Summa GoProduce

SDK for preparing files

Release date: 0119/1

Revision History

12/12/2018	First revision
31/01/2019	Changed barcode definition for code 39 barcode for hand scanner to match the definition for POSTNET barcode

Rev002

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Introduction

The information contained in this package is designed to allow technically competent people to develop software and drivers compatible with the F series flatbed cutters.
This document focuses on a driver that creates files and not on driving the F series flatbed cutters direct. These type of drivers create files which can be imported by Summa GoProduce.

Summa GoProduce is a commercial digital finishing application from Summa. This application supports pdf , oxf and SGP file types.

This document goes into detail about the requirements/recommendations for SGP files. If info is needed for other file types, then please contact Summa (contact page on www.summa.eu via direct wim@summa.eu).

Summa GoProduce is a program for driving the F series flatbed cutters. Summa GoProduce supports mark recognition and compensation for contour cutting as well as other advanced workflow features.

1 The SGP format

SGP is the preferred format for importing files into Summa GoProduce.
The data format is basically HPGL, but with a few extra's

- File extension: .SGP
- Resolution: 0.01 mm.
- Different layers are separated by HPGL "SP" commands. A layer corresponds to a specific method

1.1 Header

;GoProduce
The file must start with the keyword ;GoProduce .

TMMaterial name;
TM command followed by the material name. The material name is given with this command. This is a global setting and must be placed in the header section. The name of the material should be selectable from a list that can be updated (see section5).

> **Note:** If the thickness of the material is included in the material name. (See example section 5)

1.2   Vector data

The data format is standard HPGL. The choice of tool is set with layer commands (see subsequent section). Below is a subset of HPGL commands.

PUX,Y;
Lifts the tool and moves to coordinate X,Y.

PDX,Y;
Lowers the tool and moves to coordinate X,Y.

PA; or PAX,Y;
Switches to absolute mode. If one or more parameter(s) is/are given, then the tool also moves to that direction.

AAX,Y,angle;
Lower the tool and makes a circular arc with as start point the current position and center X,Y (absolute coordinates) and the length is given in degrees (values accepted between -360 and +360). After that the current position is the end of the arc

BZX1,Y1,X2,Y2,X3,Y3;
Lowers the tool and makes a Bezier curve (cubic) from the current position to position X3,Y3 with X1,Y1 as first control point (direction of tangent) and X2,Y2 as second control point (direction of tangent). Coordinates are absolute. After that the current position is the end of the curve (X3,Y3).

1.3 Layer commands

Different layers are separated by HPGL "SP" commands.
As additional information, the *method name* should be given with special commands.
The methods should selectable from a fixed list (although in future very sporadic extra methods might become available). Or the method name can be copied from the spot color name (a swatch library is provided for Illustrator and Indesign and a color palette for Corel)

SPn;
SP command followed by a number (see table 1) The SP command starts a new layer (tool) the n corresponds to a certain tool.
The registry layer should have 99 as layer number

LMname;
LM command followed by the layer method.
The methods can be requested from the material database or can be assigned from a static method table (see table 1). Every different cutting path should be linked to a method in order to separate them in the SGP file. In Summa GoProduce methods will be linked to the correct machine tools.

SP (ToolNumber)	LM (Method)
99	Regmark
1	Draw
2	Score
3	Crease
4	Kiss-cut
5	Thru-cut
6	Thru-cutRegmark
7	*V-Cut45*
8	*V-Cut30*
9	*V-Cut22.5*
10	*V-Cut15*
11	Bevel-Cut45
12	Bevel-Cut30
13	Bevel-Cut22.5
14	Bevel-Cut15
15	Engrave

TABLE 1
METHODS F SERIES

1.4 End of file

The file should be ended with the HPGL up command

PU;
Each file should end with this command.

1.5 Sample file

```
;GoProduce
TMVinyl brandname type 0.1 mm;
PA;
SP4;LMKiss-Cut;
PU20971.5 17759.3;
PD;
AA15481.9,17759.3,-90.00;
AA15481.9,17759.3,-90.00;
AA15481.9,17759.3,-90.00;
AA15481.9,17759.3,-90.00;
SP9;LMThru-cut;
PU8355.7,11514.8;
PD8355.7,24003.9;
PD22608.0,24003.9;
PD22608.0,11514.8;
PD8355.7,11514.8;
PU8155.7,11214.8;
SP99;LMRegister;
PD;
AA7905.7,11214.8,-90.00;
AA7905.7,11214.8,-90.00;
AA7905.7,11214.8,-90.00;
AA7905.7,11214.8,-90.00;
PU23008.0,11214.8;
PD;
AA22758.0,11214.8,-90.00;
AA22758.0,11214.8,-90.00;
AA22758.0,11214.8,-90.00;
AA22758.0,11214.8,-90.00;
PU8155.7,24303.9;
PD;
AA7905.7,24303.9,-90.00;
AA7905.7,24303.9,-90.00;
AA7905.7,24303.9,-90.00;
AA7905.7,24303.9,-90.00;
PU;
```

This file cuts a circle that will be cut with the method Kiss Cut, a rectangle with the cut with the method Thru-cut and has three registration marks.

2 The pdf format

The material name cannot be set in a pdf file. However, if the pdf has layer information and the layer names the methods names, the material database can be used, though it is a bit less automatic.

Pdf version should be minimum 1.5.
Different methods should be linked to different layers.
All registration marks should also be on a separate layer, this layer should have as name Regmark or Regmarks.
The names of the other layers should be as in the table below.

Regmark
Draw
Score
Crease
Kiss-cut
Thru-cut
Thru-cutRegmark
V-Cut45
V-Cut30
V-Cut22.5
V-Cut15
Bevel-Cut45
Bevel-Cut30
Bevel-Cut22.5
Bevel-Cut15
Engrave

TABLE 2
LAYER NAMES PDF

3 Specifications of the registration marks

Registration marks are circles with a color filling which should contrast as possible to the background (default black). The size of the marks must be adjustable. As default value a diameter of 5mm is recommend. At least 3 registration marks are needed to align and compensate a printed object, more marks are allowed. The position of the marks should result in a triangle which covers the object in the largest possible way.

3.1   Single object on sheet

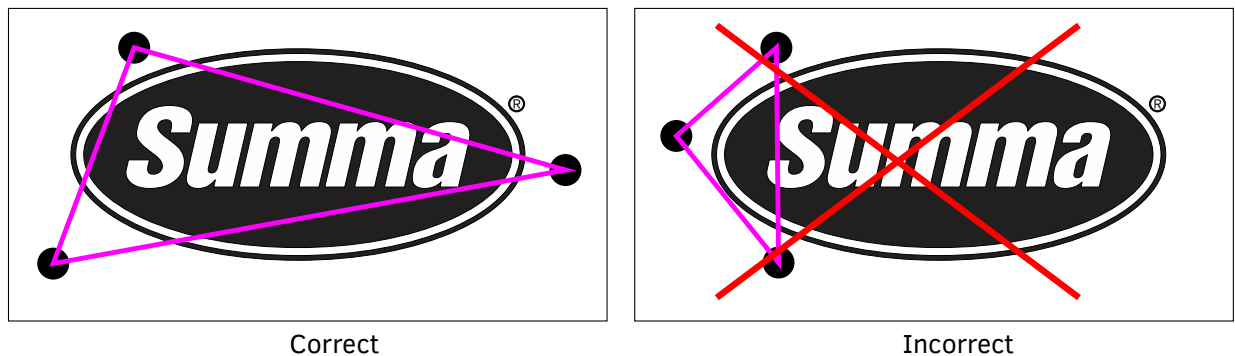Correct   Incorrect
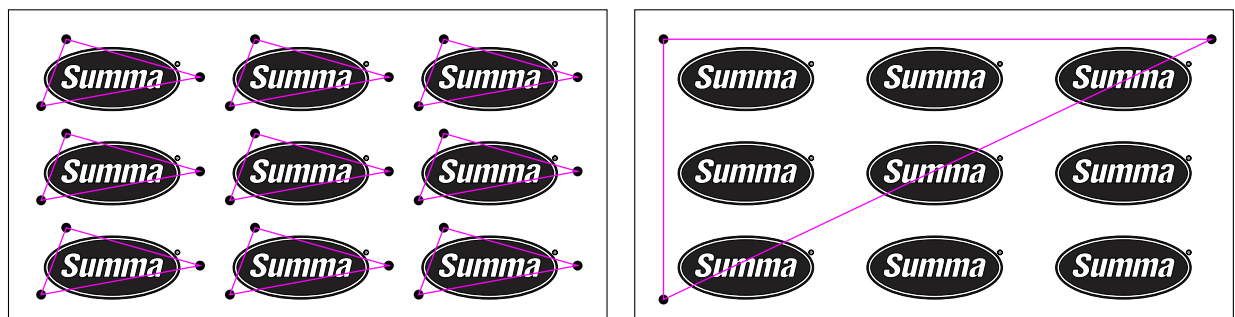
FIGURE 1
PLACEMENT MARKS ONE OBJECT

3.2   Copies

FIGURE 2
PLACEMENT MARKS MULTIPLE COPIES

In the *left* example each logo Summa is enclosed by respectively 3 registration marks. The compensation will thus be done in the relevant area for the respective object.
This way, a different scaling of the objects due to printing can be compensated. But the production time will be increased because all marks must be read by the camera.

In the *right* example the printed sheet has only 3 registration marks. In this case all objects are
compensated with these 3 marks. Here, different distortions in the individual objects cannot be compensated accurately, but production time will be reduced.

This remark about production time is also valid in case of no copies, but in case of multiple objects in one job.

3.3 Placement of the registration marks for jobs longer then maximum table length

Each segment must at least have 4 registration marks. The distance between the registration marks should be adjustable by the user. The multiple of the default value of the distance between marks may never be equal to the maximum table length. It should be substantially larger or smaller. Current used table lengths are 1200 mm. So standard distances of 300 or 400 should not be used (use 250 or 350).

Below is an example of universal distribution of the registration marks.
The distance in X and y direction does not have to be the same, but it may be like this.
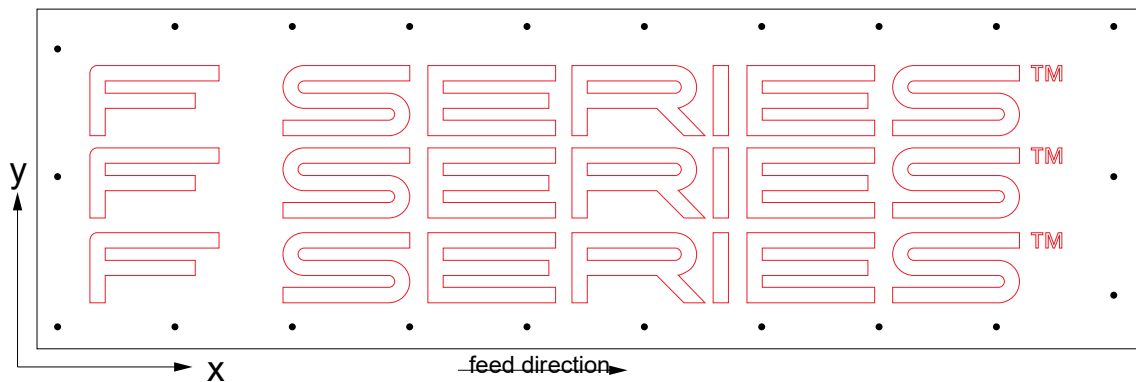

FIGURE 3
PLACEMENT MARKS LONG JOBS

3.4 Types of marks

The more marks, the more precise the contour can be cut. There are basically three methods of mark placement.
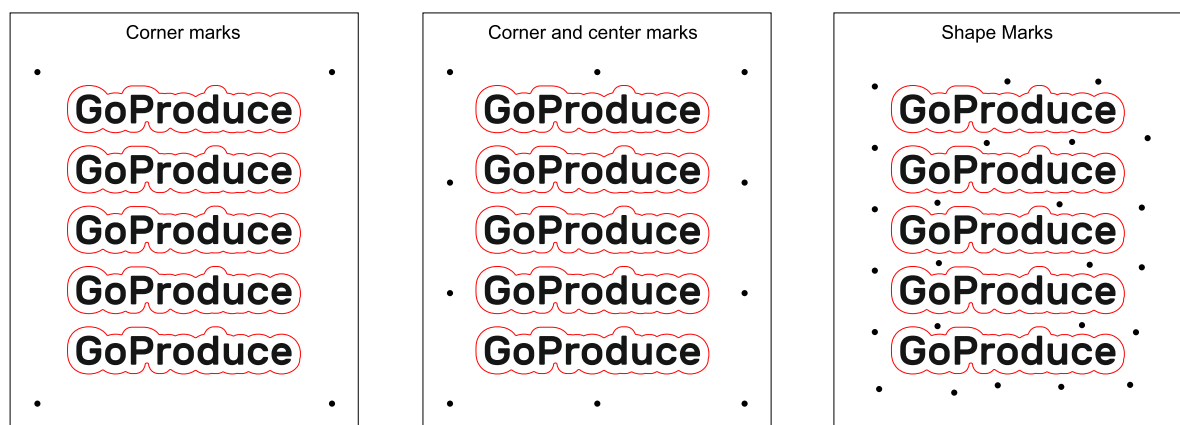

FIGURE 4
MARK PLACEMENT METHODS

The middle method is most commonly used, however if high accuracy is needed, then the method with shape marks is recommended.

4 Specifications for the barcode

4.1 Introduction

4.1.1 General

Summa GoProduce supports the file import by barcode in order to automate the Print&Cut production workflow. The intention of this workflow is to save user time and eliminate errors.
In this workflow each job is printed with a unique barcode.
There are two possible ways to read the barcode.
With a separate hand scanner
If a hand scanner is used, then the operator must read each barcode by hand before each job.
With the camera on the cutting table.
If the camera on the table is used for reading the barcodes, then the workflow can be automated. After finishing one job, the camera can automatically look for the second barcode and thus process a complete roll without user intervention. The camera on the table can also be used for working job per job.

4.1.2 Definition barcode

The barcode itself is a 11 digit number. The 11th digit is the rotation indicator for the orientation. Bottom = 0, Top = 5, Right = 8 and Left = 4. This last digit at the end of each printed barcode defines the orientation of the document before cutting. The required rotation of the file is done by Summa GoProduce during the file import.

4.1.3 Definition filename

The orientation digit is not in the jobname. This means that there are only 10 determining digit needed in the file name. They can be used as filename, or the jobname may be preceded with the jobname used in the rip.

So, if the barcode printed is **12345678900**.
Then the filename can be **1234567890.SGP** or **1234567890_jobname.SGP**

4.2   Barcode for handscanner

At the end of the print process the RIP generates an SGP cut file automatically. The file name must contain the value of the printed barcode without the last digit. This digit indicates the orientation of the printed file placed on the table.
Summa GoProduce uses **Code39** barcode specification, to keep compatibility with most available barcode scanners. The recommended print length of the barcode is between 70 mm and 100 mm.

FIGURE 5
HANDSCANNER

Two barcode placement methods are supported.

2 barcodes, only Bottom (0) and Top (5) (recommended)

At the bottom of the document, the printed barcode is: "*12345678900*" At the top of the document, the printed barcode is: "*12345678905*".

4 barcodes, Bottom (0), Top (5), Left (4), Right (8)

At the bottom of the document, the printed barcode is: "*12345678900*" At the top of the document, the printed barcode is: "*12345678905*".
At the left of the document, the printed barcode is: "*12345678904*" At the right of the document, the printed barcode is: "*12345678908*"

Possible file names

1234567890.SGP or 1234567890_[print file name].SGP

> **Note:** The origin of the SGP file should be in the same corner as the barcode which has a rotation character 0.
> Or otherwise said the mark next to the barcode with as rotation digit 0 is closest to the origin of the SGP file.

Sample file, print file with 2 barcodes:

FIGURE 6
SAMPLE PRINTOUT BARCODE HANDSCANNER

At the bottom of the document, the printed barcode is: "12345678900".
At the top of the document, the printed barcode is: "12345678905".

The orientation digit is not in the jobname. The jobname may be preceded with the jobname
used in the rip : 1234567890.SGP or 1234567890_jobname.SGP

4.3   Barcode for camera on table

Again, at the end of the print process the RIP generates an SGP cut file automatically. The file name has to contain the value of the printed barcode without the last digit. This digit indicates the orientation of the printed file placed on the cutter / router table.
The camera on the table can then read the barcode to identify the job and get the correct cut file. It can also look automatically for the next job. This way multiple jobs can be processed after each other without operator intervention.

The barcode is based upon 'POSTNET' used by the US post (http://en.wikipedia.org/wiki/POSTNET).

Summarized definition:

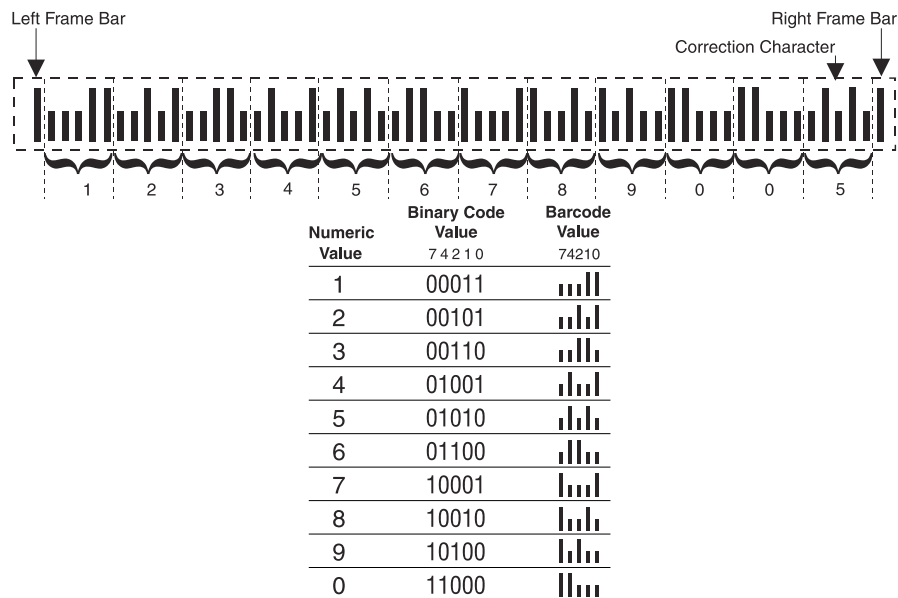| Numeric Value	Binary Code Value 7 4 2 1 0	Barcode Value 74210
1	00011	
2	00101	
3	00110	
4	01001	
5	01010	
6	01100	
7	10001	
8	10010	
9	10100	
0	11000	

FIGURE 7
SAMPLE BARCODE AND BARCODE VALUES FOR POSTNET

- The left and right full bars in a barcode — the frame bars — do not count.
- Each digit (numeric value) is represented by five bars.
- The last five bars in the barcode make up the correction character. The sum of the 11 digits and the correction character must equal to a multiple of 10.
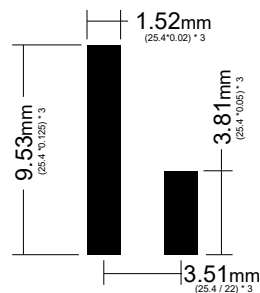- The barcode should be three times the official size.
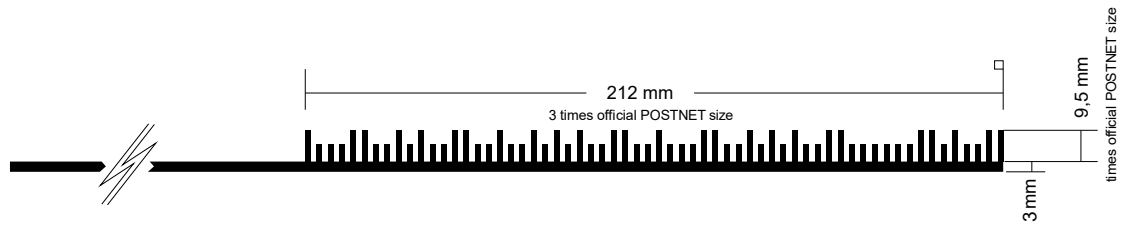

FIGURE 8
SIZE OF BARCODE DIGIT (POSTNET)

FIGURE 9
BARCODE SIZE POSTNET

- The barcode must be placed on a 3mm thick line and aligned at the right side.
- There must be a white space of at least 20mm before the barcode.
- Optional is the printing of the barcode label (the 11 digit number). The distance between the label and the line must be at least 5mm
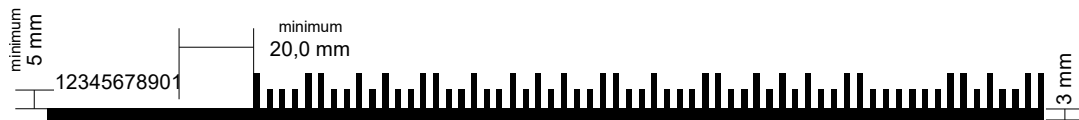

FIGURE 10
PLACE OF BARCODE LABEL (OPTIONAL, BUT RECOMENDED)

- The line must be placed to the left of the right lower mark. The bottom of this line should be aligned to the bottom of the lower right mark and leave 10mm of white space between the left side of the mark and this line. The line should run from left to right over the complete width of the design.
- There must be a white space of 20mm before the line and 5mm above the line (barcode excluded)
- The rest of the marks can be put anywhere. There should be a white space of at least 5mm around a mark.
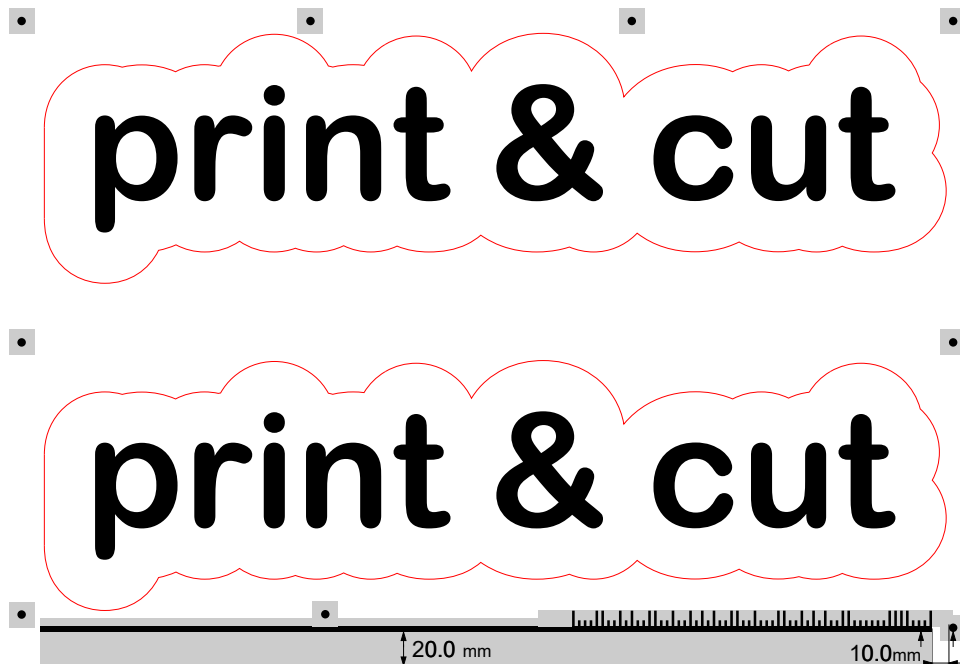

FIGURE 11
WHITE AREA (LIGHT GRAY) AROUND MARKS AND BARCODE

> **Note:** The registration marks at the and at the bottom are not all on the same line. The first mark at the beginning of the barcode is positioned so that the bottom of the mark is aligned to the bottom of the line of the barcode. The rest of the marks are positioned 8mm higher. With the barcode at the top it is the other way around.
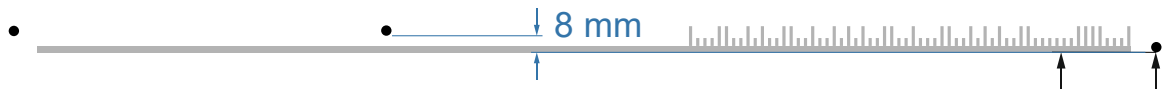

FIGURE 12
DETAIL BOTTOM LINE MARKS

- Recommended used values are: maximum 350mm distance between marks and set the marks at 10mm from the design.
- Two barcode placement methods are supported.

1 barcode

The barcode can be printed at the bottom or at the top of the print job. The place of the barcode then automatically is the bottom of the cut job.

2 barcodes, bottom and top (recommended)

If it is not certain yet how the job will be loaded on the table, then a barcode can be printed at the top and at the bottom of each job.

Orientation must be so that when the media is loaded on the table, the line is in front of the barcode.

At the bottom of the document, the printed barcode is: "*12345678900*".
At the top of the document, the printed barcode is: "*12345678905*".

Sample file name

The orientation digit is not in the jobname. The jobname may be preceded with the jobname used in the rip :1234567890.SGP or1234567890_jobname.SGP
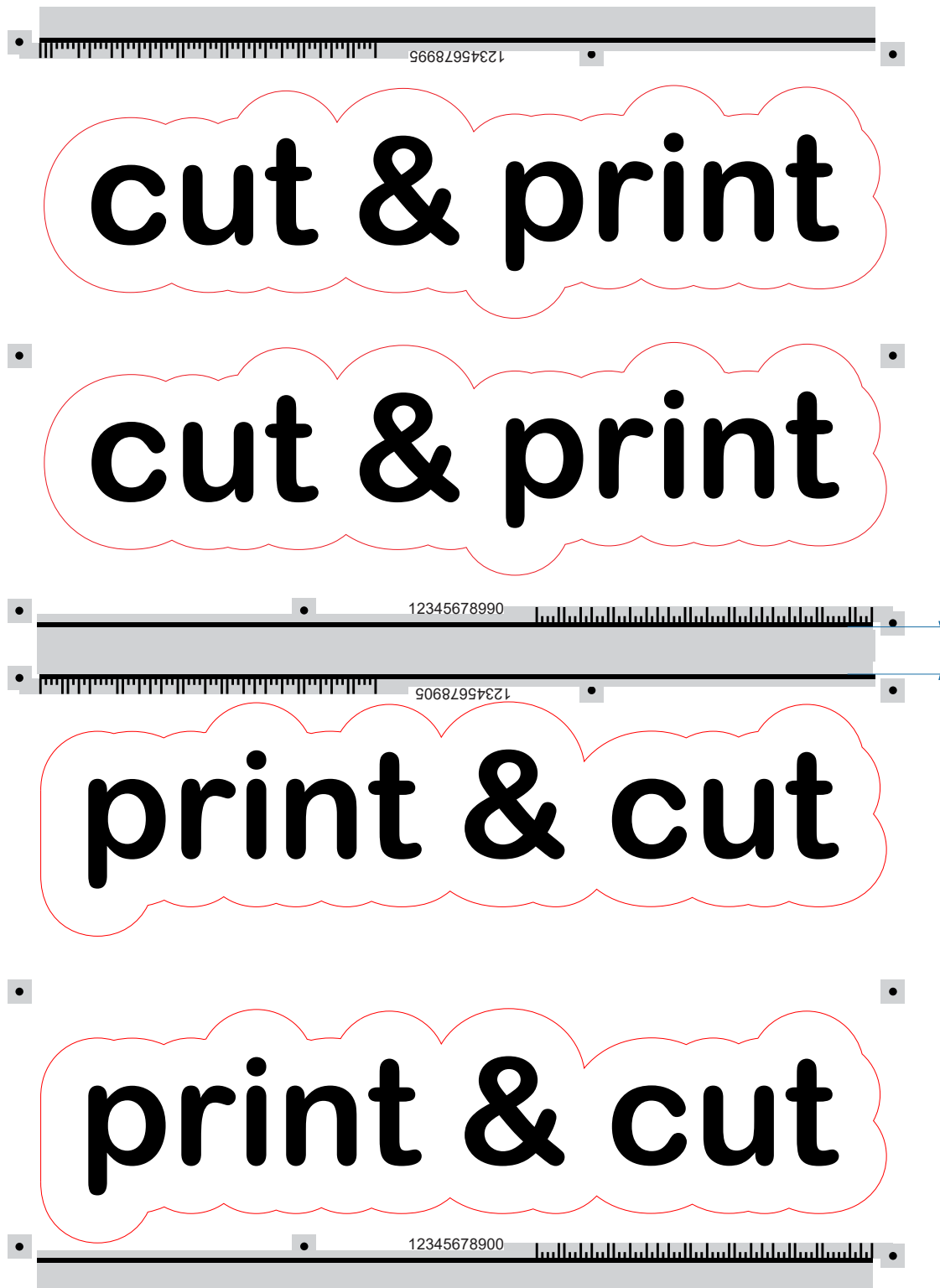
FIGURE 13
BARCODE ON ROLL WITH AUTOMATIC ORIENTATION MINIMUM 30MM BETWEEN TWO BARCODE JOBS

Note: For continues workflow (roll to roll) nothing may be printed between the lines of the barcodes of consecutive jobs.

4.4   The use of both barcodes at the same time.

Both barcodes can also be printed at the same time. Like this the operator has the choice to either use the camera as barcode reader or the hand scanner as barcode reader. The picture below shows the recommended usage.
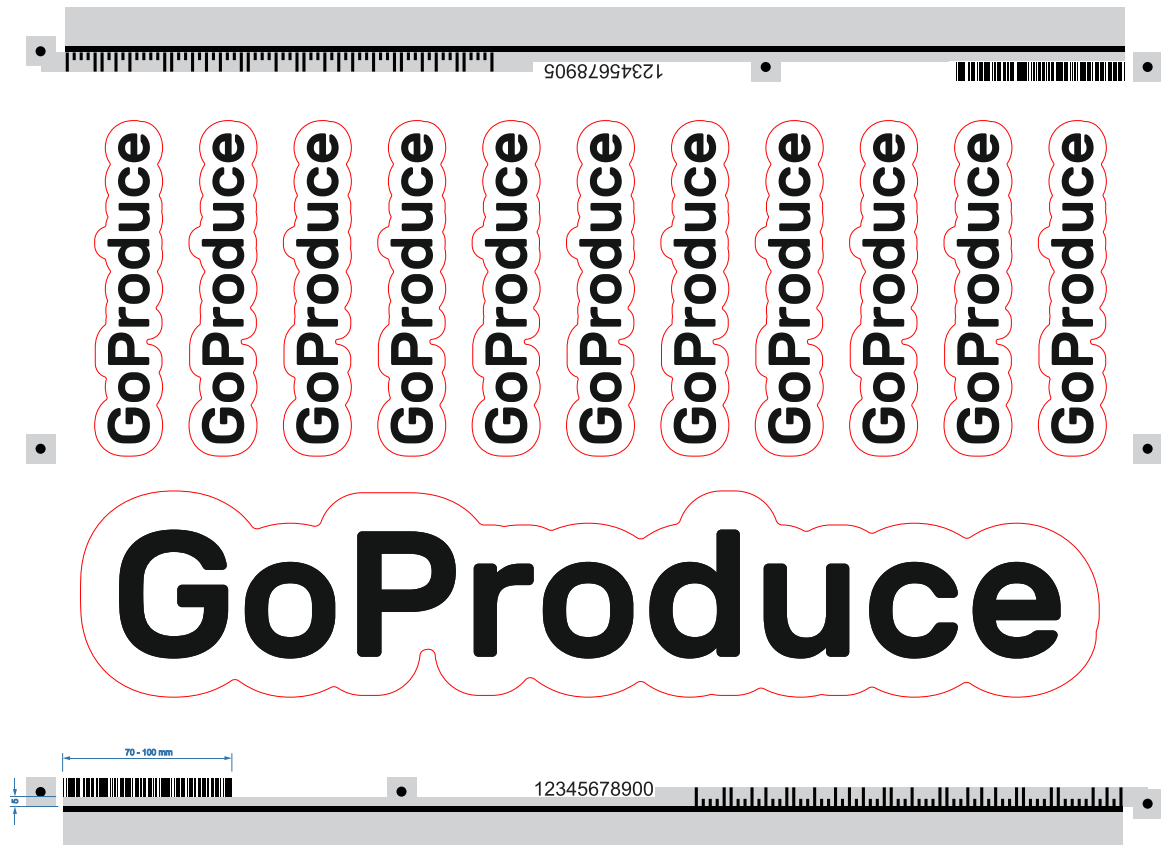

FIGURE 14
THE USE OF BOTH BARCODES AT THE SAME TIME (PLACEMENT)

The code 39 barcode can be printed at the other end of the line of the POSTNET barcode. Print it aligned to the end of the line. The recommended barcode size is between 70mm and 100 mm long and 10mm high. There should be a white space of 5mm between the barcode line and the barcode (same as the white space between the marks and the barcodeline).

5 Use of Material names and methods names.

5.1   Setup of the use of materials names and methods

To facilitate the workflow the methods and material names are used.
The use of methods: The designer chooses the method while making the design. For that he has the use of a swatch library with spot colors. The RIP does not print those vectors with the spot colours but uses them to make the cut data. The designer has a list with spot colors that have the same names as shown in table 1.
The use of materials: The finishing program Summa GoProduce uses a tool to do the job the choice of tool that this program makes depends on the choice of method and the choice of material. The parameters that will be needed to do the job are then also automatically set correct by Summa GoProduce.
The set up of the workflow is so that the designer choses the methods, the print operator choses the media and the table operator just has to put the material on the table, select the correct file with the cut data (by hand or automatic if barcode is used) and the program Summa GoProduce will chose the correct tools and the correct settings for that tool and start the job.

5.2   Methods

The designer chooses the methods, it is up to the rip to pass that message through in the cut data. Therefore a link must be made between the spot colour and the method command. The designer has uses normally as spot colour name the method name, however there should be a user interface in the rip that can link other spot colour names to the methods names. The list of methods may be fixed because it does not change a lot. A possibility to add extra methods can be considered useful in the future. Other options are: get the methods from the material datafile from Summa GoProduce. Or another option is to use just the spot color name from the design file. This can be the case if the design program has a swatch library with as named spot colours the methods.
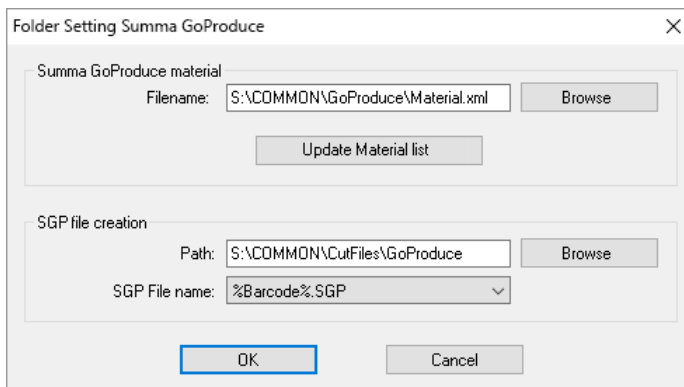
5.3   Materials

With materials is a bit more complicated. The program Summa GoProduce works with a list of materials. For each material there is a predefined setting for the tools that can be used for that material taken in account the thickness of the material and the chosen method. Therefore the name of the material has to be selectable in the RIP itself. Normally the RIP itself has already a list of media that is used for color calibration. The names used in this list of media from the RIP will probably differ from the names in the list of materials from Summa GoProduce. There are two possibilities to solve this.

1. The RIP can either link the media name used in the list of the color calibration of the RIP to the name used in the list of materials from Summa GoProduce. Like this the printer operator must choose only once which media he will use. However, because the same material can have different thickness, it is then probably necessary to copy media calibrations and give them different names that also include a thickness value.
2. Or a setting in the user interface when making the SGP files will have the possibility to choose a material from the list obtained from Summa GoProduce. If this option is used, then the printer operator must choose twice, a media from the list for the colour calibration and a material from the list for preparing the cut data.

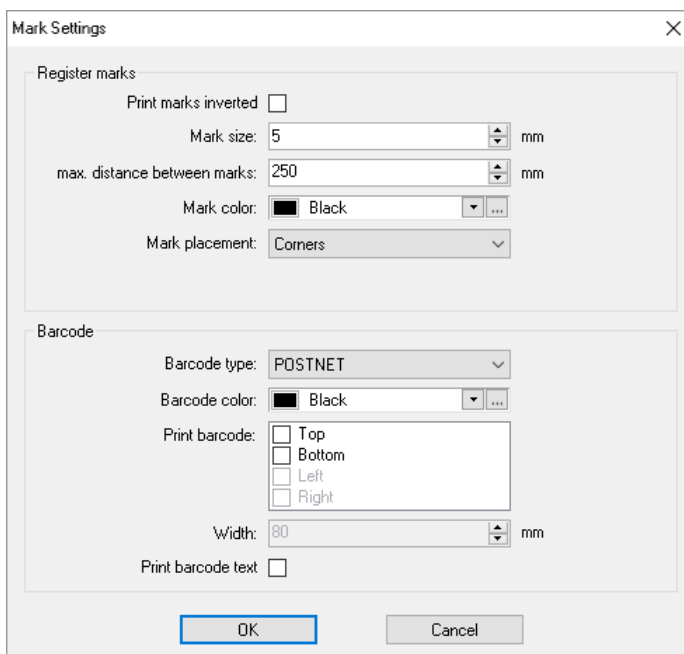# Appendix 1 – example of recommended settings in RIP UI for setup

The operator should be able to adjust the SGP workflow to meet his requirements. Therefore, it is recommended to add some basic settings to RIP's UI. There are three main settings groups. Pictures below are just an impression what it could be, settings may be divided in other group, the layout may be completely different.

- Folder and filename for importing data material database Summa GoProduce
- SGP output folder and file name

- Size, color and placement of registration marks
- Barcode type, Code39 or POSTNET
- Color and placement of barcode (size for Code 39)

- Color – Method mapping table
- Media – Material mapping table

Note: The thickness of each material in the list of materials that is exported from Summa GoProduce has also the thickness of the material in it.

Appendix 2 – example of an XML file exported from Summa GoProduce

Normally an xml file is delivered together with this SDK document. This xml file shows how the data in the file looks that is exported from Summa GoProduce. This xml file is basically a list of the used methods and the used materials. The file looks like this:

```xml
<?xml version="1.0" encoding="utf-8"?>
<SuMaterialManagerRIPXml xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <BaseMethodColl>
   <SuBaseMethodRIPXml>
    <Id>99</Id>
    <Name>Regmark</Name>
   </SuBaseMethodRIPXml>
   <SuBaseMethodRIPXml>
    <Id>1</Id>
    <Name>Draw</Name>
   </SuBaseMethodRIPXml>
   <SuBaseMethodRIPXml>
    <Id>2</Id>
    <Name>Score</Name>
   </SuBaseMethodRIPXml>
   <SuBaseMethodRIPXml>
    <Id>3</Id>
    <Name>Crease</Name>
   </SuBaseMethodRIPXml>
   <SuBaseMethodRIPXml>
    <Id>4</Id>
    <Name>Kiss-cut</Name>
   </SuBaseMethodRIPXml>
   …
 <MaterialMmColl>
   <SuMaterialMmRIPXml>
    <Category>Self-adhesive</Category>
    <Description>Cast Vinyl</Description>
    <Name>Vinyl 0.1 mm</Name>
   </SuMaterialMmRIPXml>
   <SuMaterialMmRIPXml>
    <Category>Self-adhesive</Category>
    <Description />
    <Name>3M Controltac 0.1 mm</Name>
   </SuMaterialMmRIPXml>
   <SuMaterialMmRIPXml>
    <Category>Honeycomb Board</Category>
    <Description />
    <Name>Honeycomb Board 4 mm</Name>
   </SuMaterialMmRIPXml>
   <SuMaterialMmRIPXml>
    <Category>Honeycomb Board</Category>
```

```
    <Description />
    <Name>Honeycomb Board 5 mm</Name>
  </SuMaterialMmRIPXml>
  <SuMaterialMmRIPXml>
    <Category>Honeycomb Board</Category>
    <Description />
    <Name>Honeycomb Board 6 mm</Name>
  </SuMaterialMmRIPXml>
  <SuMaterialMmRIPXml>
    <Category>Honeycomb Board</Category>
    <Description />
    <Name>Honeycomb Board 10 mm</Name>
  </SuMaterialMmRIPXml>
  <SuMaterialMmRIPXml>
    <Category>Honeycomb Board</Category>
    <Description />
    <Name>Honeycomb Board 12 mm</Name>
  </SuMaterialMmRIPXml>
  <SuMaterialMmRIPXml>
    <Category>Honeycomb Board</Category>
    <Description />
    <Name>Honeycomb Board 16 mm</Name>
  </SuMaterialMmRIPXml>
  <SuMaterialMmRIPXml>
    <Category>Honeycomb Board</Category>
    <Description />
    <Name>Honeycomb Board 18 mm</Name>
  </SuMaterialMmRIPXml>
  <SuMaterialMmRIPXml>
    <Category>Honeycomb Board</Category>
    <Description />
    <Name>Honeycomb Board 20 mm</Name>
  </SuMaterialMmRIPXml>
  <SuMaterialMmRIPXml>
    <Category>Honeycomb Board</Category>
    <Description />
    <Name>Honeycomb Board 25 mm</Name>
  </SuMaterialMmRIPXml>
  …
</MaterialMmColl>
<MaterialInchColl>
  <SuMaterialInchRIPXml>
    <Category>Self-adhesive</Category>
    <Description>Cast Vinyl</Description>
    <Name>Vinyl 0.004 inch</Name>
  </SuMaterialInchRIPXml>
  …
</MaterialInchColl>
</SuMaterialManagerRIPXml>
```

There are 3 lists in that xml file.
1. The list with the methods (Name) and its corresponding tools number (Id) for the SP command.
2. The list with the materials (Name) sometimes with their thickness in mm.
3. The list same with the materials (Name) sometimes but with their thickness in inches.

The file described as above should create two tables. There should be the choice to use the material list with mm or with inches, if necessary there could be the choice to include both lists in the list that is created in the RIP.

Methodes:

99	Regmark
1	Draw
2	Score
3	Crease
4	Kiss-cut
…	

Materials:

Vinyl 0.1
3M Controltac
Honeycomb Board 4 mm
Honeycomb Board 5 mm
Honeycomb Board 6 mm
Honeycomb Board 10 mm
Honeycomb Board 12 mm
Honeycomb Board 14 mm
Honeycomb Board 16 mm
Honeycomb Board 20 mm
Honeycomb Board 25 mm
…