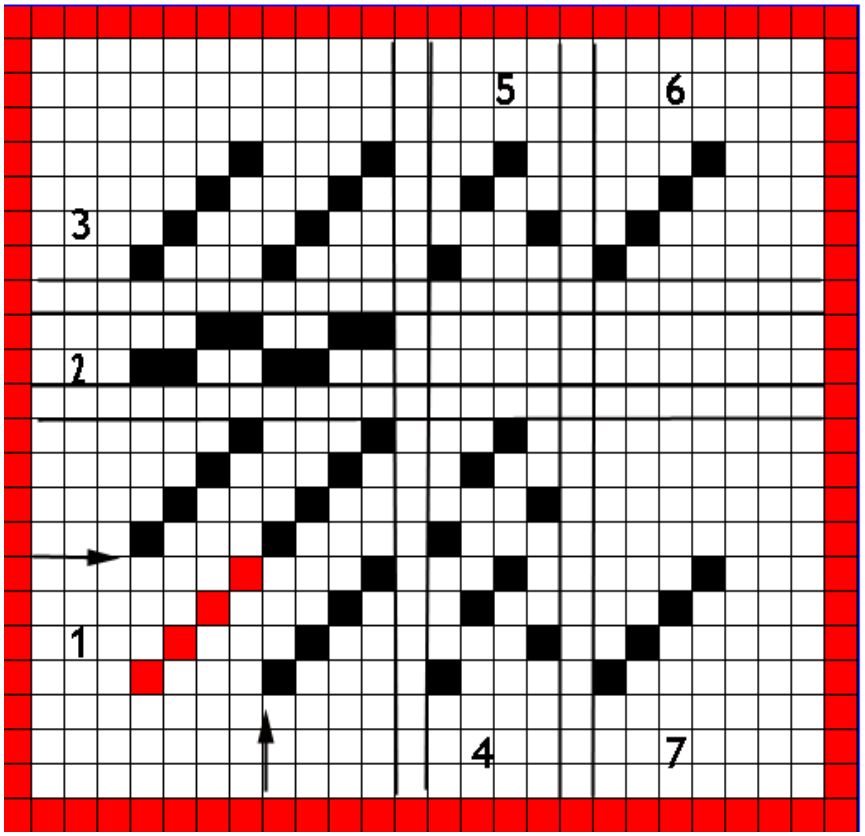

File Edit Options Image Measure Special Weave Windows Help
10:52 PM
JacqCAD_4.31b3
Quick Menu item
zoom in
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
End replication
@ 8X
5 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
4 Width
1 Step
2 Rise
Cancel
Ok
ISO:
20-01 04-02-01
Convert
⌘P
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste
Show Clipboard
Make Repeats Window
Popular...
Find Next
No Grid


File Edit Options Image Measure Special Weave Windows Help
10:53 PM
JacqCAD_4.31b3
Quick Menu item
zoom in
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
@ 8X
7 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
4 Width
1 Step
2 Rise
Cancel
Ok
ISO:
30-01 06-01-02
Convert
⌘P
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste


File Edit Options Image Measure Special Weave Windows Help
10:54 PM
JacqCAD_4.31b3
Quick Menu item
zoom in
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
@ 8X
8 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
4 Width
1 Step
3 Rise
Cancel
Ok
ISO:
30-01 07-01-03
Convert
⌘P
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste
Show Clipboard
Make Repeats Window
Popular...
Find Next
No Grid


File Edit Options Image Measure Special Weave Windows Help
10:57 PM
JacqCAD_4.31b3
Quick Menu item
zoom in
Paste Control
Rotate:
Mode
al Copy
Select Weaves
+Repeats
Create an ISO 9354 weave (max WxH= 188 X 110)
PATTERN
@ 8X
8 Picks
MISS 1,1
Info
Taffeta --
Twill -----
Satin -----
4 Width
1 Step
5 Rise
Cancel
Ok
ISO:
30-07 01-01-05
Convert
⌘P
Error: #11:height > 110
Br1 :Solid
None
QUICK MENU
EDIT quick menu
Undo ⌘Z
Cut
Copy
Paste
Show Clipboard
Make Repeats Window
Popular...
Fq pix only
Find Next ⌘F
No Grid ⌘G

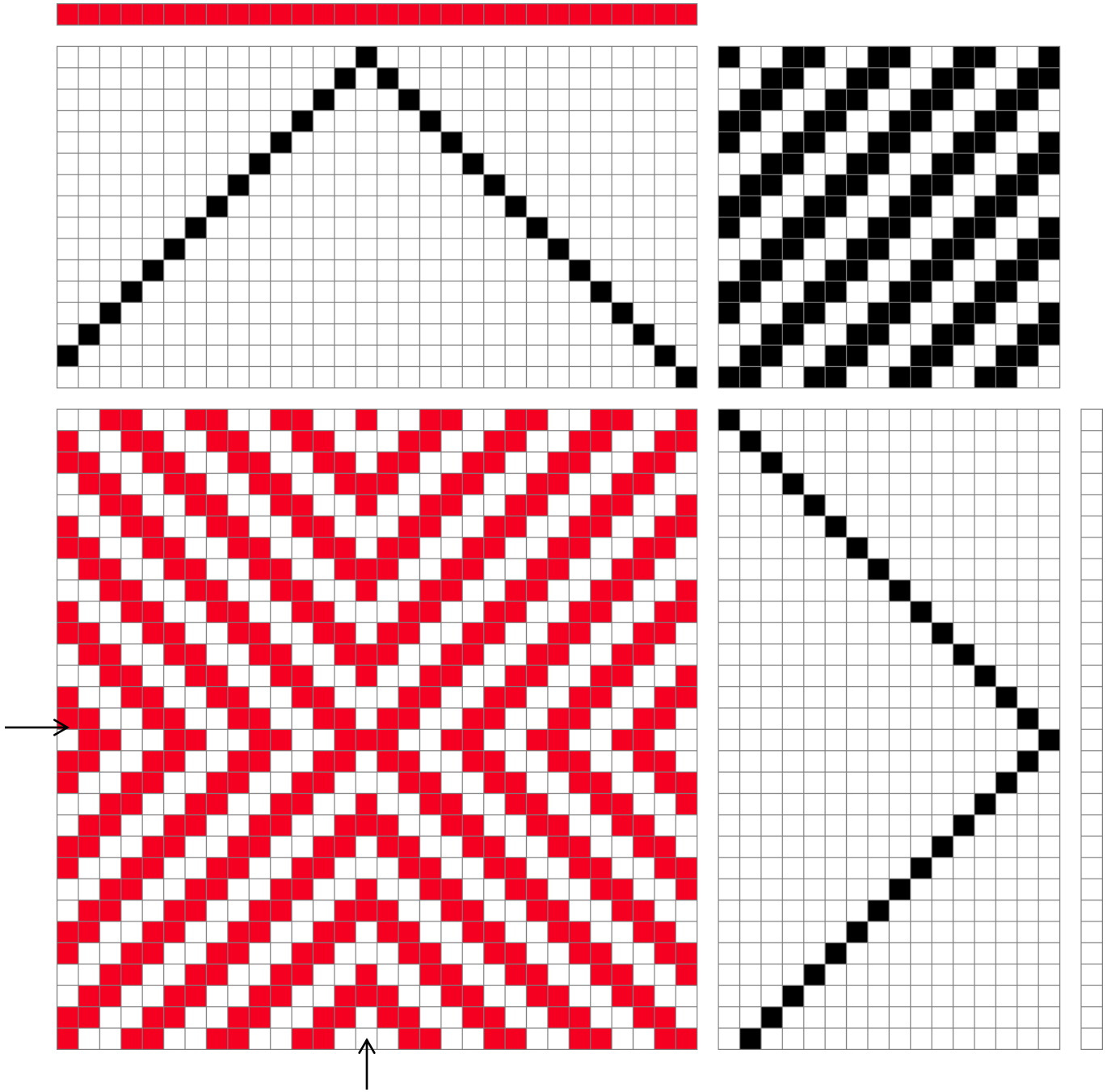
Production Draft (Fertigungspatrone)



1. Binding (1/3 twill)
2. Reed denting (2 per dent)
3. Threading on 4 shafts
4. Treadling order
5. Tieup
6. Card (lift) order
7. Liftplan, punching order

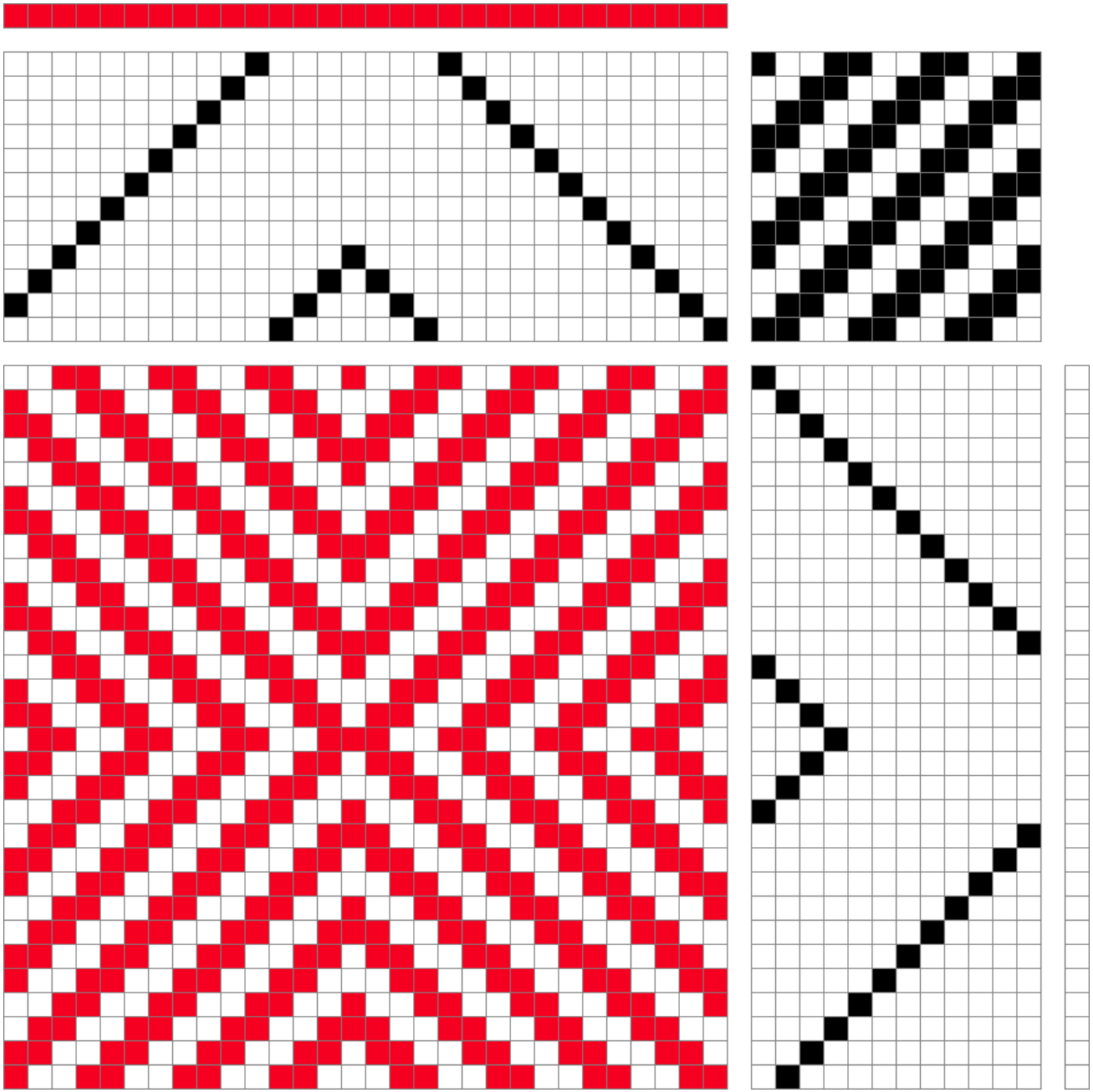
Source: IGH-Sindelfingen 4. And 5. Based on CM loom walking treadles 1, 4, 2, 3.

3. Threading.
It makes no difference what you use for threading, as long as the binding you designed remains unchanged.
Here are examples of a simple goose eye twill on multiple loom configurations with multiple threadings/treadlings and all produce exactly the same fabric once off the loom.
All samples tromp as writ.

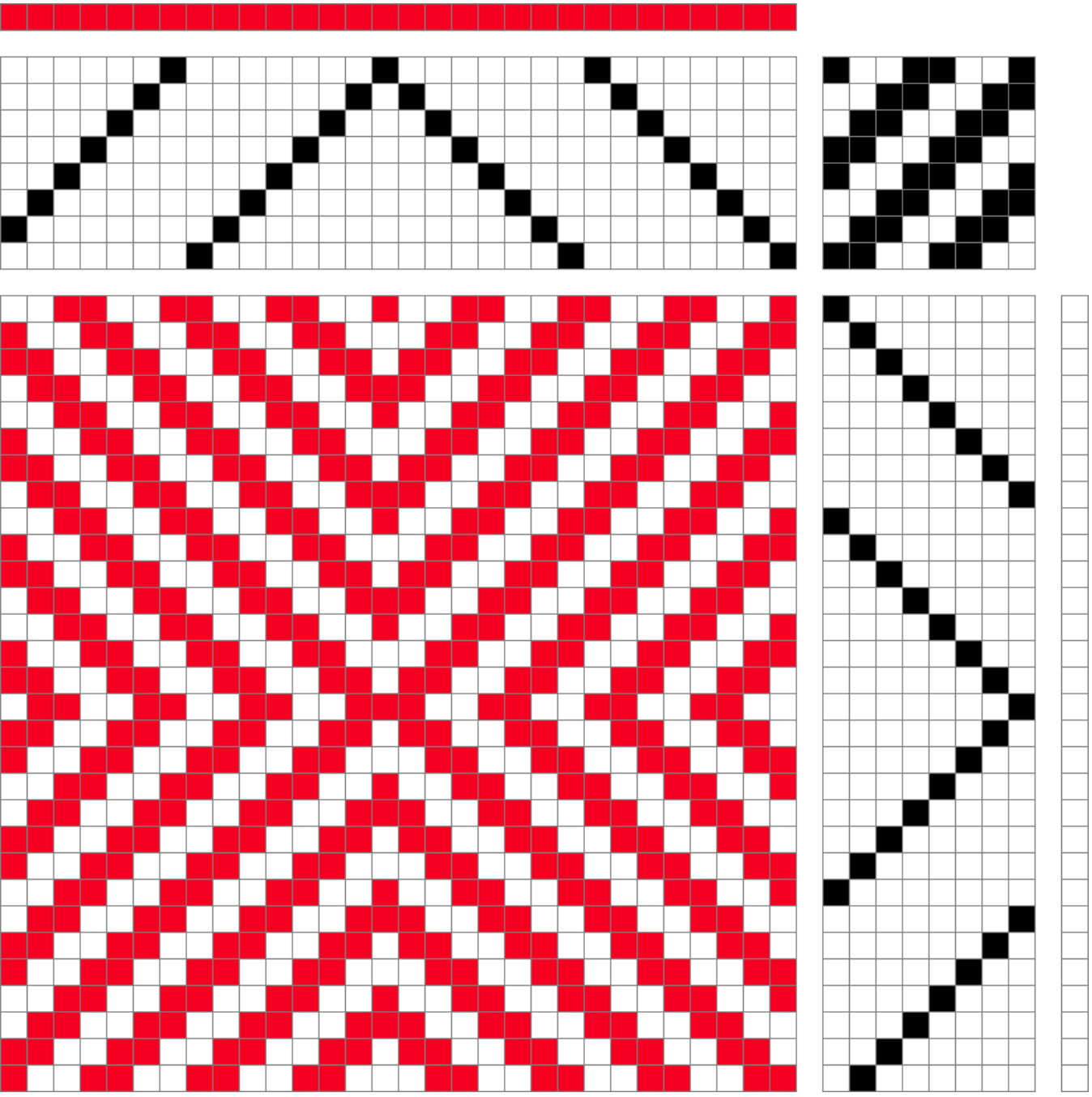


One binding, here a simple goose eye twill with 4 bands that weaves easily on 16 shafts with a point threading and a point treadling.

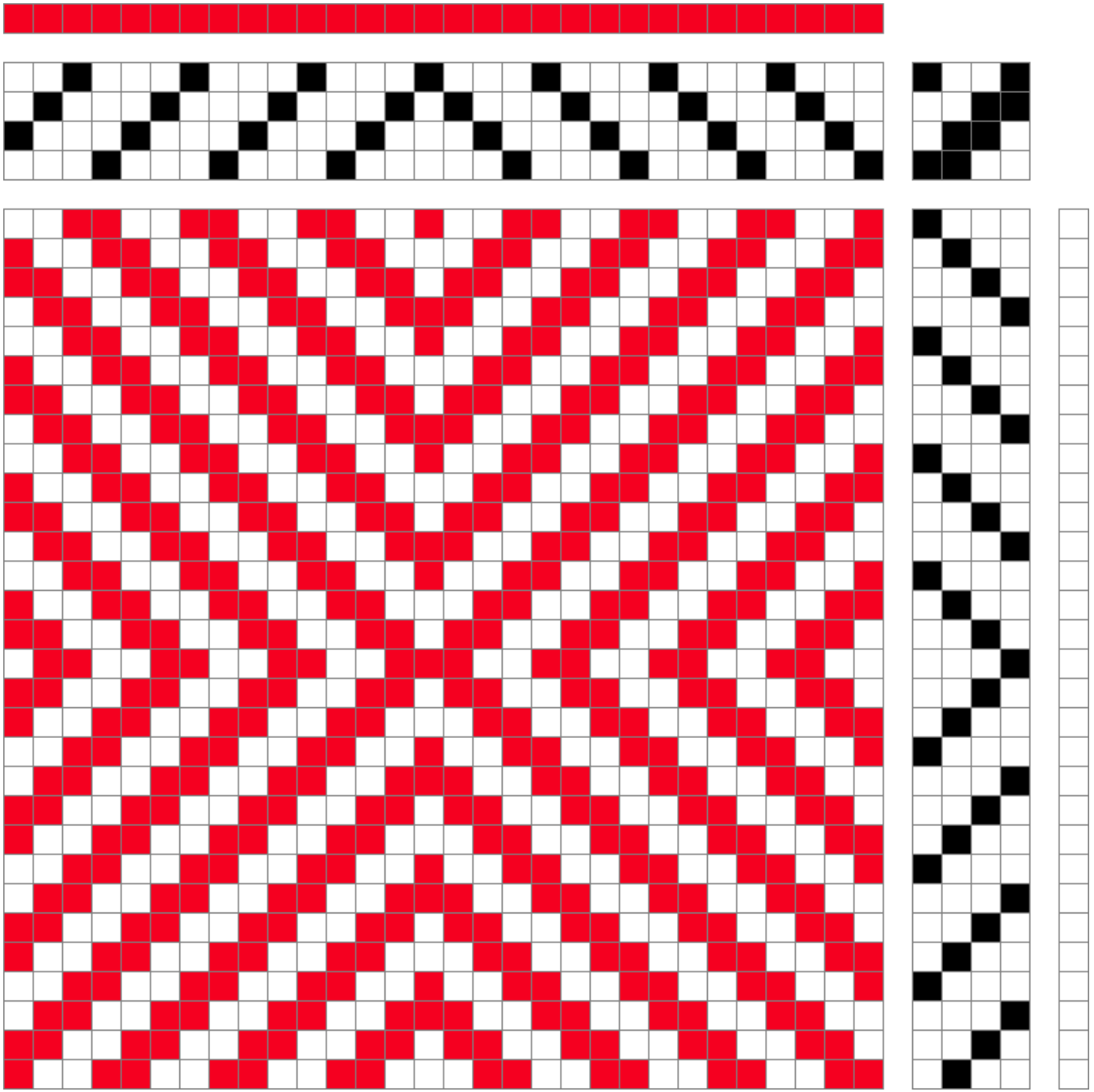
Can this binding be woven in another way?



4 banded goose eye twill, same as previous slide – modified to weave on 12 shafts.

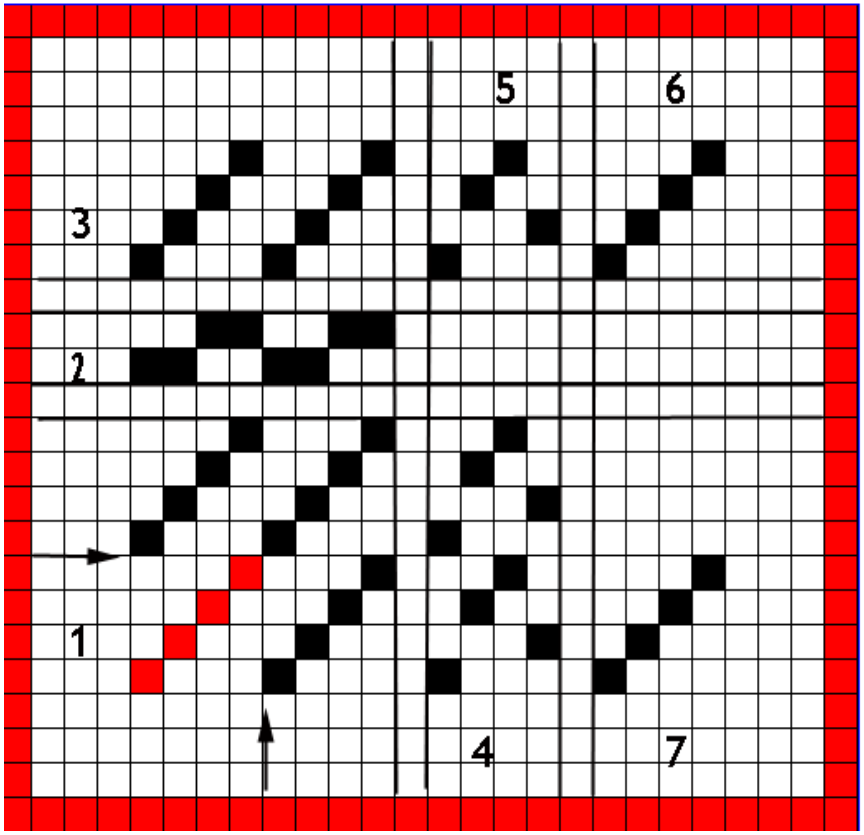


4 banded goose eye twill, same as previous slide – modified to weave on 8 shafts.



4 banded goose eye twill, same as previous slide – modified to weave on 4 shafts.

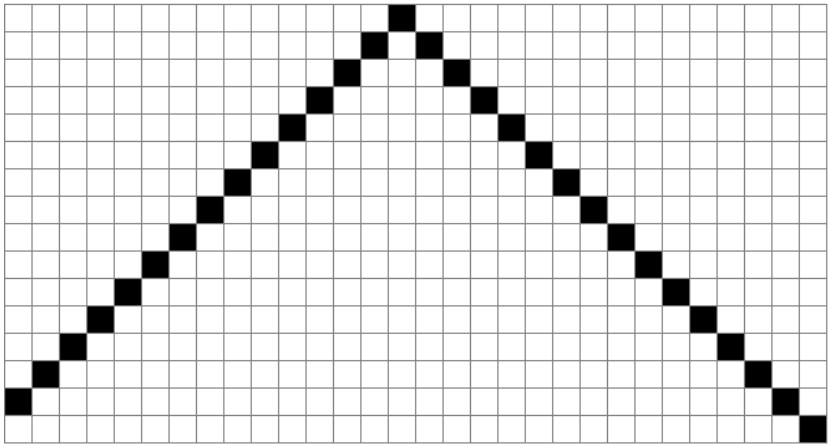
Production Draft (Fertigungspatrone)

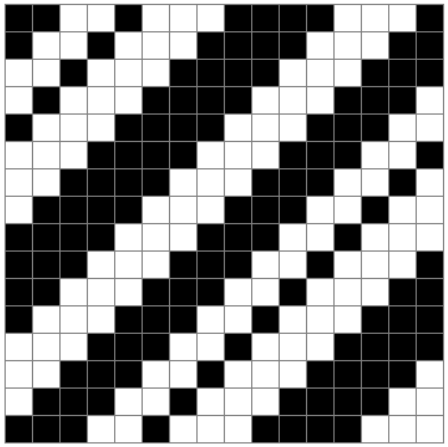


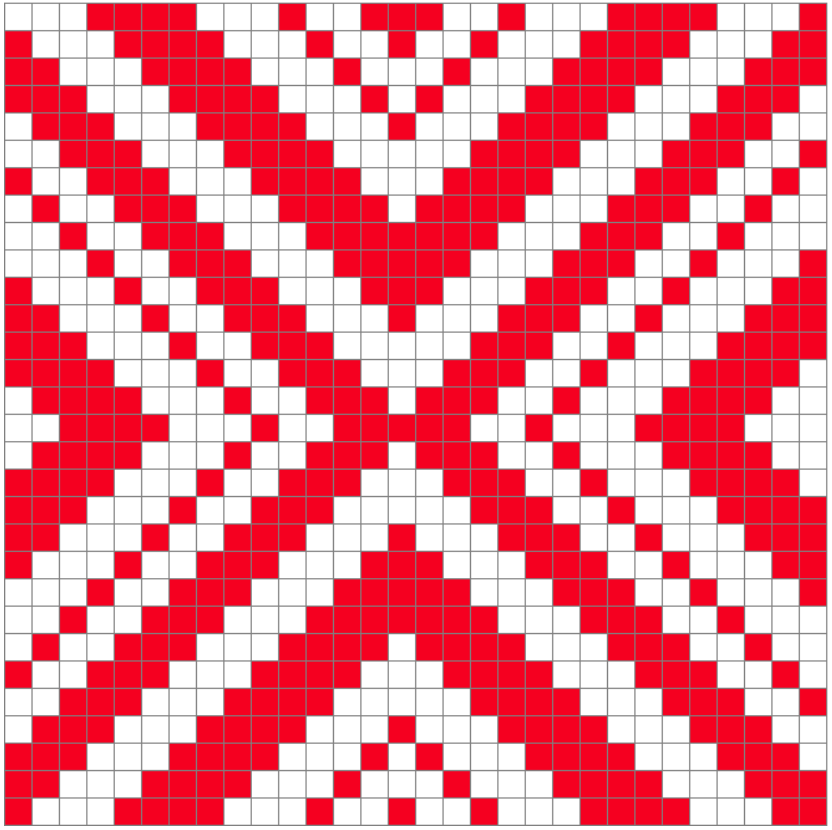
1. Binding (1/3 twill)
2. Reed denting
   (2 per dent)
3. Threading on 4
   shafts
4. Treadling order
5. Tieup
6. Card (lift) order
7. Liftplan, punching
   order

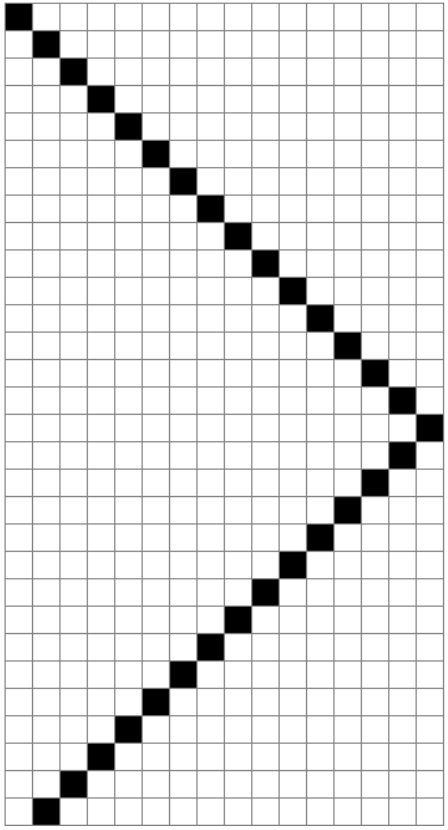
Source: IGH-Sindelfingen 4. And 5. Based on CM loom walking treadles 1, 4, 2, 3.

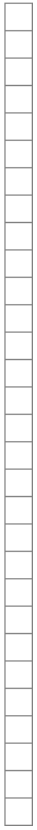
Changes to tieup and treadling do change the basic binding.



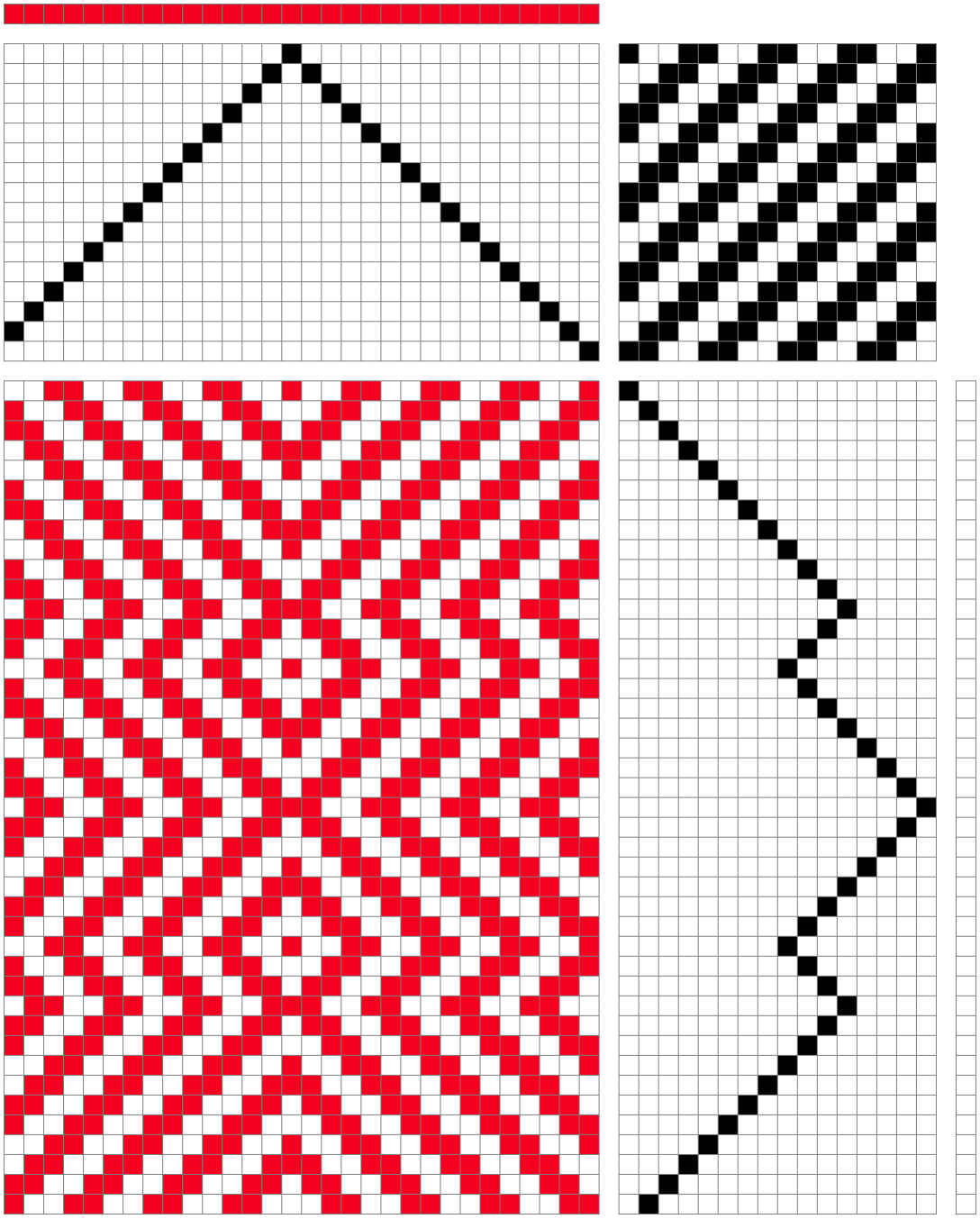






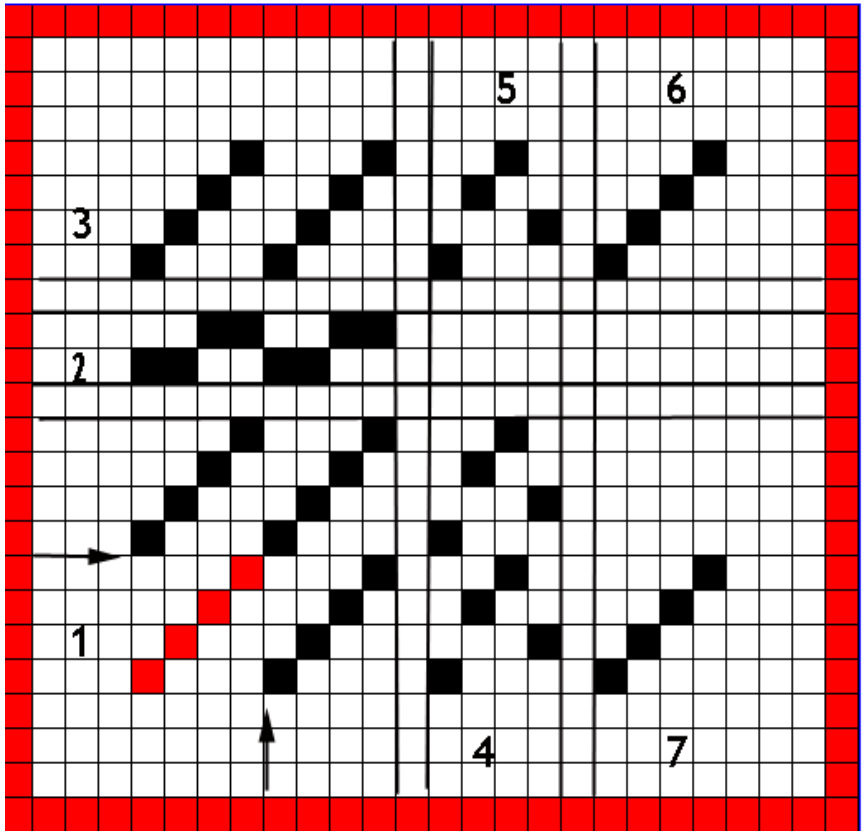


A new tieup produces a new binding, still a point twill.



Substituting a patterned point draw as treadling produces an interesting variation, a new binding, and no restructuring of the loom setup.

Production Draft (Fertigungspatrone)

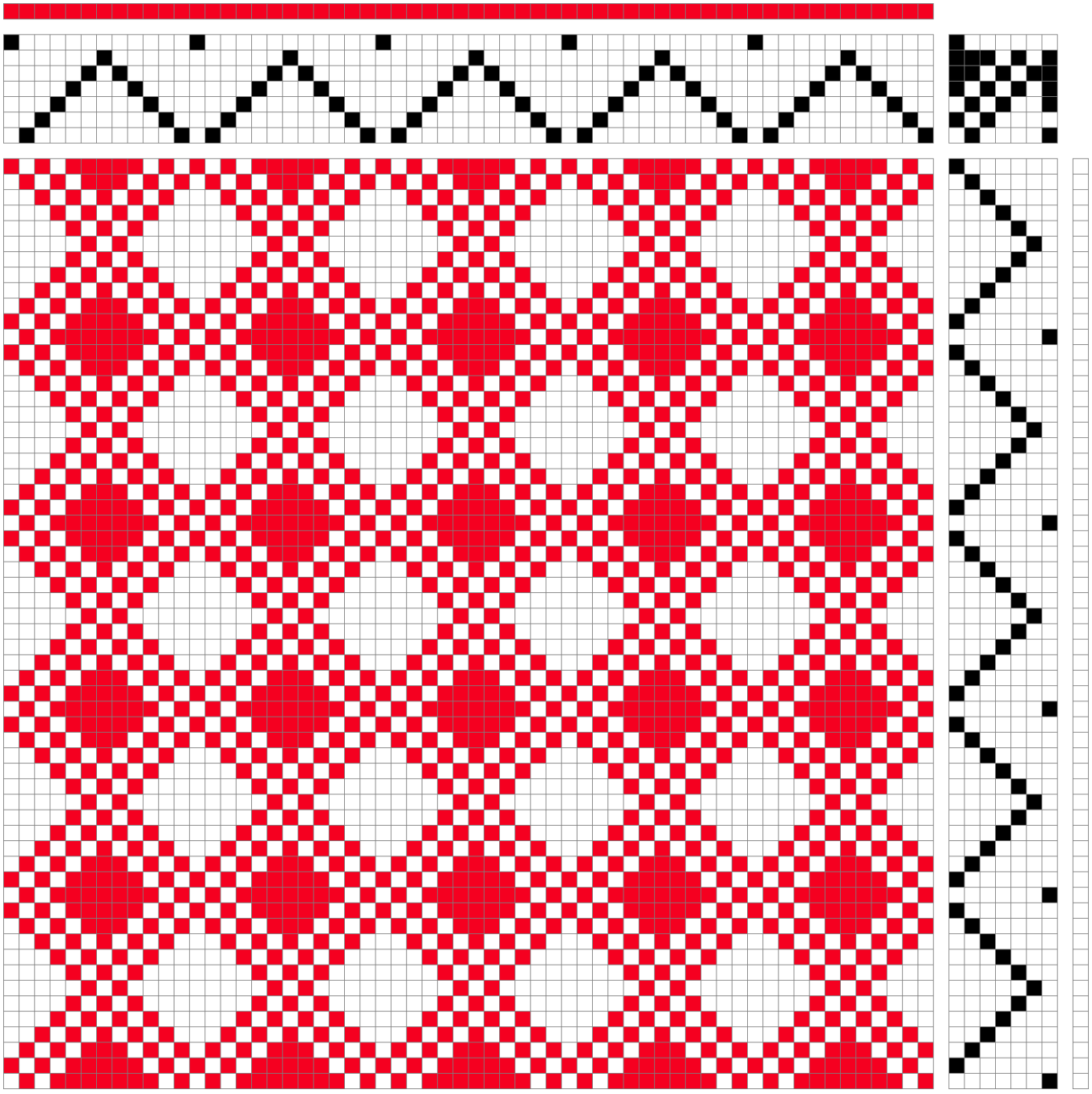


1. Binding (1/3 twill)
2. Reed denting (2 per dent)
3. Threading on 4 shafts
4. Treadling order
5. Tieup
6. Card (lift) order
7. Liftplan, punching order

Source: IGH-Sindelfingen 4. And 5. Based on CM loom walking treadles 1, 4, 2, 3.

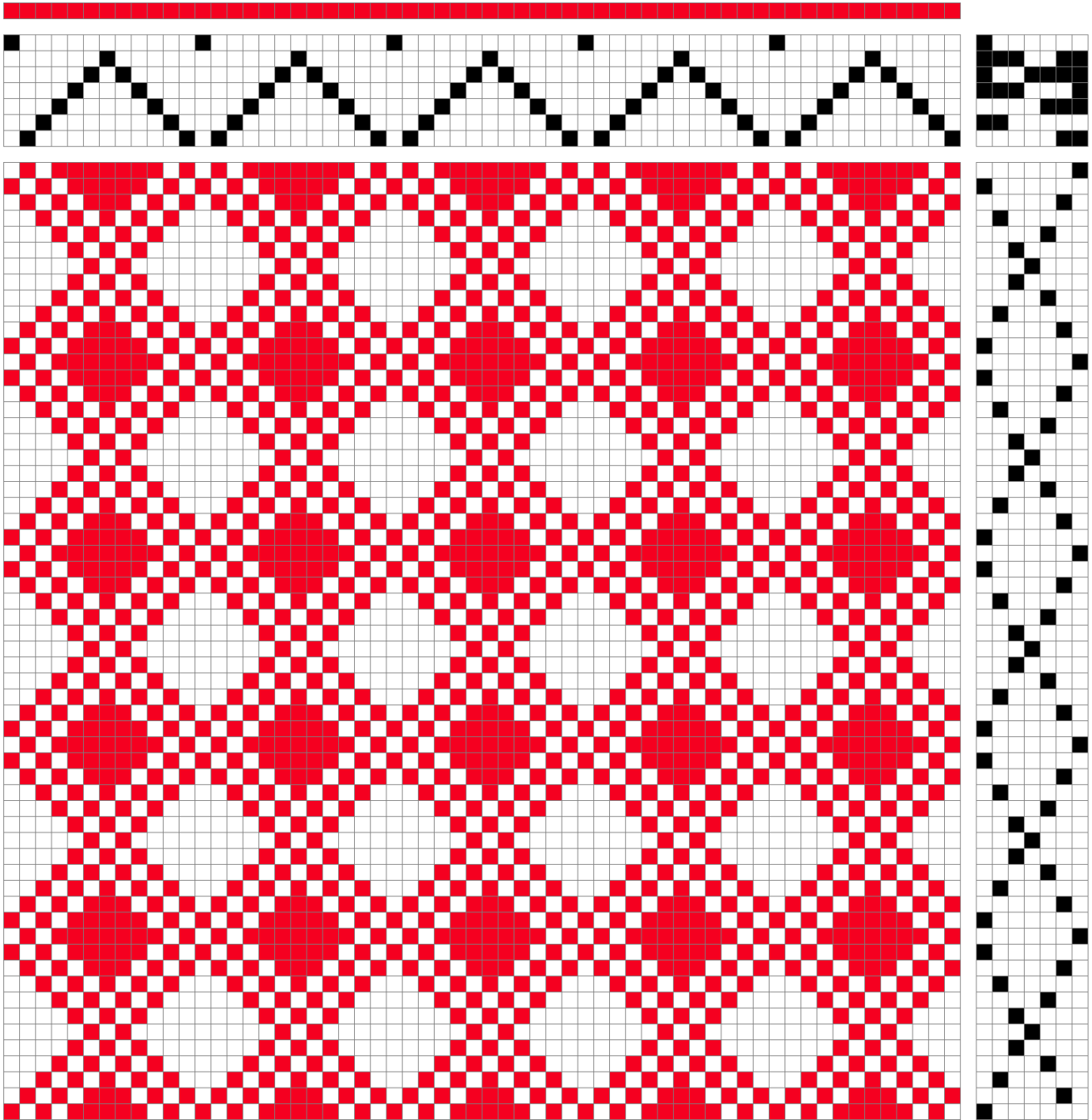
Adaptations of a simple waffle binding to accommodate the features of various looms.

1. Point threading/treadling, rising shed
2. Point threading/tieup and treadling changed to accommodate walking the treadles
3. Point threading/liftplan for a table or dobby loom

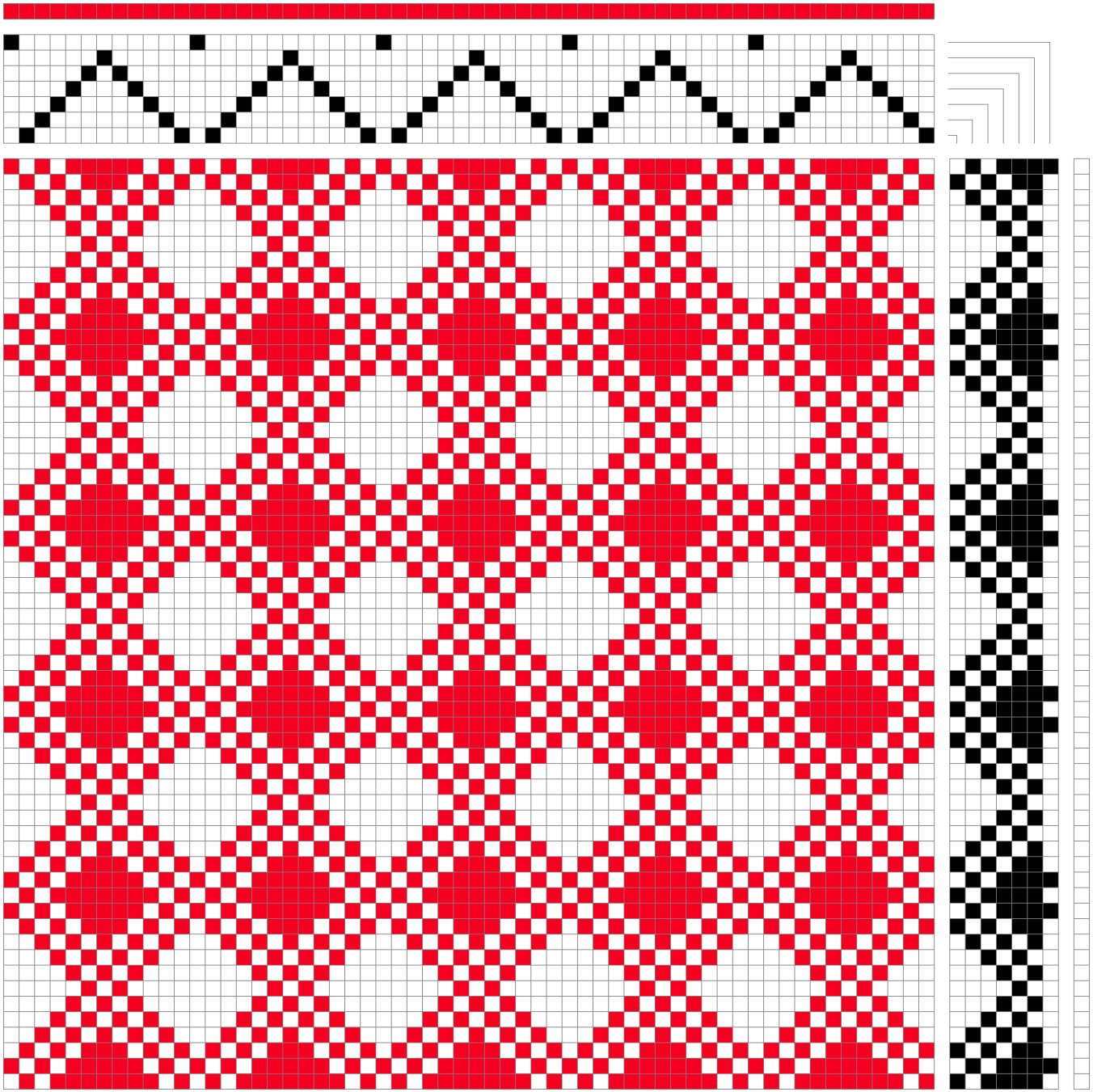


Straightforward draft for waffle weave on 7 shafts.

Point threading and treadling, binding created with tieup.

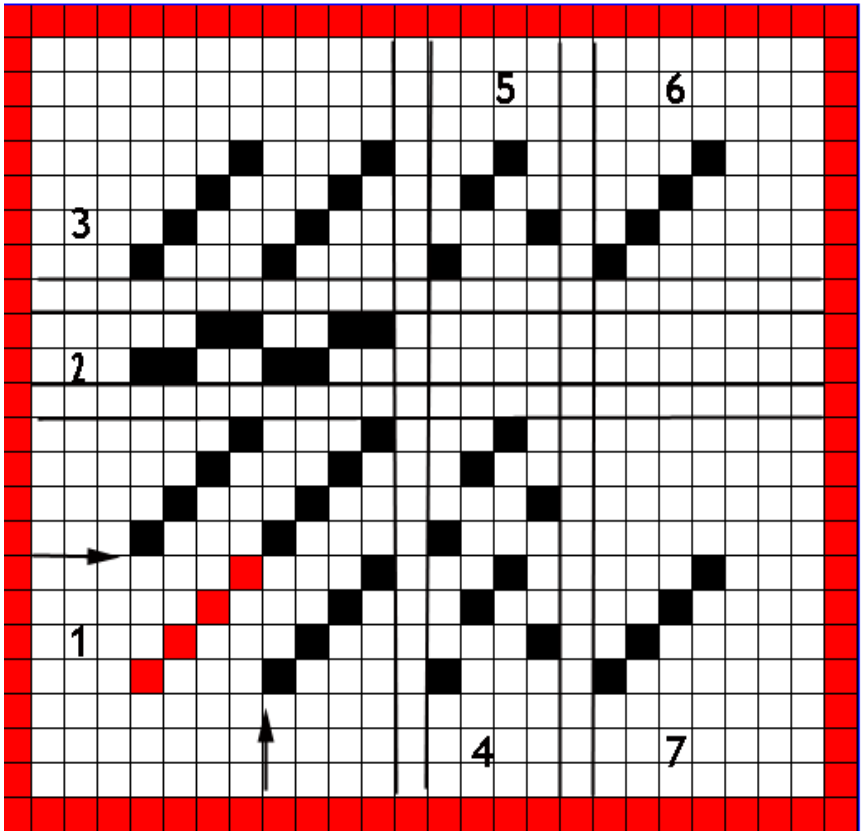


The same waffle weave – same threading but with tieup and treadling adjusted for walking the treadles from left to right, outside to inside.



Once again,
waffle weave on
7 shafts.
This time, a liftplan
has been substituted
for tieup and
treadling.

Production Draft (Fertigungspatrone)

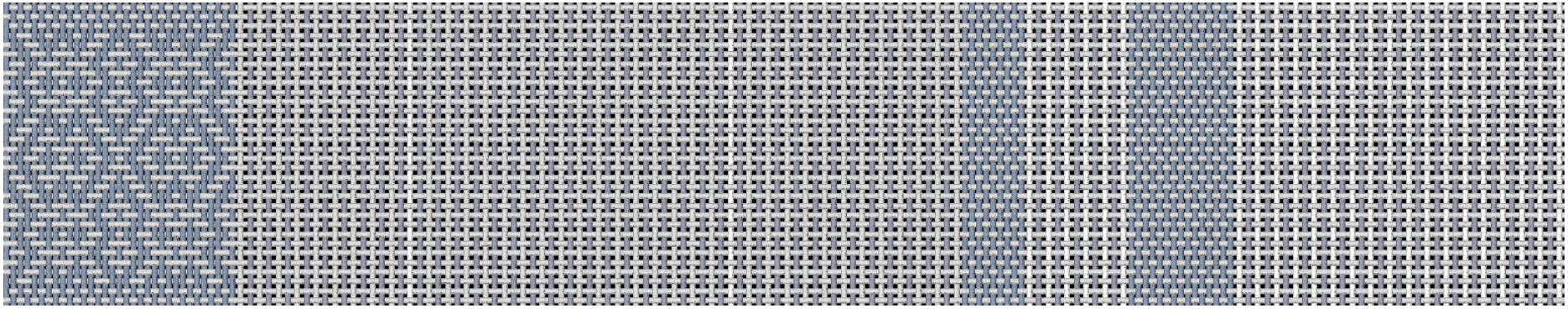


1. Binding (1/3 twill)
2. Reed denting (2 per dent)
3. Threading on 4 shafts
4. Treadling order
5. Tieup
6. Card (lift) order
7. Liftplan, punching order

Source: IGH-Sindelfingen 4. And 5. Based on CM loom walking treadles 1, 4, 2, 3.

2. Presenting the Reed Denting in the Production Draft

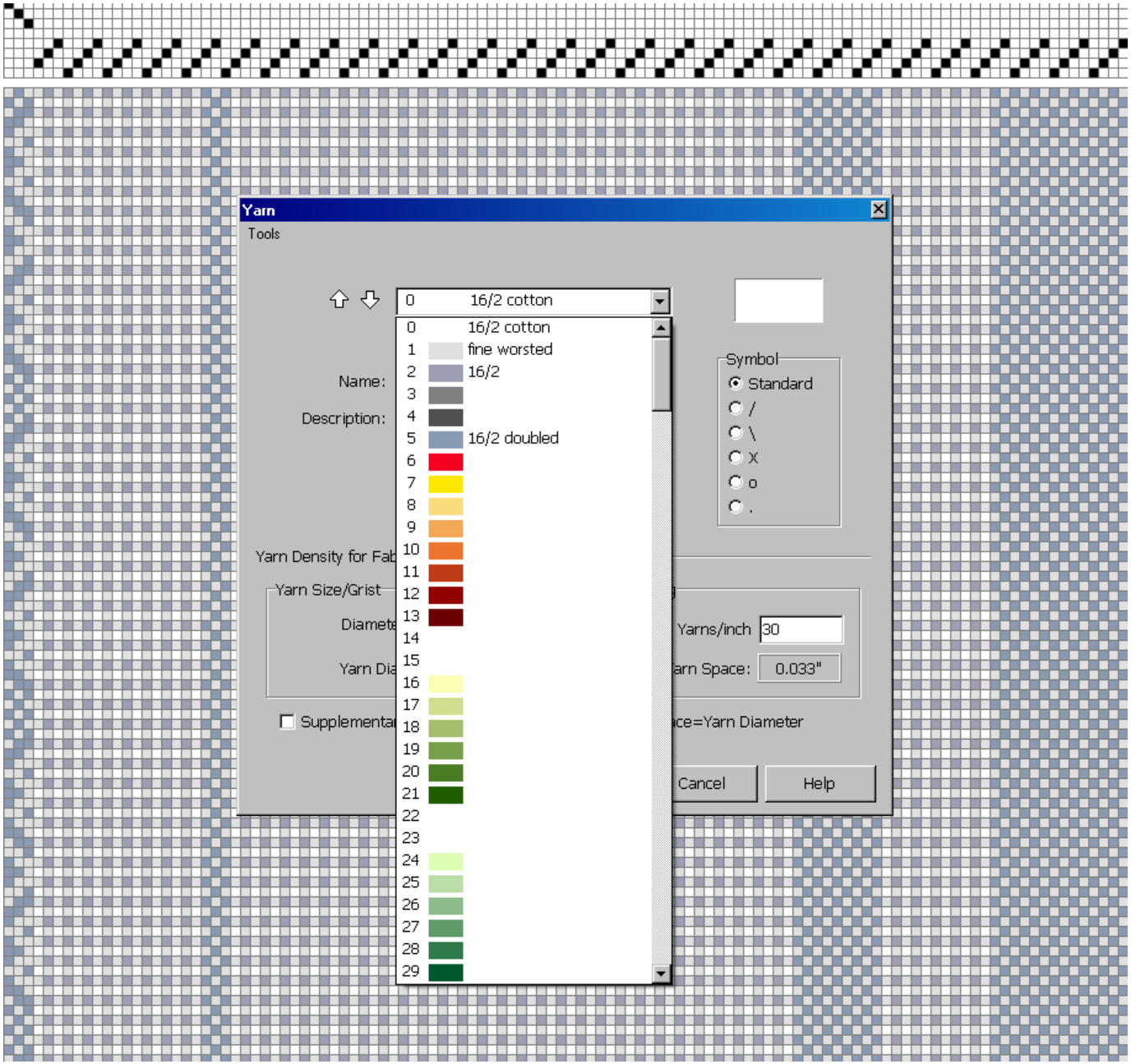
While not usual, it can be very helpful in displaying the effect of denting in the finished fabric as shown by the following examples.

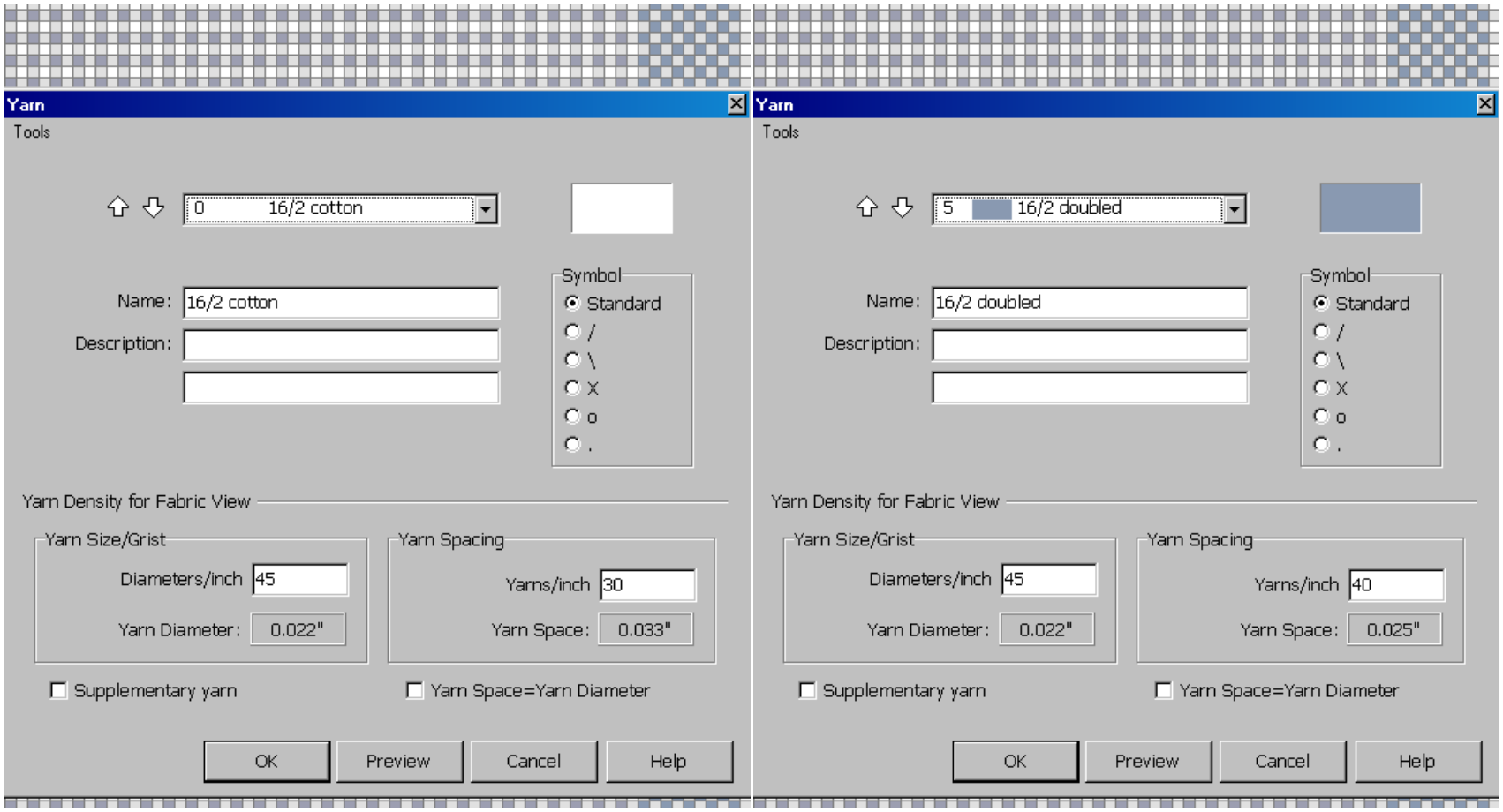


Uneven denting is difficult to represent, though Weavepoint does allow differing thread densities based on yarn descriptions.

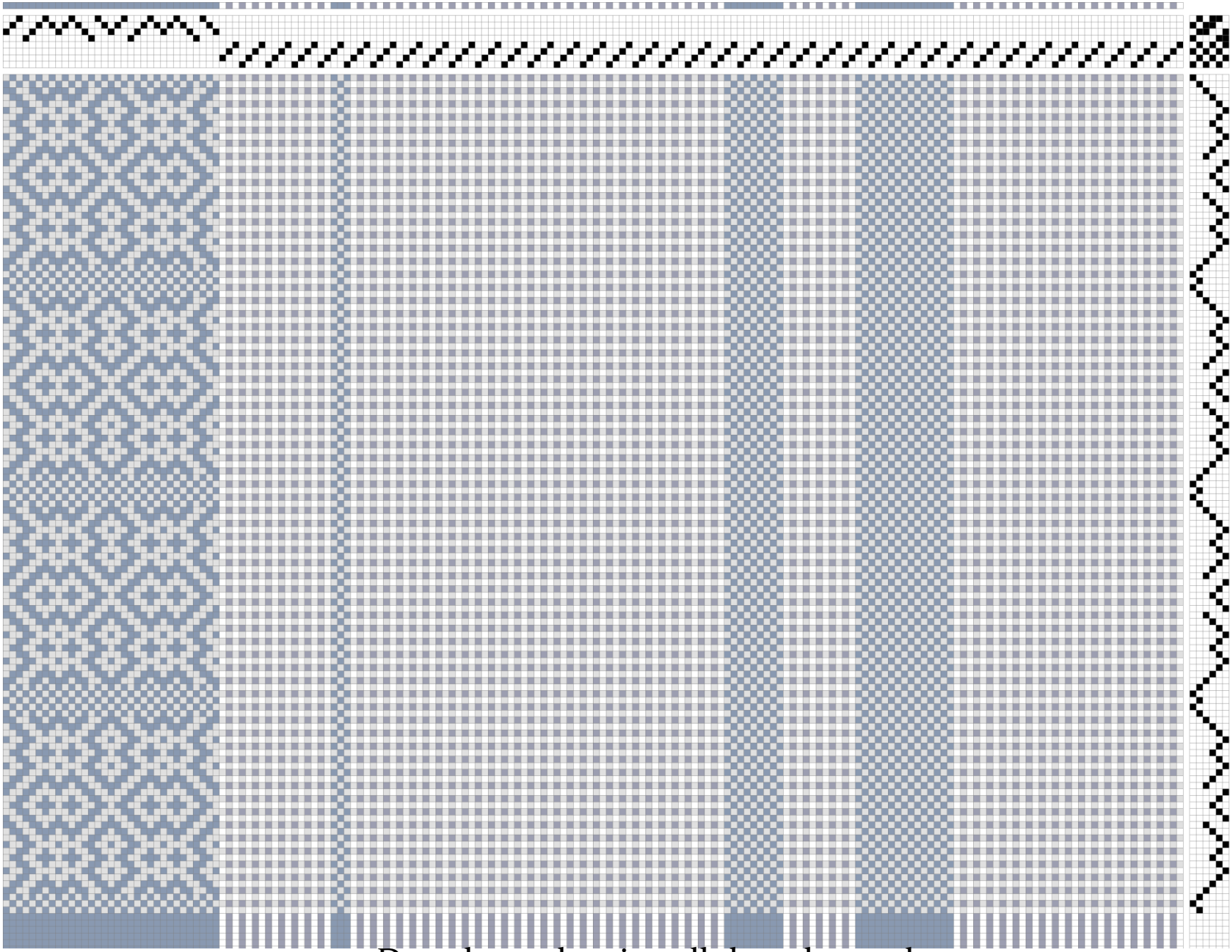
Here, for a curtain fabric, the blue warp stripes are threaded 3 ends per dent and the alternating tabby warp is threaded 2 ends per dent.

Some programs offer thick/thin thread descriptions – these can be manipulated display uneven denting.

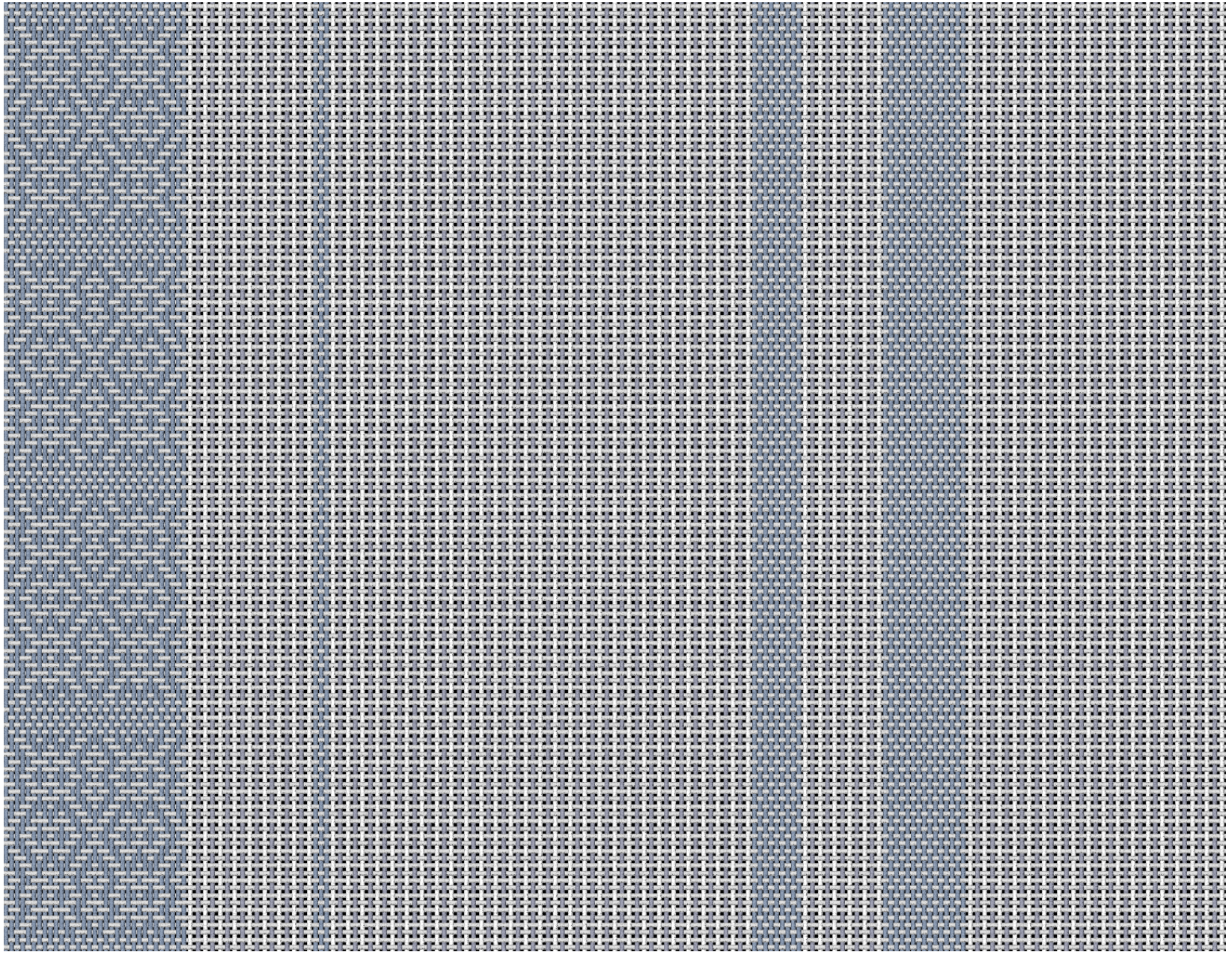

Yarn
Tools
0 16/2 cotton
0 16/2 cotton
1 fine worsted
2 16/2
3
4
5 16/2 doubled
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
Name:
Description:
Symbol
Standard
/
\
X
o
.
Yarn Density for Fab
Yarn Size/Grist
Diamete
Yarn Dia
Yarns/inch 30
arn Space: 0.033"
Supplemental
ce=Yarn Diameter
Cancel
Help

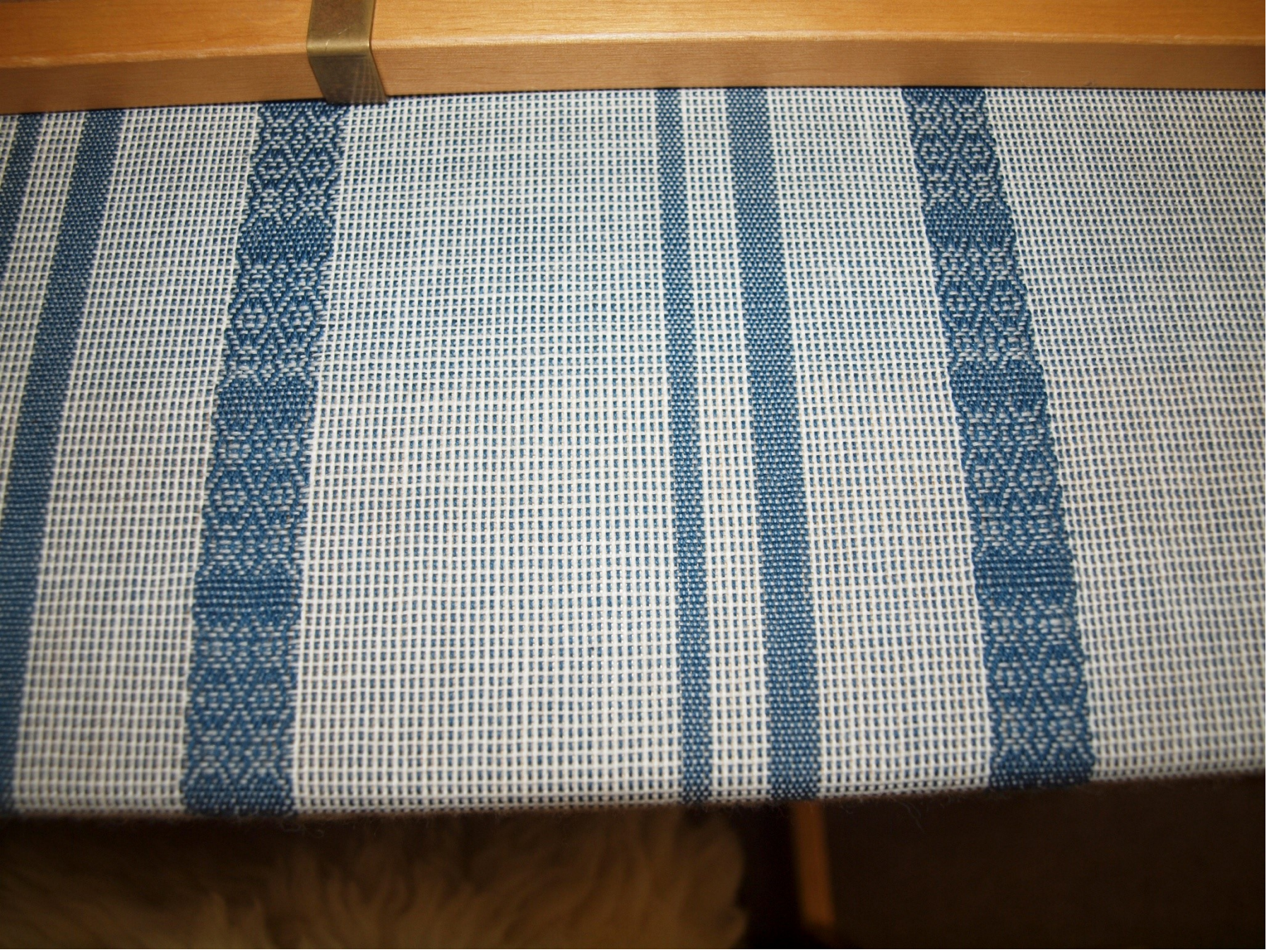


Yarns defined as 30 or 45 epi for fabric view.



Drawdown showing all threads equal.

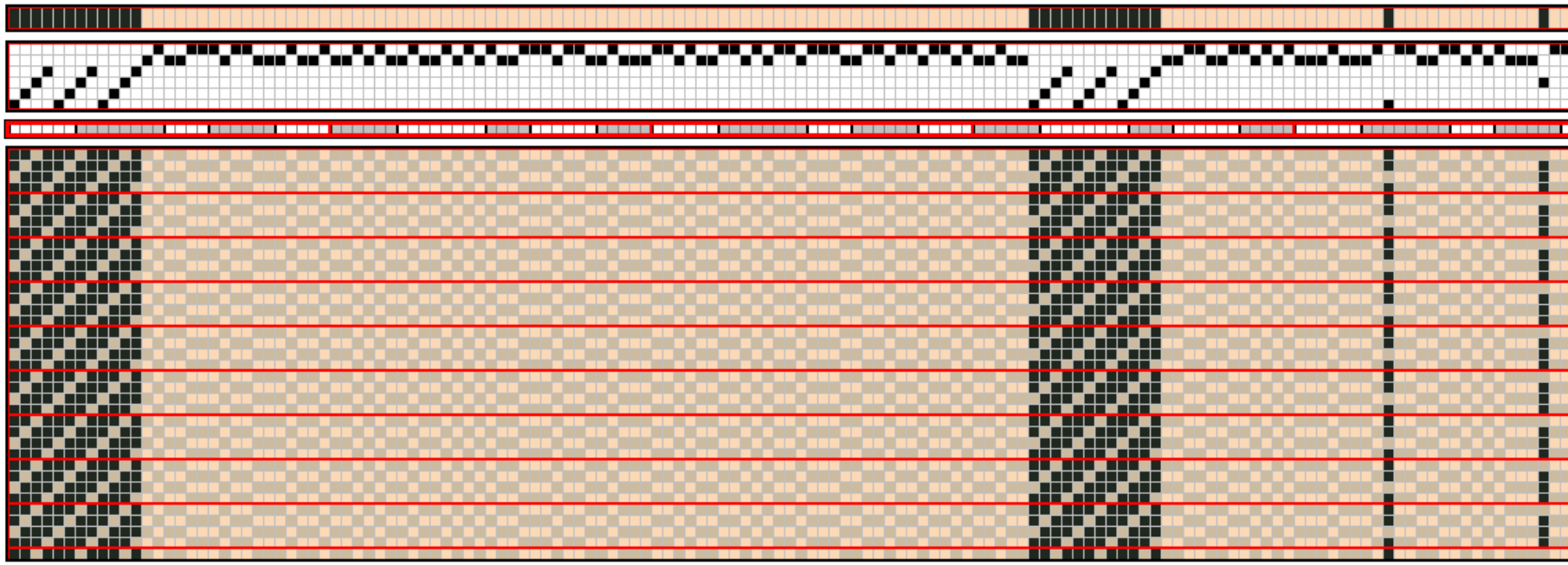




fanreedscart2 [Reed - Ground]

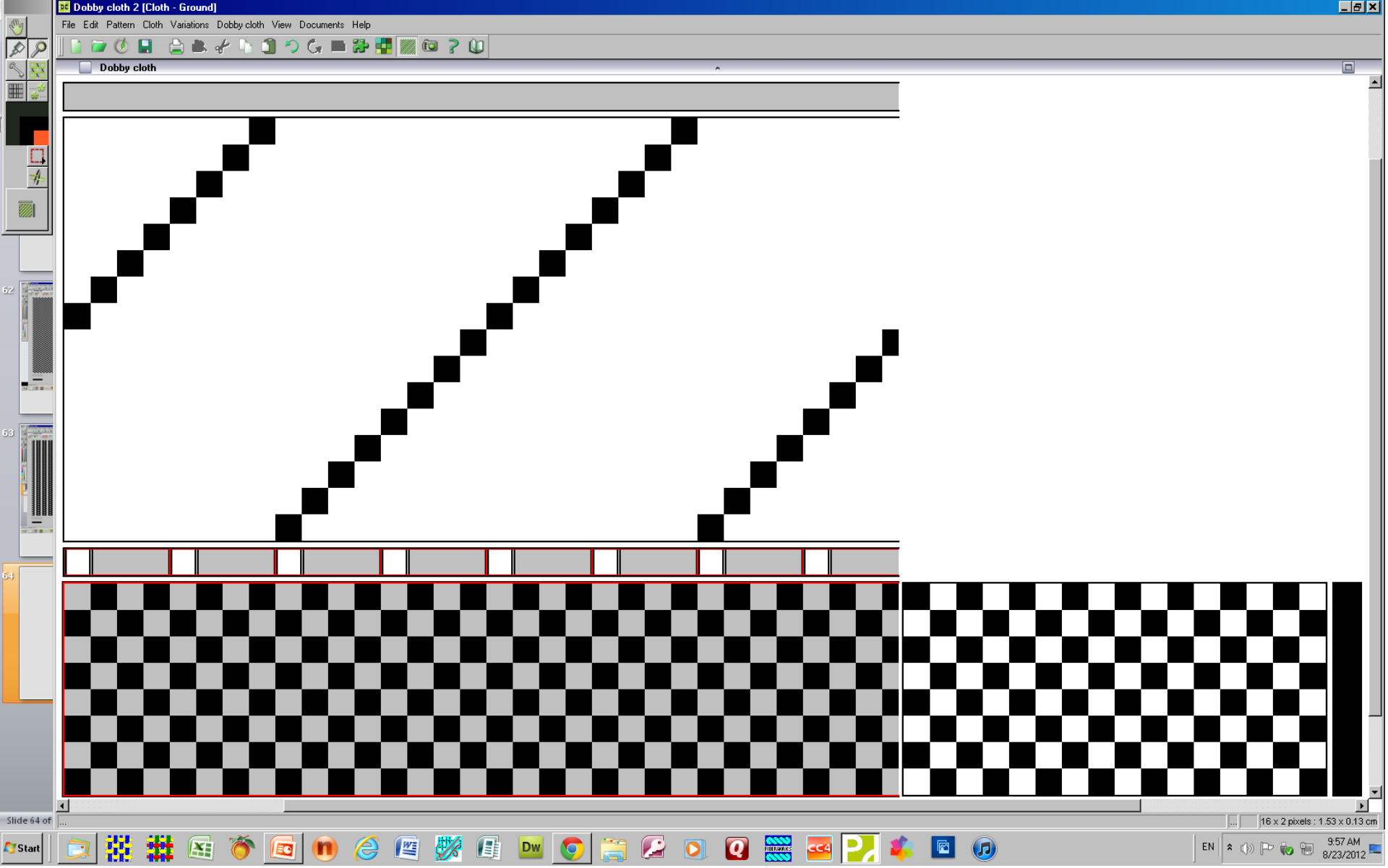
File Edit Pattern Cloth Variations Dobby cloth View Documents Help

Dobby cloth



Variation table

Zoom x 4


Dobby cloth 2 [Cloth - Ground]
File Edit Pattern Cloth Variations Dobby cloth View Documents Help
Dobby cloth
Slide 64 of
16 x 2 pixels : 1.53 x 0.13 cm
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8/23/2012

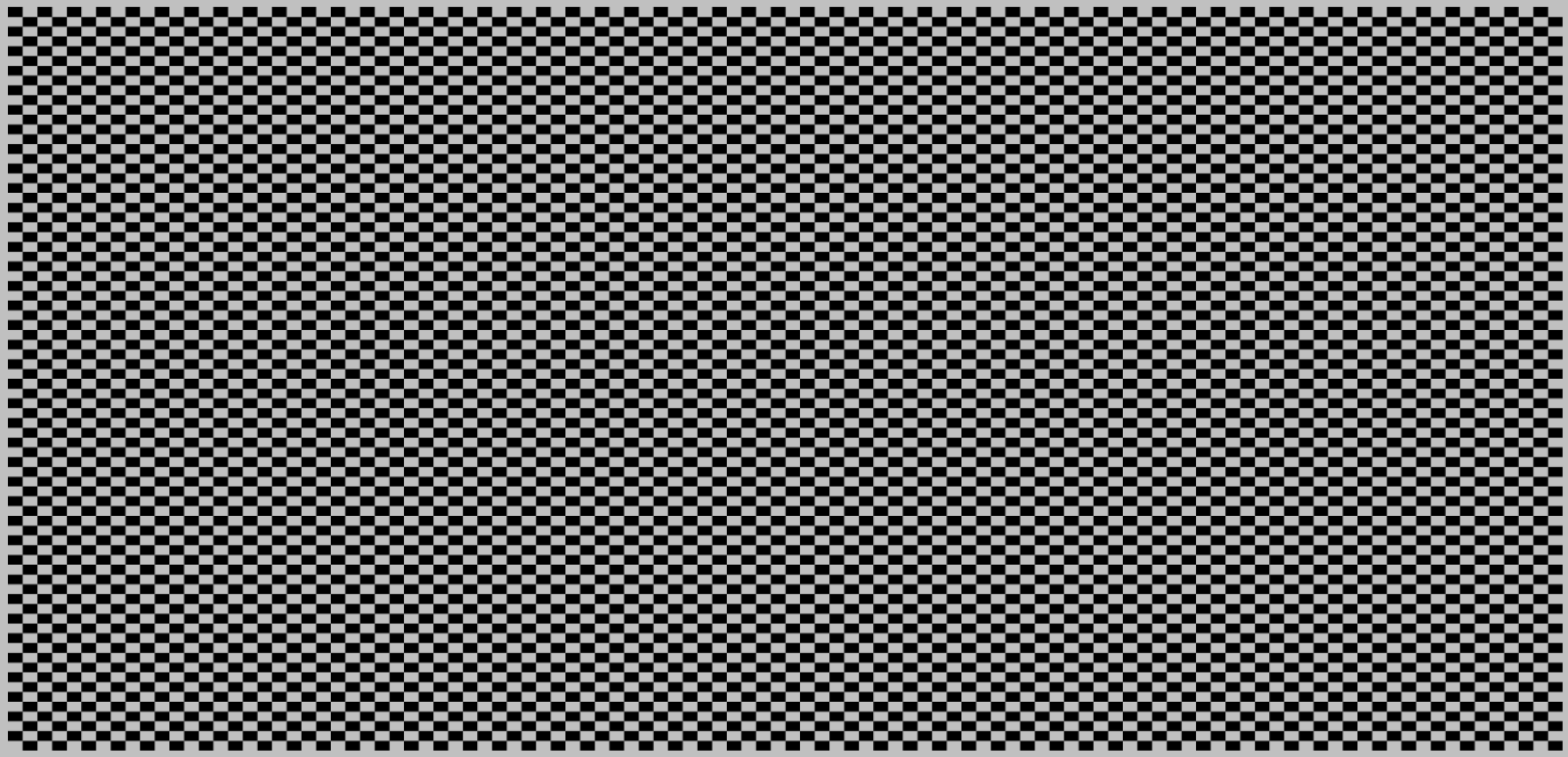
Dobby cloth 2

File Edit Pattern Cloth Variations Dobby cloth View Documents Help

Variation table

Zoom x 4

Show this bar



RGB

HLS

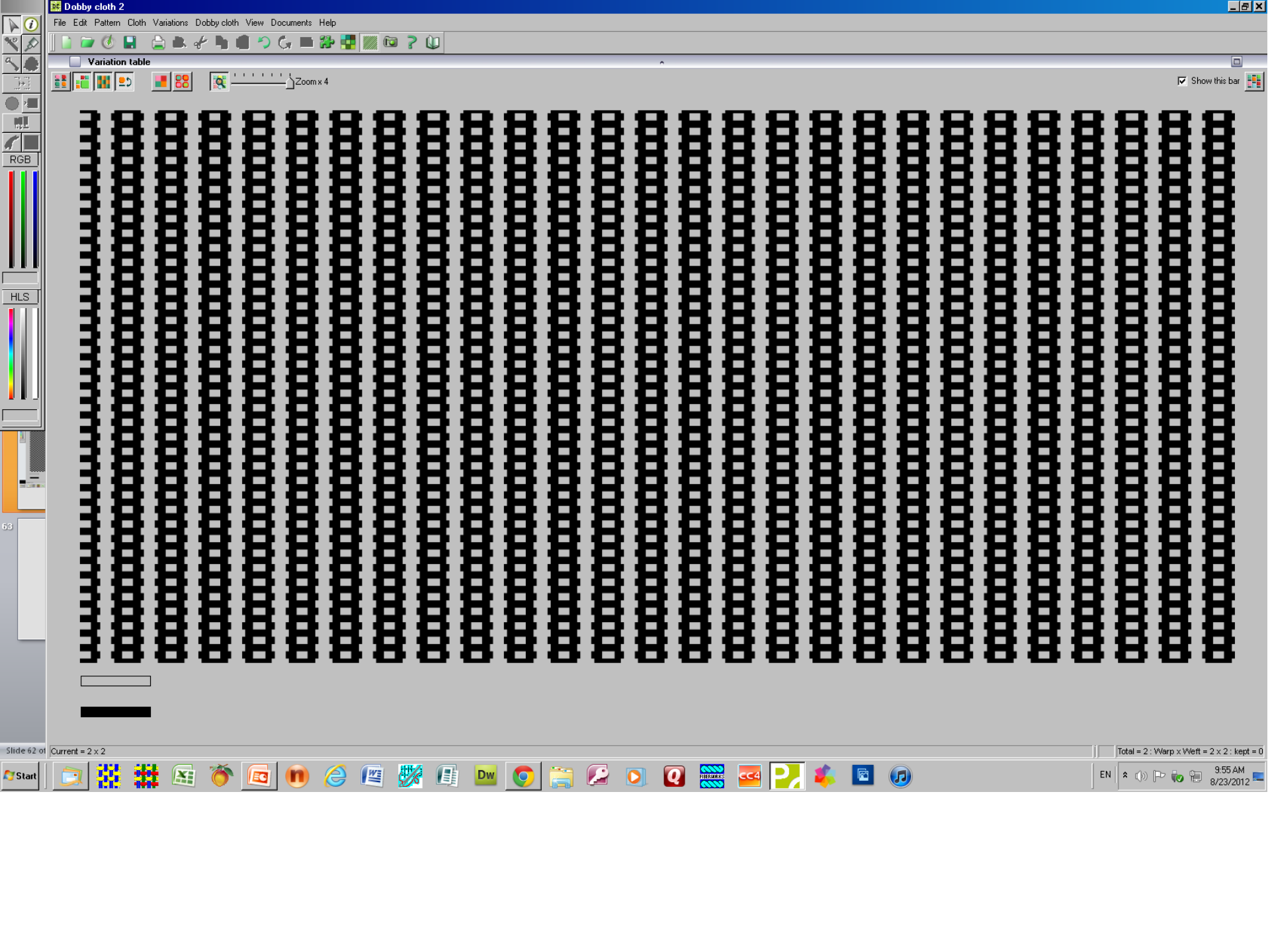
Current = 2 x 2

Total = 2 : Warp x Weft = 2 x 2 : kept = 0

Start

EN

9:49 AM
8/23/2012


Dobby cloth 2
File Edit Pattern Cloth Variations Dobby cloth View Documents Help
Variation table
Zoom x 4
Show this bar
RGB
HLS
Current = 2 x 2
Total = 2 : Warp x Weft = 2 x 2 : kept = 0
Start
EN
9:55 AM
8/23/2012

Now it is time for the quiz.
Collaboration is essential to completing the exercises.

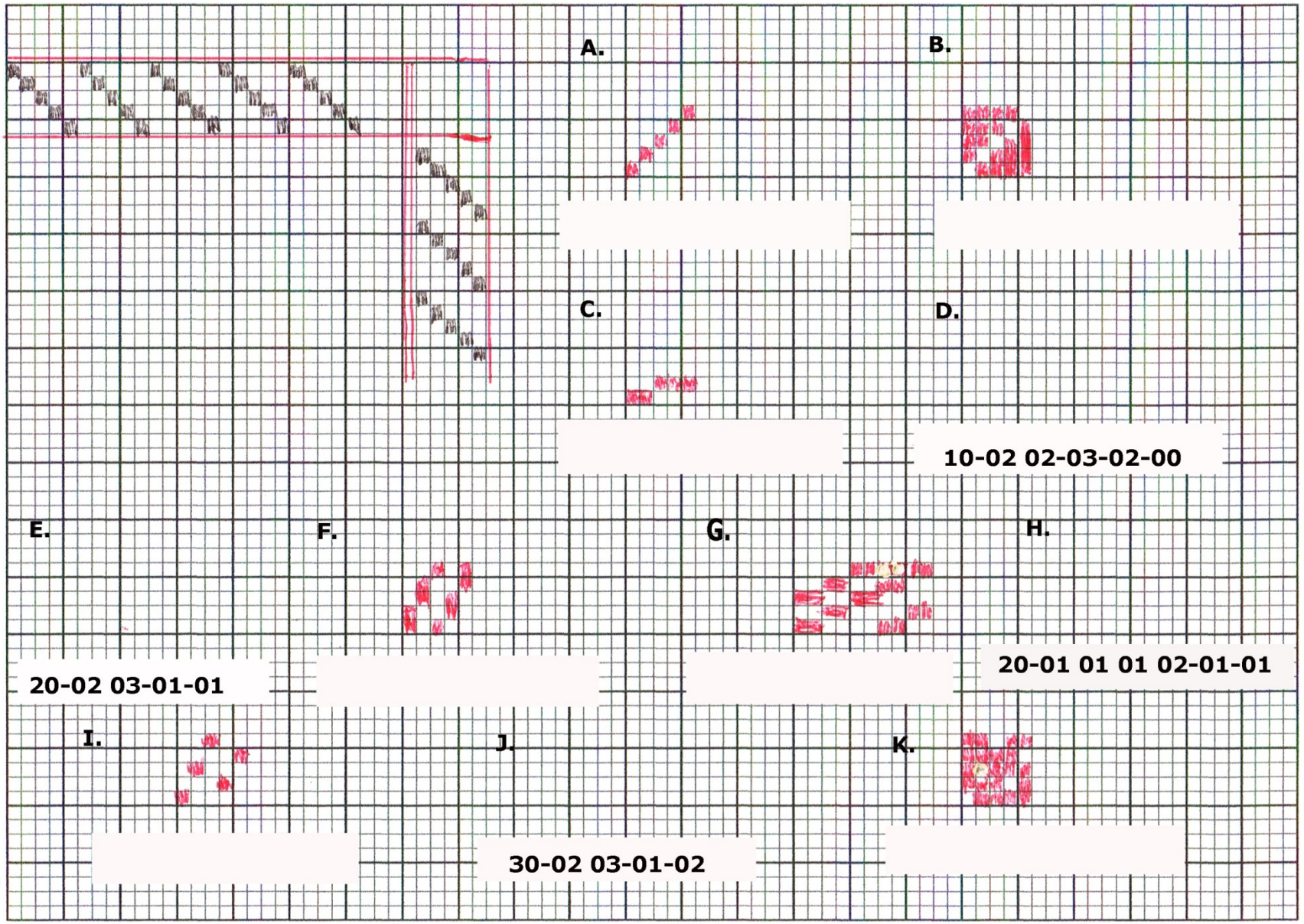
There is an answer key to assist you in correcting your answers.

There are no grades being given -

Project Title:

WORKSHEET - BINDUNGSLEHRE

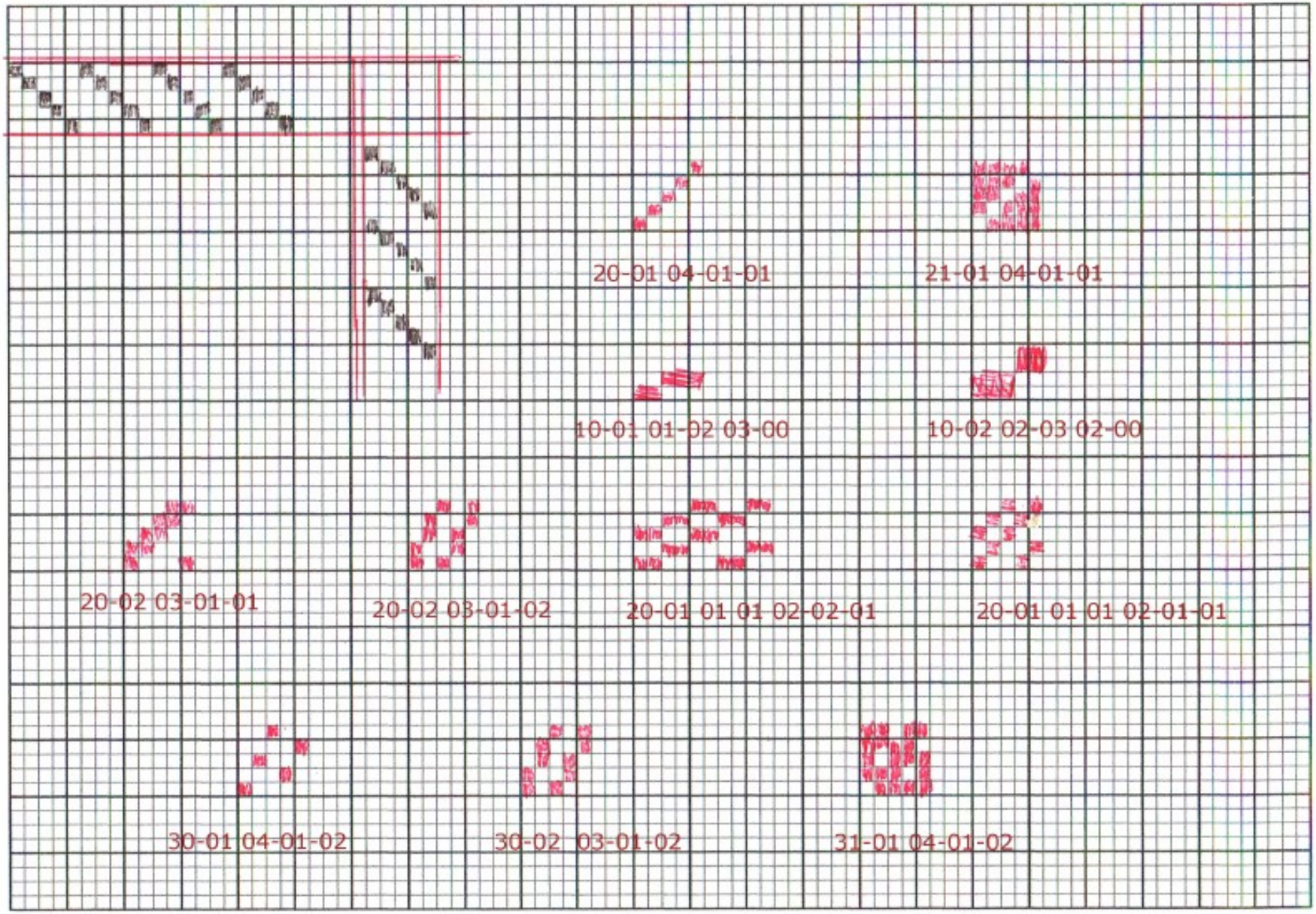
BASIC GRID - STRAIGHT THREADING, STRAIGHT TREADLING, 5SHAFTS/5 TREADLES



Project Title:

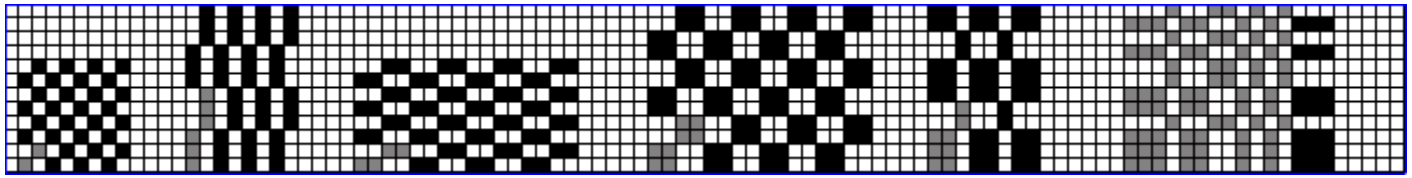
ANSWER KEY - BINDUNGSLEHRE

BASIC GRID - STRAIGHT DRAW STRAIGHT TREADLING



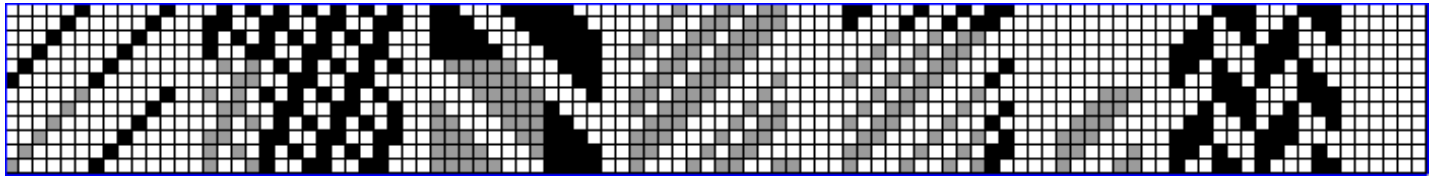
What about the “derivation”?
The building blocks of bindungslehre can be combined, rotated, sliced and diced in any way the weaver chooses to produce a wide array of textiles.
Here are some ways to incorporate the basics of bindings into creating original weave structures and fabrics.

Plain Weave: Standard threading/treadling sequences R=Rib, Q=horizontal, L = vertical, P=Panama or basket



10-01 01-01-00 or **L 1/1**	10-03 03-01-00 or **RQ 3/3**	10-01 01-02-00 or **RL 1/1 2t**	10-02 02-02-00 or **P2/2 2t**	10-03 02-02 01-00 or **P 3/2 2+1t**	10-03 01 02 02 01 01 01-03 01 02 02 01 01 01-00 or **P 3/1/2/2/1/1/1 3+1+2+2+1+1+1t**

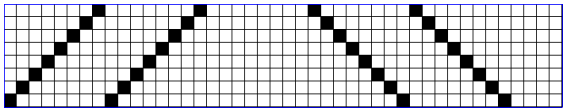
Twill Weave



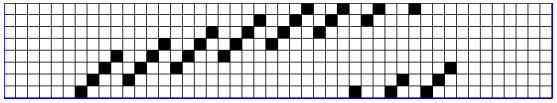
20-01 05-01-01 K ___1____ Z 5	20-03 02 01 02-01-02 K_3 1__Z 2 2 (Step 2)	20-05 -03-01-07 K __5__S **3**	20-03 01 02 02 01 03-01-01 **K_3 2 1__Z** **1 2 3**	20-02 01 01 02 01 03-01-01 K __2 1 1_Z 1 2 3	Ground: 20-03 03-01-01 K__3__Z 3 Cross twill, over 3 threads

8. Threading/Treadling standards - In addition to DIN 61101, DIN 61110 describes a series of standard threading and treadlings used to produce production drafts.

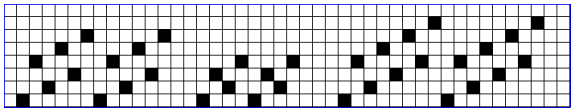
Straight draw left S, right Z



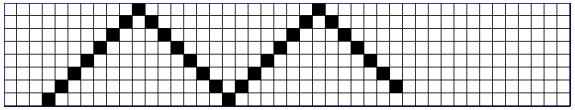
Intermittent Draw



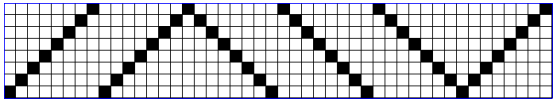
Scattered Draw



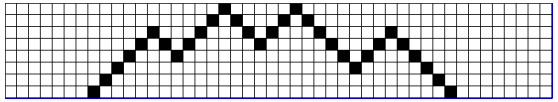
Point Draw



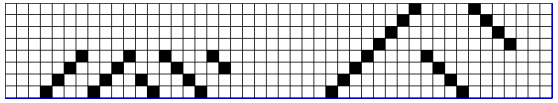
Extended Point Draw



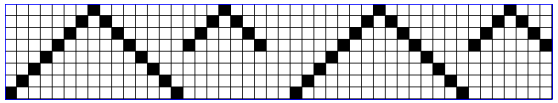
Patterned Point Draw



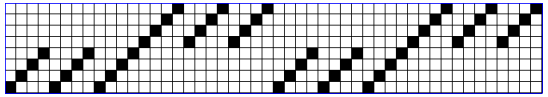
Broken Draw



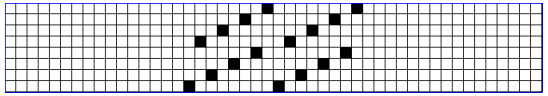
Broken Point Draw

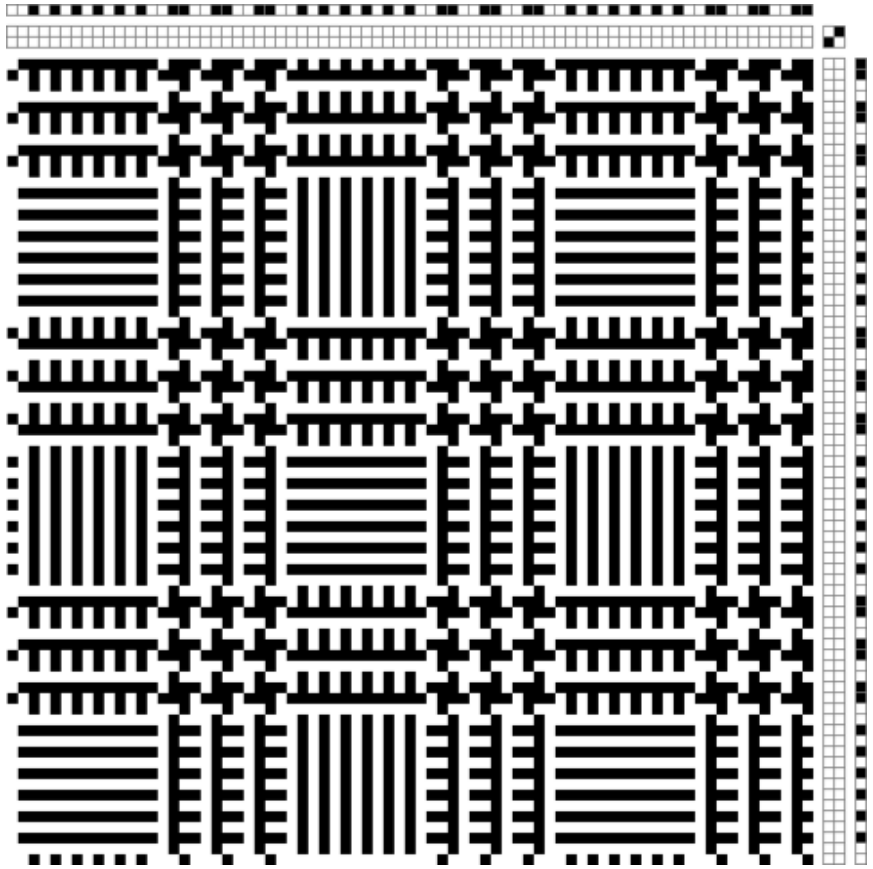


Block Draw with 2 Blocks



Multi-section Draw with 2 Shaft Sections

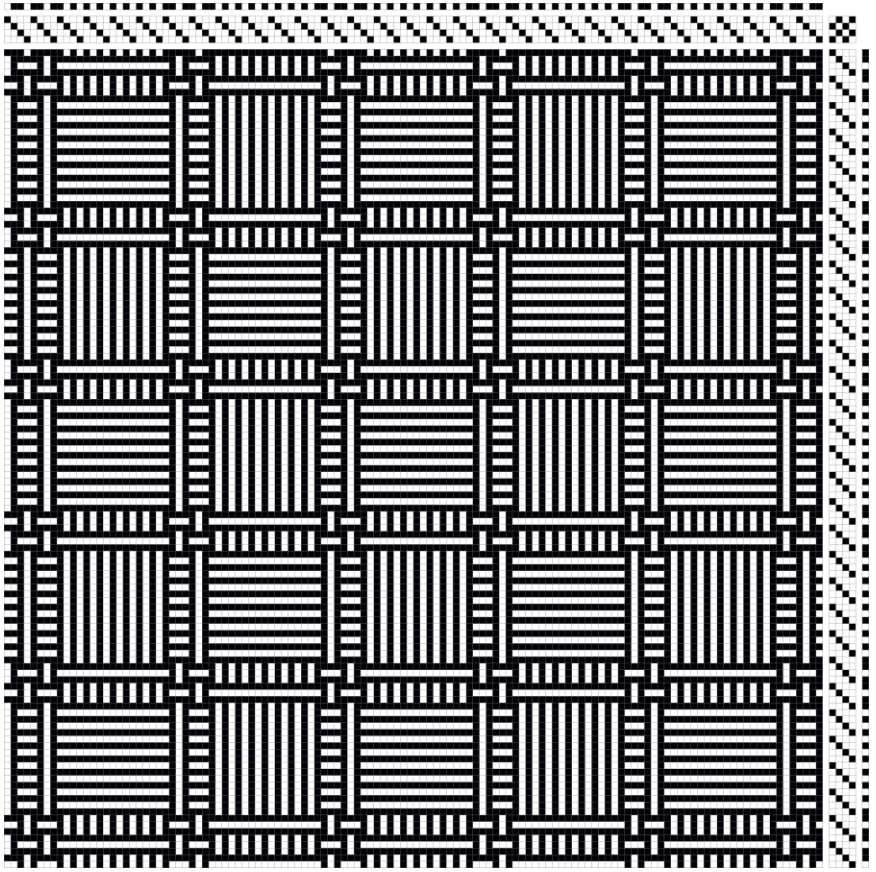


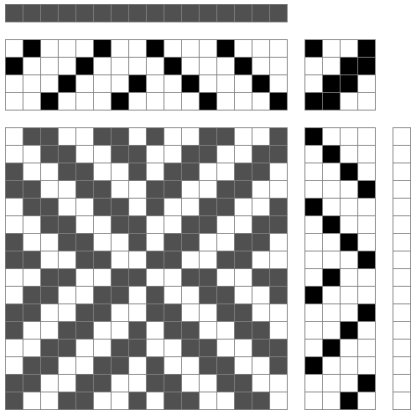


Color and weave.
These samples are simple tabby using careful alternation of color in both warp and weft.

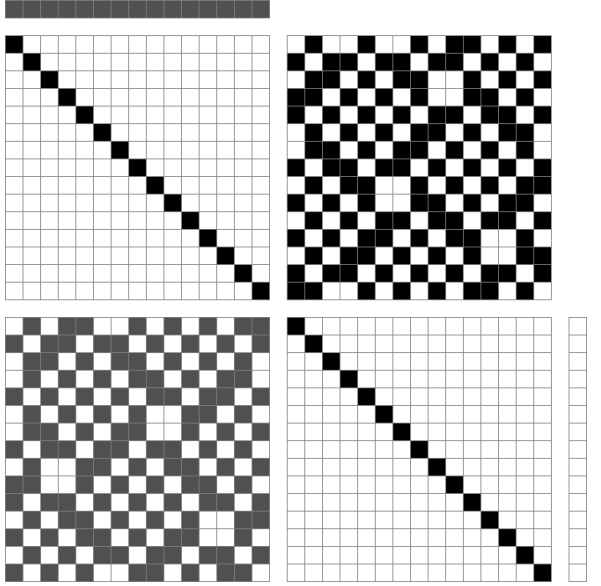
Above, the sequence is aa 5(ba) b
3 (aabb)

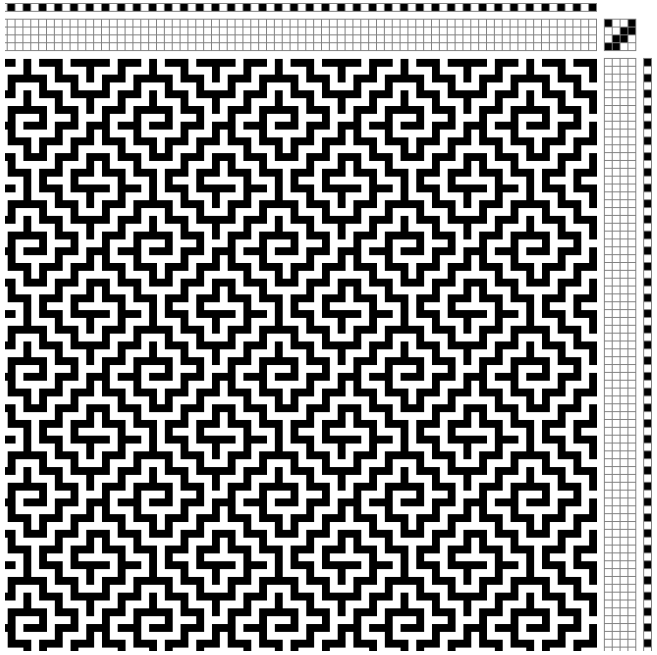
At left the color sequence is 7 (ab)
3(abb)

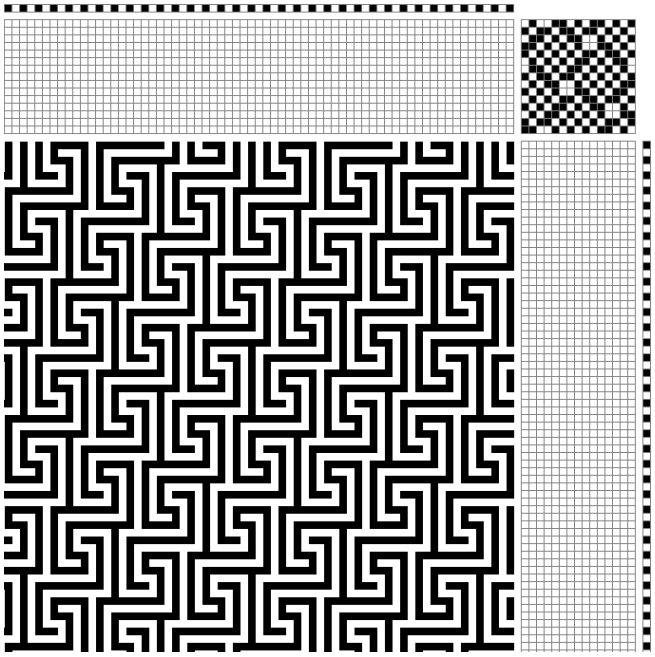




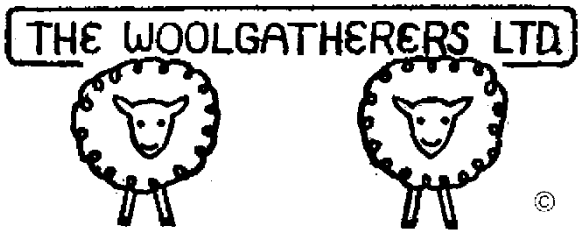
Color and weave
using various bindings
combined with simple
alternating color in
both warp and weft.







The End



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