Improving Listing Generation with ODS EXCEL

Stephanie Ann Sanchez, Roche Tissue Diagnostics

ABSTRACT

The ODS destination for EXCEL® simplifies data listing generation while enabling attractive features like sheet protection and AutoFilter to simplify team reviews in a format which is familiar and accessible to non-statistical reviewers. With SAS® 9.4M4, now you can create native Excel files without any post-processing steps, display full titles and footnotes including multiple justifications, and print page numbers and titles on every page, all while reducing the amount of programming required to fit the table to the contents. This paper describes how to utilize the features of the ODS destination for EXCEL to create submission-ready data listings and will provide you with simple workarounds for common compatibility issues.

INTRODUCTION

Data line listings collate source and derived data elements relevant to the analysis for review. They are an important tool for cross-functional data review, quality control, and examination. Often, line listings are presented in RTF and/or PDF formats for inclusion in a report appendix. ODS Tagsets.ExcelXP allows you to generate listings in an Excel readable format, but requires post-processing or use of VBA macros to convert the output file into a native Excel file.

Line data are often requested in Excel format to facilitate cross-functional and regulatory reviews. With ODS Excel, you are one PROC away from making data listings in Excel enabled with features which make the files suitable for cross-functional review. With the advent of the eCOPY program and more companies moving away from paper based document reviews, listings produced with ODS Excel have the potential to obviate the need to produce listings in print ready RTF or PDF files.

ODS EXCEL SYNTAX

ODS Excel was first introduced as an experimental destination in SAS 9.4M2 with a production version available since SAS 9.4M3 and new features added in each subsequent release.

The following code generates a listing of sashelp.cars:

```
proc sort data=sashelp.cars out=cars;
    by origin;
run;

options nodate nonumber missing=' ' nobyline orientation=landscape;

ods excel file="Cars.xlsx" style=excel
 options( sheet_interval = 'bygroup'
            sheet_name = '#byval(origin)'
            autofilter = 'all'
            row_repeat = 'header'
            frozen_headers = 'on'
            print_header = '&P'
            embedded_titles = 'yes'
            embedded_footnotes = 'yes'
            ORIENTATION = 'landscape'
            flow = 'tables'
          );
```

```
title1 j=l 'Listing of sashelp.cars';
footnote1 j=l "File Generated &sysdate/&systime by user &sysuserid..";

proc report data=cars;
   by origin;
   columns Make Model Type DriveTrain MSRP Invoice EngineSize Cylinders
           Horsepower MPG_City MPG_Highway Weight Wheelbase Length;
run;

ods excel close;
```

As shown in Figure 1, the SHEET_INTERVAL='bygroup' option creates a separate worksheet for each country of origin. The sheets are automatically labelled with the value of the by-variable ORIGIN with the option SHEET_INTERVAL='bygroup'. Additional options such as AUTOFILTER, ROW_REPEAT, FROZEN_HEADERS, EMBEDDED_TITLES, and EMBEDDED_FOOTNOTES make the document user friendly by adding column filters and displaying titles, column headers, and footnotes in the default Normal view within Excel.

Display 1 ODS EXCEL Output
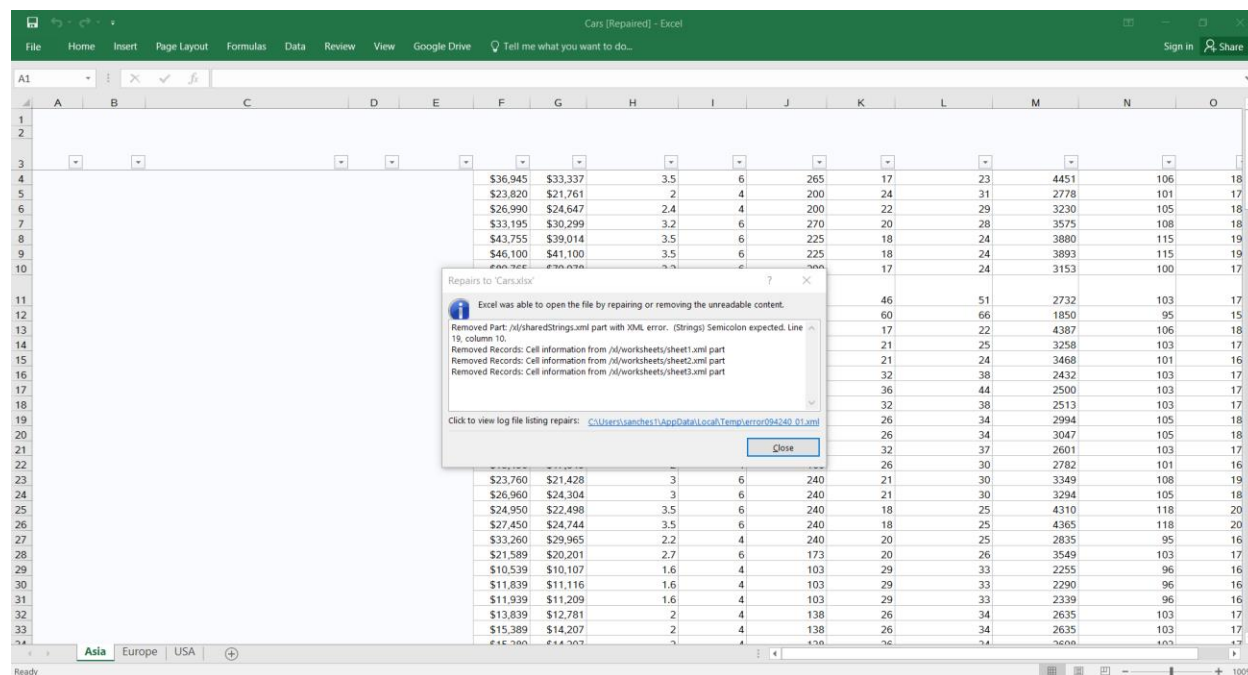

TROUBLESHOOTING

UNREADABLE CONTENT ERRORS

Features frequently used in generating RTF files may cause unreadable content errors, such as shown in Figure 2. Excel will attempt to suppress the problematic content, and portions of your report will be missing or blank as shown in Figure 3.

Display 2 Excel Content Error
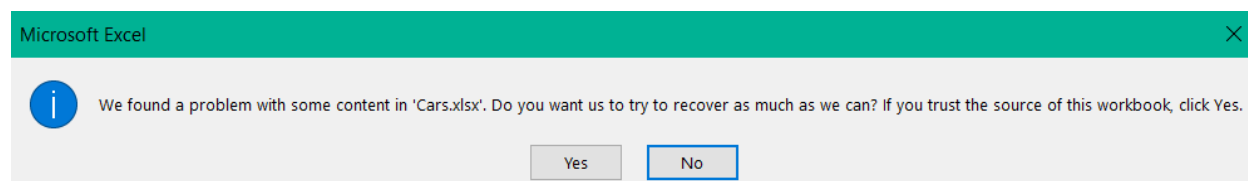
Display 3 Recovered File

Check if you have one or more of the following situations:

1. An XML special character (<, >, &,',") was present in any portion of the suppressed file contents

2. In the REPORT procedure, PROTECTSPECIALCHARS=OFF has been specified

3. Multiple title justifications are used in a single title statement in SAS 9.4M3 or earlier and EMBEDED_TITLES=ON.

4. Multiple justifications are used in a single footnote statement in SAS 9.4M3 or earlier and EMBEDED_FOOTNOTES=ON.

If it is not needed, remove the PROTECTSPECIALCHARS=OFF option from your proc REPORT statement. This option should be used with caution, as XML special characters in header or footer text (e.g. EMBEDDED_TITLES=NO) may be suppressed or result in unexpected content without generating an error. With PROTECTSPECIALCHARS=ON, the appropriate escape sequence will be passed to Excel to correctly display any XML special characters which appear in the file contents. If you require turning off this option, you will need to mask any special characters that should be displayed as text. The following example uses a DATA step to replace less than characters in a display variable with an equivalent Unicode value:

```
ods escapechar='^';
data cars2;
   set cars;
   maskvar=transtrn(dispvar,'<','^{unicode 003C}');
run;
```

In SAS 9.4M3 or earlier, use of multiple justification within a single title or footnote statement is not supported when titles or footnotes are embedded in the document, and will result in an unreadable content error.

IMPROVEMENTS IN ODS EXCEL

Improvements have been made in ODS EXCEL functionality with each subsequent maintenance release. For example, when using SAS 9.4M3 or earlier, AUTOFILTER did not function as expected in multi-sheet workbooks. However, this issue is solved in SAS 9.4M4. In SAS 9.4M4, you now also have the ability to use multiple title and footnote justifications for embedded titles and footnotes. This works well for most small tables of 3-5 columns when the left, centered, and right justified text strings are relatively short. Rules for merging columns and wrapping title text in order to enable this feature can be optimized in future maintenance releases. Also introduced in SAS 9.4M4, the PROTECT_WORKSHEET option protects the workbook content from changes by setting read-only access. When both AUTOFILTER and PROTECT_WORKSHEET options are used, PROTECT_WORKSHEET takes precedence, and column filters will be applied but disabled. These features may be made compatible in future maintenance releases.

CONCLUSION

The ODS EXCEL destination streamlines production of data listings. Evolution in documentation and submission practices away from paper and into fully electronic format may eliminate the meticulous attention to detail and fine adjustments needed to prepare line listings into print-ready formats. In the future, ODS EXCEL could become the go-to destination for generating line listings to support both cross-functional and regulatory e-reviews.

ACKNOWLEDGMENTS

Jane Elsinger and Chevell Parker for technical support and Isaac Bai for reviewing this paper.

RECOMMENDED READING

- SAS Institute Inc. 2016. SAS 9.4 Output Delivery System: User's Guide. Cary, NC: SAS Institute Inc. Available at http://support.sas.com/documentation/cdl/en/odsug/67921/HTML/default/viewer.htm#titlepage.htm.

- "A Ringside Seat: The ODS Excel Destination versus the ODS ExcelXP Tagset" Chevell Parker, SAS Institute Inc. Available at https://support.sas.com/resources/papers/proceedings16/SAS5642-2016.pdf

- SAS9 ODS Destination for Excel Tip Sheet. Available at https://support.sas.com/rnd/base/ods/ODS_Excel_Dest_tips.pdf

CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

Stephanie Ann Sanchez
Roche Tissue Diagnostics
stephanie_ann.sanchez@roche.com

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration.

Other brand and product names are trademarks of their respective companies.