

ALTAIR COMPOSE™ FOR DATA AUTOMATION – PUNCH FILE MANIPULATING

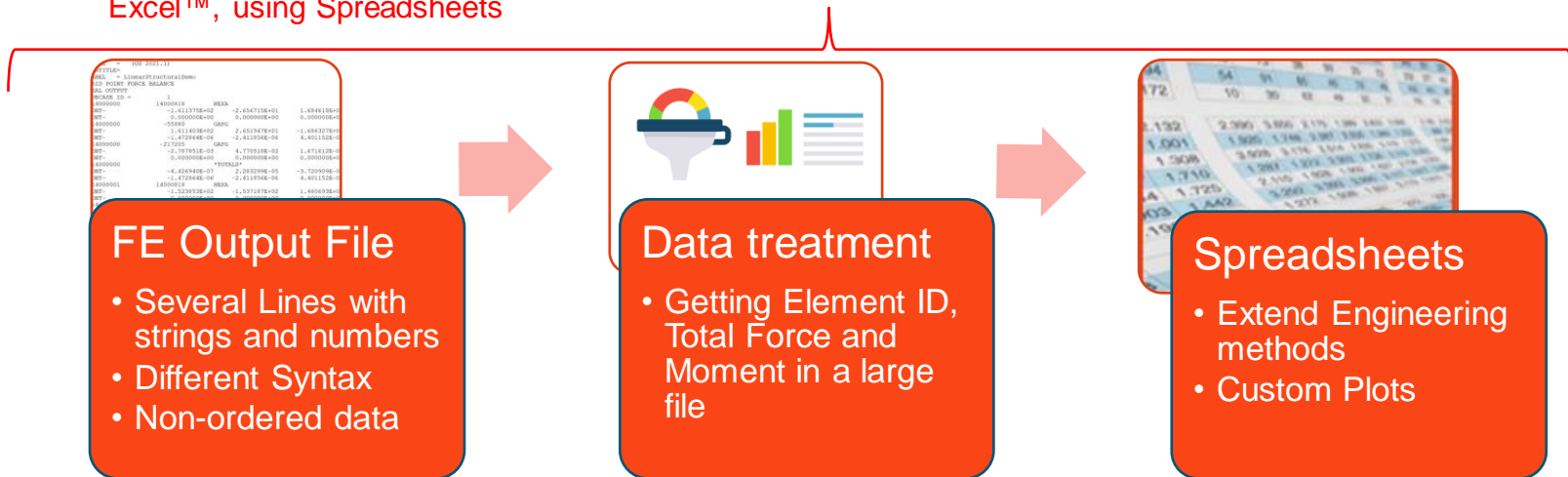
João Marabisa – Technical Support – May 2021

Math and FE Analysis: Reading and Filtering CAE data

Typical Workflow:

Main obstacles:

- CAE output files have **several lines with many types of syntax** which makes hard the possibility to easily access specific data
- **Lack of mathematical tool** to perform advanced and custom post-processing, making data treatment the most time consuming task for the user
- **Lack of easy integration** between CAE output files and tools widely used by engineers such as MS Excel™, using Spreadsheets



Key Takeaways



Post-process data of a large and non-ordered output file in a **fast way**



Use **OML language** capabilities to quickly access result files (.pch, .opti, .h3d, etc)



Minimize effort to treat results from CAE analysis to MS Excel™ files

	A	B	C	D	E	F	G
1	ID	Fx	Fy	Fz	Mx	My	Mz
2	14000000	-4.4E-07	2.28E-05	-3.7E-05	-1.5E-06	-2.4E-06	4.4E-08
3	14000001	-2.6E-06	1.61E-05	4.51E-05	1.58E-06	0.000136	-9.6E-07
4	14000002	-1.9E-06	-9.7E-06	2.91E-05	-6.3E-06	4.63E-05	-4E-06
5	14000003	-2.5E-07	2.72E-05	-0.00017	1.97E-06	3.25E-06	-9.3E-08
6	14000004	-9.2E-07	-6.3E-05	-8.5E-05	-2.3E-06	-3.5E-06	2.98E-07
7	14000005	-7E-07	-5.1E-05	-2.7E-06	7.86E-06	1.99E-05	3.7E-07
8	14000006	-3.7E-06	-2.9E-05	-5.8E-05	-4.2E-08	-9.1E-07	3.39E-07
9	14000007	4.13E-07	-0.00013	-0.00021	1.9E-06	3.36E-05	4.88E-07
10	14000008	-1.3E-08	3.47E-06	6.13E-05	-1.5E-07	-2.3E-06	1.39E-08
11	14000009	-4.6E-07	-1.6E-05	-0.00016	5.92E-07	1.22E-06	2.43E-08
12	14000010	-4.4E-07	-3.4E-05	-2.4E-05	-3.4E-07	3.38E-06	1.09E-07
13	14000011	-2.9E-07	2.71E-05	-5.5E-05	-1.6E-06	1.08E-06	5.55E-08
14	14000012	-2.4E-07	-1.9E-05	-3E-05	-8.4E-07	1.84E-06	1.47E-07
15	14000013	-3E-07	6.17E-05	-0.00018	-4.9E-07	-2.5E-06	-3.9E-07
16	14000014	-4E-07	1.21E-05	-1E-05	-1.6E-08	4.43E-07	6.06E-08
17	14000015	-3.3E-07	2.62E-05	7.16E-05	6.2E-07	-1.4E-06	-2.6E-09
18	14000016	-4.5E-08	1.3E-05	-6E-05	2.13E-06	-1.8E-07	-8E-09
19	14000017	-4.5E-08	-1.5E-05	-0.00016	-4.7E-07	-3.6E-06	-1.7E-07
20	14000018	6.71E-09	-7.9E-06	-0.00024	-3.3E-07	2.47E-06	-8.7E-08
21	14000019	-1.6E-09	-5.5E-05	-9.8E-05	-3.6E-07	5.35E-06	-1.4E-07

Creating custom spreadsheets with filtered data:

Familiar interface for all kinds of groups to post-process CAE results

Altair Compose™: Reading and Filtering CAE data

All-In-One Math Environment:

- Scripting
- Debugging
- Visualization

Functions:

- Read CAE data
- Cell operations
- Matrix operations
- Write Spreadsheets

```

cd(fileparts(omlfilename('fullpath.txt'))); %Change directory to the same as the master script's

%Main file
pchfile = uigetfile(); %Select '.pch' file

%Reading '.pch' file
wholepch = type(pchfile); %Read whole content
wholepch = wholepch{1}; %Unnest unnecessary cell element
wholepch = strsplit(wholepch, char(10)); %Split in different lines

%Finding the desired indexes on the whole '.pch' file to filter
idx = find(~cellfun(@isempty, strfind(wholepch, '*TOTALS*'))); %Find exact positions of '*TOTALS*'

body_new1 = regexprep(WP, ' +', ' '); %Removing irregular whitespaces on each line
body_new2 = strrep(body_new1, '-CONT-', ''); %Replacing the '-CONT-' string
body_new3 = strtrim(body_new2(:)); %Removing the trailing blanks from the beginning
body_new4 = deblank(body_new3(:)); %Removing the trailing blanks from the end

%Creating '.xlsx' file
headers = {'ID' 'Fx' 'Fy' 'Fz' 'Mx' 'My' 'Mz'}; %Headers
fcell = mat2cell(mat_total); %Structured cell by the matrix
writedata = {headers fcell}; %Final data to write: Headers + data
xls2write = xlsopen([cd '\ 'Punch_Output.xlsx'], 1); %Open/Create an Excel file
xlswrite(xls2write, [writedata]); %Write data in Excel file
xlsclose(xls2write); %Close Excel file

```

OML
(Open
Matrix
Language)

Use Case

Getting total Forces and Moments of elements from a CAE data (.pch)

- The Element ID and its respective total forces and moments are in different lines, with different spacing over the entire file

```

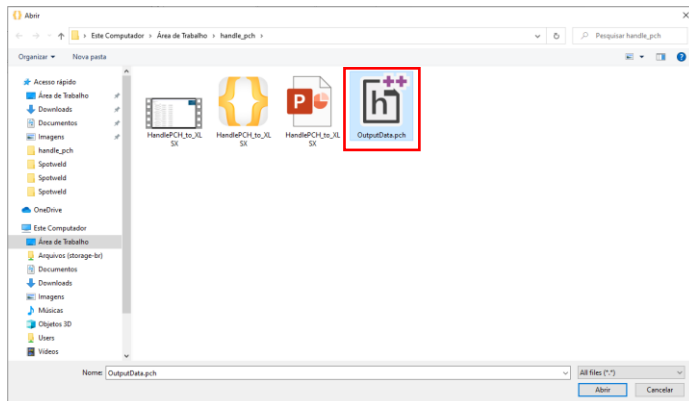
$TITLE = (OS 2021.1)
$SUBTITLE=
$LABEL = LinearStructuralDemo
$GRID POINT FORCE BALANCE
$REAL OUTPUT
$SUBCASE ID =
14000000 14000818 HEXA
-CONT- -1.611375E+02 -2.656715E+01 1.684618E+00
-CONT- 0.000000E+00 0.000000E+00 0.000000E+00
14000000 -55880 GAPG
-CONT- 1.611403E+02 2.651947E+01 -1.686327E+00
-CONT- -1.472864E-06 -2.411856E-06 4.401152E-08
14000000 -217205 GAPG
-CONT- -2.787851E-03 4.770518E-02 1.671612E-03
-CONT- 0.000000E+00 0.000000E+00 0.000000E+00
14000000 X *TOTALS* Y Z
-CONT- -4.426940E-07 2.283299E-05 -3.720909E-05 Forces
-CONT- -1.472864E-06 -2.411856E-06 4.401152E-08 Moments
14000001 14000818 HEXA
-CONT- -1.523853E+02 -1.537187E+02 1.480693E+01
-CONT- 0.000000E+00 0.000000E+00 0.000000E+00
14000001 -55881 GAPG
-CONT- 1.523028E+02 1.537635E+02 -1.481003E+01
-CONT- 1.579539E-06 1.359640E-04 -9.574812E-07
14000001 -217204 GAPG
-CONT- 8.513784E-02 -4.567840E-02 2.928960E-03
-CONT- 0.000000E+00 0.000000E+00 0.000000E+00
14000001 -217206 GAPG
-CONT- -2.670160E-03 9.249442E-04 2.160024E-04
-CONT- 0.000000E+00 0.000000E+00 0.000000E+00
14000001 X *TOTALS* Y Z
-CONT- -2.590500E-06 1.611002E-05 4.511636E-05 Forces
-CONT- 1.579539E-06 1.359640E-04 -9.574812E-07 Moments

```

Use Case

Step #1:

Select the **result file** (.pch, .opti etc)



Forces and Moments of all elements from the Structural Analysis will be automatically read

Benefit:

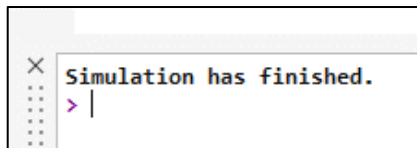
6

It is possible to **read CAE result files** without the need of previous filtering

Use Case

Step #2:

A **message** will appear in the OML Command Window to signalize that the data manipulation has been done successfully



Now your data will be read, filtered and ready to be used both in Compose with Matrix operations and in Excel through a '.xlsx' format.

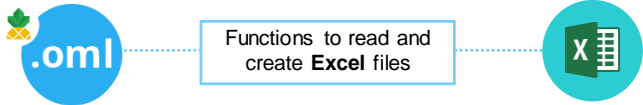
	A	B	C	D	E	F	G
1	ID	Fx	Fy	Fz	Mx	My	Mz
2	14000000	-4.4E-07	2.28E-05	-3.7E-05	-1.5E-06	-2.4E-06	4.4E-08
3	14000001	-2.6E-06	1.61E-05	4.51E-05	1.58E-06	0.000136	-9.6E-07
4	14000002	-1.9E-06	-9.7E-06	2.91E-05	-6.3E-06	4.63E-05	-4E-06
5	14000003	-2.5E-07	2.72E-05	-0.00017	1.97E-06	3.25E-06	-9.3E-08
6	14000004	-9.2E-07	-6.3E-05	-8.5E-05	-2.3E-06	-3.5E-06	2.98E-07
7	14000005	-7E-07	-5.1E-05	-2.7E-06	7.86E-06	1.99E-05	3.7E-07
8	14000006	-3.7E-06	-2.9E-05	-5.8E-05	-4.2E-08	-9.1E-07	3.39E-07
9	14000007	4.13E-07	-0.00013	-0.00021	1.9E-06	3.36E-05	4.88E-07
10	14000008	-1.3E-08	3.47E-06	6.13E-05	-1.5E-07	-2.3E-06	1.39E-08

Benefit:

7

Flexibility to work (read and create) with a large type of files through Matrixes

Use Case



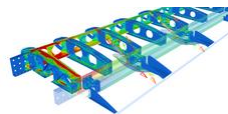
Reading & Filtering CAE data (.pch) + Writing Excel File
using **Altair Compose**

Summary

Altair Compose™ fits Engineering procedures and workflows because:



All-in-one tool for
Maths & Visualization



Seamless **integration with CAE** through
result reading capabilities



Large data handling
and manipulation



Creation of **modified outputs**
in a large range of formats



THANK YOU

altair.com



#ONLYFORWARD