Watermarking SAS® Outputs Without Using Proc Template and ODS

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ABSTRACT

Hastily using confidential or draft listings and tables produced in SAS® for business needs increases the risk associated with misusing or misinterpreting the results. A viable solution to reduce that risk is to use a visible watermark embedded in the SAS outputs such as a pale image or text displayed and/or printed behind the text. This paper will introduce a method of watermarking the output directly from SAS through an interface with Microsoft® Office Word (Word) without using Proc Template and ODS.

INTRODUCTION

Customers regularly use the reports produced in SAS for business needs; if they are in draft or confidential, this can run the risk of misusing or misinterpreting the results. To prevent this, the word "Draft" or "Confidential" is placed on or close to the margin area of the paper to emphasize that the report is neither final nor unrestricted. However, it can be easily overlooked due to the margin position and/or small font size used. Incorporating a visible watermark into the report provided a better solution that increased awareness and reminded our reviewers or users of the report's status.

The visible watermark is a pale image or text displayed and/or printed "behind" text in the document and a valuable unobtrusive way to display important information that cannot be missed by the reader such as the fact that the document is a draft version or confidential.

Starting with SAS 9.1, using ODS with a template predefined by Proc Template, an image can be placed behind a table or listing. However, in many companies tables or listings are directly generated in .rtf or .doc format using home-grown macros (systems) and not ODS (Zhou, 2001; Zhou, 2002; Qi and Zhang, 2003). This paper introduces an alternative to using SAS to place a watermark in a report.

TECHNIQUE AND MECHANISM

There are four steps required to create a SAS report with a watermark:

1. Create a Watermark Template in Word

2. Open the Watermark Template in Word with SAS

3. Insert the SAS Output into Word with SAS

4. Use SAS to Save the Document with Desired Page Attributes

CREATE A WATERMARK TEMPLATE IN WORD

The first step in the process is to create a watermark template using Word. (Note: This paper discusses how to add a watermark using Word 2003. The steps to get to the **Printed Watermark** dialog box are different in other Word versions e.g., in Word 2007 use Page Layout>Watermark>Custom Watermark.)

To insert a watermark:

1. Select **Format** from the standard toolbar.

2. On the **Format** menu, point to **Background,** and then click **Printed Watermark**.

3. In the **Printed Watermark** dialog box, select one of the two options: **Picture watermark** or **Text watermark**.

The **Text watermark** option is effortless and appropriate to use for most reports. To use the **Text watermark** feature:

1. In the **Printed Watermark** dialog box, click the radio button next to **Text watermark**.

2. In the **Text** field you can either select from the list in the drop-down menu or you can type directly in the **Text** field.

3. The default **Font** is Times New Roman, but any font on the system can be chosen and will appear in the drop-down menu.

4. It is recommended that the default values for **Size**, **Color**, **Semitransparent**, and **Layout** fields are used so that the watermark does not distract from the document text and is just dark enough to print and be readable behind the text.

For a more sophisticated or deluxe custom watermark, select the **Picture watermark** option; this permits the use of a picture file such as the company's logo. If this option is used, when you click the **Select Picture** button, a dialog box will open that allows browsing the hard drive for the picture to use. It is best apply the defaults for **Scale** and leave the box next to **Washout** checked so that the watermark does not interfere with the readability of the document. Use a program such as Photoshop or Paint to create a custom picture file to change the rotation, transparency, and color of the picture.

Once the watermark is created save it as either a .dot or .doc file with the standard margins and desired page orientation and store it in a shared network server with read-only access permissions. Note: a separate file will be needed for each watermark type such as draft, confidential, or image.

OPEN THE WATERMARK TEMPLATE IN WORD

Once the watermark template is designed and stored, the next step is to use SAS to automate the process.

In order for a client/server communication link to be established, both SAS and Word must be running. Therefore, for the first iteration, it is necessary to programmatically launch Word from a SAS session.

1. Establish the linkage between SAS and Word via the DDE triplet using the following filename statement:

```
filename word DDE 'Winword|System' lrecl=1000;
```

2. Verify that the two system options NOXWAIT and NOXSYNC are enabled prior to executing the statement in step 3.

The NOXWAIT option specifies that the DOS Command Prompt window disappears without having to type EXIT when the process is finished, and the NOXSYNC specifies that the process should execute asynchronously (i.e., control is returned immediately to the SAS System and the command continues executing without interfering with your SAS session).

3. Launch Word from a SAS session using the following statement:

```
%let rc=%sysfunc(system(start winword));
```

There are several techniques available to launch Word from SAS, and this is the simplest one.

If the watermark template file will be shared by more than one user, it will be necessary to programmatically copy the file to a temporary folder, e.g., C:\temp, to avoid the Read-only pop-up window in Word.

1. Use the following X statement with the DOS copy command to copy the file:

```
x "%str(copy %"J:\WM\&watermark..doc%" %"C:\temp\&watermark..doc%")";
```

The &watermark is a macro variable for the name of a watermark template file defined by a %let statement or a macro parameter. The double quotation marks are used rather than the single quotation marks due to the embedded macro variable.

2. Open the template file by sending the FileOpen WordBasic command to Word with a data _null_ step:

```
data _null_;
   file word;
   put '[FileOpen .Name = "' "C:\temp\&watermark..doc" '"]';
run;
```

INSERT THE SAS OUTPUT INTO WORD

After the watermark template is open in Word, the next step is to insert your SAS output into the template. The FileOpen WordBasic command for the SAS output cannot be used because it will open the file with a new document in Word.

Execute the following InsertFile WordBasic command to insert the SAS report into Word:

```
data _null_;
   file word;
   put '[InsertFile .Name ="' "J:\project\study\output\demog.doc" '" ]';
run;
```

SAVE THE DOCUMENT WITH THE DESIRED MARGINS AND PAGE ORIENTATION

When the SAS output is inserted into the Word template, the page attributes of the SAS output will be lost. If the margins and page orientation of the SAS output differs from the watermark template, these attributes will need to be recreated in the Word document.

1. Execute the `FilePageSetup` WordBasic command.

    The arguments for the `FilePageSetup` statement correspond to the options in the File>Page Setup dialog box in Word.

2. Use the following syntax for `FilePageSetup`:

    `FilePageSetup` [.Tab = number] [, .TopMargin = number or text] [, .BottomMargin = number or text] [, .LeftMargin = number or text] [, .RightMargin = number or text] [, .Gutter = number or text] [, .PageWidth = number or text] [, .PageHeight = number or text] [, .Orientation = number] [, .FirstPage = number] [, .OtherPages = number] [, .VertAlign = number] [, .ApplyPropsTo = number] [, .Default] [, .FacingPages = number] [, .HeaderDistance = number or text] [, .FooterDistance = number or text] [, .SectionStart = number] [, .OddAndEvenPages = number] [, .DifferentFirstPage = number] [, .Endnotes = number] [, .LineNum = number] [, .StartingNum = number] [, .FromText = number or text] [, .CountBy = number] [, .NumMode = number]

    The arguments and their explanations can be found in *Word 95 WordBasic Reference* (Microsoft Press, 1995). For convenience, the key arguments are listed in the following table.

Argument	Explanation
.TopMargin	The distance between the top edge of the page and the top boundary of the body text in points or a text measurement.
.BottomMargin	The distance between the bottom edge of the page and the bottom boundary of the body text in points or a text measurement.
.LeftMargin	The distance between the left edge of the page and the left boundary of the body text in points or a text measurement.
.RightMargin	The distance between the right edge of the page and the right boundary of the body text in points or a text measurement.
.PageWidth	The width of the page in points or a text measurement.
.PageHeight	The height of the page in points or a text measurement.
.Orientation	The orientation of the page: 0 (zero) – Portrait; 1 – Landscape
.HeaderDistance	Distance of header from the top of the page.
.FooterDistance	Distance of footer from the bottom of the page.

3. Set up the page attributes. Following is sample code to set up the page attributes with landscape orientation and one-inch for each margin:

```
data _null_;
   file word;
   put '[FilePageSetup '
       '.Orientation =1,'
       '.PageWidth ="11.5 in ",'
       '.PageHeight ="8.5 in ",'
       '.TopMargin ="1 in ",'
       '.BottomMargin ="1 in ",'
       '.LeftMargin ="1 in ",'
       '.RightMargin ="1 in "]';
run;
```

4. Save the document and close the file with the following code:

```
data _null_;
   file word;
   put "[FileSaveAs"
        ".Name=""J:\project\study\output\demog.doc "","
        ".Format=0,"
        ".AddToMru=1]";
    put "[FileClose]";
  run;
```

The detailed arguments and their explanations of the `FileSaveAs` command can be found in Xu and Zhou (2007).

MACRO %WATERMARK

By following the steps in the previous sections, a watermarked Word document was programmatically created using SAS. To facilitate the steps, a SAS macro entitled `%watermark` was developed (see Appendix for details) that automates the process of generating the visible watermark from creating and opening the watermark template to saving and closing the Word document. The following table lists the five keyword parameters.

Parameter	Definition
Watermark:	Define the name of watermark template.
In:	Define the path and name of the input SAS output, e.g., `C:\temp\demog.doc`.
Out:	Define the path and name of the final document to be saved. By default, the path and name defined by the `In` parameter are used.
Margin:	Define the page margins in inches with four variants, separated from each other by a space, and representing top, bottom, left, and right margins, respectively. The default is 1.25 inches for the top margin and one inch for the rest, which meets the FDA requirements. Any number, including decimals, can be used to define the parameter.
O:	Define the page orientation, with L for landscape (default) or P for portrait.

Following is a simple macro call to `%watermark`:

```
%watermark(watermark=draft, in=c:\temp\demog.doc);
```

CONCLUSION

When sharing Microsoft Office Word documents, watermarks can be the most effective way to designate their life cycle status or the importance of the data. For example, using "Draft" to convey the content is not final when the data is not to be released as official communication. With just a little tweaking using the techniques described in this paper to add a visible text or image watermark, the comprehension of the SAS output status can be significantly increased.

REFERENCES

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APPENDIX

```
%macro watermark(watermark=, in=, out=, margin=1.25 1 1 1, o=L);
   %if %length(&orientation)>0 %then
      %let o=%upcase(%substr(&orientation,1,1));
   %else %let o=P;
   %if %length(&out)=0 %then %let out=&in;
   %if &o=L %then %do;
      %do i = 1 %to 4;
         %let m&i=%scan(&margin, &i, ' ') in;
      %end;
      %let o=1;
      %let pagewd=11.5 in;
      %let pageht=8.5 in;
   %end;
   %else %do;
      %do i = 1 %to 4;
         %let m&i=%scan(&margin, &i, ' ') in;
      %end;
      %let o=0;
      %let pagewd=8.5 in;
      %let pageht=11.5 in;
   %end;

   filename word DDE 'Winword|system' lrecl=1000;

   options noxwait noxsync;
   x "%str(copy %"J:\WM\&watermark..doc%" %"C:\temp\&watermark..doc%") ";

   filename watermrk "C:\temp\&watermark..doc";

  %let rc=%sysfunc(system(start winword));

  data _null_;
     file word;
     put '[FileOpen.Name = "' "C:\temp\&watermark..doc" '"]';
     put '[Insertfile .Name ="' "&in" '" ]';
     put '[FilePageSetup '
         '.Orientation =' "&o" ','
         '.PageWidth ="' "&pagewd" '",'
         '.PageHeight ="' "pageht" '",'
         '.TopMargin ="' "&m1" '",'
         '.BottomMargin ="' "&m2" '",'
         '.LeftMargin ="' "&m3" '",'
         '.RightMargin ="' "&m4" '"]';
     put "[FileSaveAs"
         ".Name=""&out"","
         ".Format=0,"
         ".AddToMru=1";
     put "[FileClose]";
  run;
%mend watermark;
```