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MEMO

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Release Notes **FAHTS Version 6-6**				
DISTRIBUTION Users of FAHTS			X	

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Release Notes

FAHTS 6-6, Sep 2015

1 Introduction

The current official version of FAHTS is version 6-6 with release date 2015-09-01. The release contains the following:

- Release Notes (this MEMO)
- Updated software on www.usfos.com
- Updated manuals on www.usfos.com

Except for this MEMO, no written information will be distributed in connection with this release. All information is stored on the WEB.

2 Changes in version 6-6

In order to improve the quality of the analysis results, important changes are made:

2.1 Restrictions on shell element angles

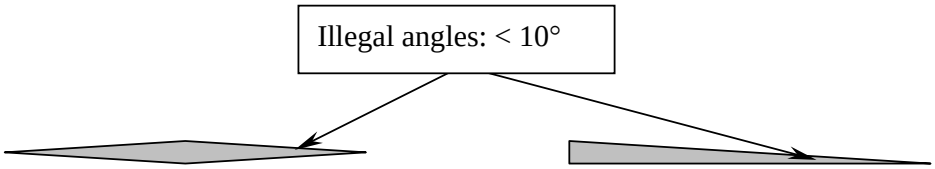


Figure 2-1 - Illegal small angles for 4- and 3-node shell

Extreme **small** element corner angles are checked for. If the angle is less than 10°, FAHTS will report this as an illegal angle and stop with an error message.

Following information are given:

- The elements are printed in the "out" file
- The USFOS label file: "*prefix"_illegal_shell_angles.usl*" could be opened in xact and the illegal elements are shown.

The best option is always to modify the structural model and remove the bad-shaped elements. However, if the user decides to keep the elements, the "**`ILLEGAL`**" command could be used to bypass the check.

Figure 2-2 describes the recommended "bypassing": Specification one-by-one. This option means that the user has an overview over important and less important elements, (which f ex have "no" practical load carrying function).

The option works as follows:

- A new minimum angle is defined by the user (Illegal ShellAngle Accept)
- The element to accept are listed (Illegal ShellAngle Elem …)

The minimum angle could be re-defined several times. The commands are executed in the specified sequence.

```
'         Key-1      Opt      Value
Illegal ShellAngle  Accept   9      ! Redefine Min angle

'         Key-1      Opt   IDs
Illegal ShellAngle  Elem   1001  1002 ! Accept elem 1001 and 1002
                           2001  2002 ! Accept elem 2001 and 2002
                           3001  3002 ! Accept elem 3001 and 3002
```

Figure 2-2 Accepting elements with small angles. Specification element-by-element

The “lazy” (not recommended) version is to accept all elements with too small angles without any specification. A warning will be printed in the output file, (see Figure 2-4).

```
'         Key-1      Opt      Value
Illegal ShellAngle  Accept   5   ! Redefine Min angle

'         Key-1      Opt
Illegal ShellAngle   UsersRisk  ON   ! Accepting everything unchecked
```

Figure 2-3 Accepting elements with small angles without element specification

```
        ------------------------------------------------
        --    * * *    W A R N I N G   * * *           --
        --      Unconditionally Acceptance of         --
        --    Very Small Angles on Users own Risk     --
        ------------------------------------------------
```

Figure 2-4 - The warning is printed in the output file.

In the output file (.out), the results from element checking are printed. If illegal elements are found, the analysis stops, and an Label file (name: *illegal_shell_angles.usl*) is created. By opening this file (File/Read Labels from file), a label with the angle is attached to each illegal shell in the graphical presentation of the model.

3 News in FAHTS version 6-6 - 2015.

3.1 Introduction

The new features are described in brief in this memo and in the updated manuals.

3.2 Operating Systems

FAHTS is built on following operating systems:

- Windows-64bit
- Windows-32bit
- LINUX
- Mac OSX

All windows utility software found under “modules” is built on 32bit platform and works therefore on both win32 and win64 computers.

The utilities for LINUX and Mac are built for these platforms and are found under LINUX Modules and Mac-OSX modules.

3.3 How to upgrade your FAHTS version

- Download the FAHTS module,
- Unzip and
- Copy to C:\Program Files\USFOS\bin Windows
  $FAHTS_HOME/bin LINUX and Mac

3.4 Extended export to the Graphical User Interface

The RAF file produced by FAHTS version 6-6 contains more information in the RAF file.

3.4.1 Visualization of groups

The groups defined in the analysis model, using **GroupDef** *) command combined with the **Name*)** Group could be visualized in xact.

By default, no group info is stored on the RAF file, but the new command FATGROUP means that group data are generated by FAHTS and stored on the RAF file.

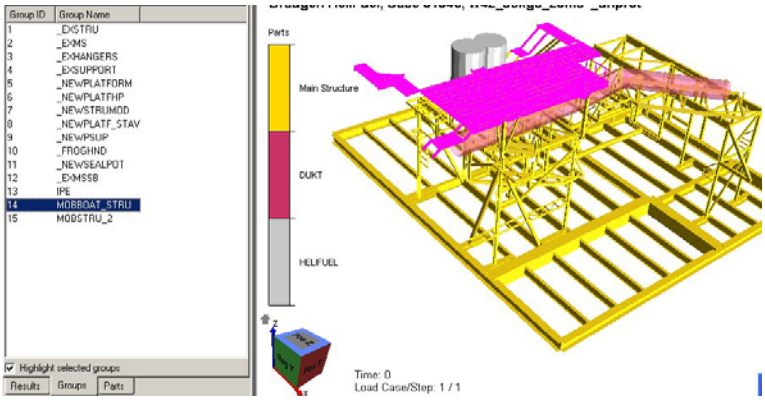


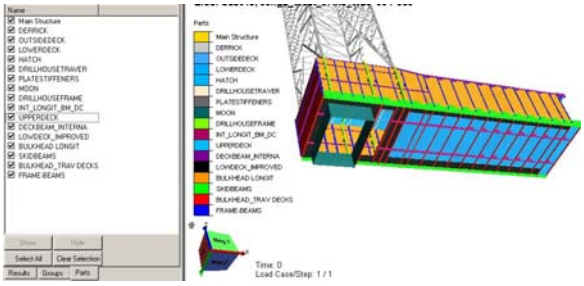
Figure 3-1 - Groups are visualized in xact if *FatGroup* is defined.

**) GROUPDEF and NAME commands are described in the USFOS user's manual.*

3.4.2 Visualization of parts

The "PART *)" option gives the user the possibility to divide the structure into parts. Each part may have different colour and transparency.

The "hide/show" (tick box) makes it easy to remove parts for easing the model inspection.



**) PART command is described in the USFOS user's manual.*

3.4.3 Visualization of Equipment

Heavy items are normally modelled (in USFOS) using one or more NodeMass definitions. However, in order to improve the information from an analysis, some new equipment mass definitions are introduced (see user's manual). In the USFOS analysis, the masses from these 1- 2- and 4-node mass-elements are applied as usual node-masses, but in xact, the items are visualized as shown below. FAHTS will include these "equipments" in the analysis, (for information only).

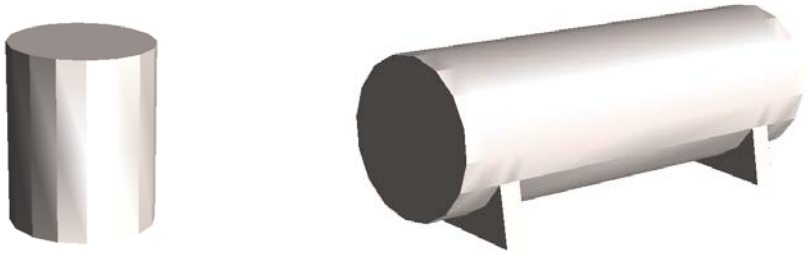
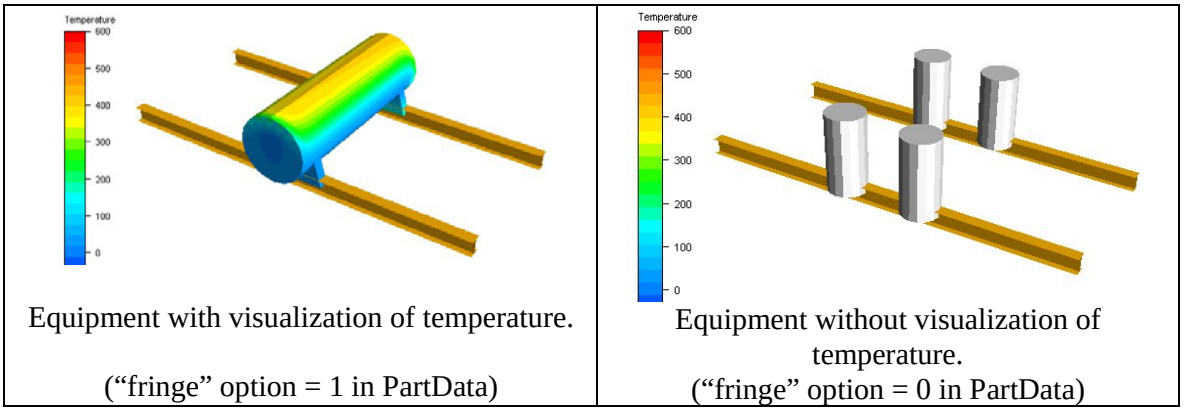


Figure 3-2 - 1-node equipment, (left) and 4-node (right) *)

**) The "Equip" elements are described in the USFOS user's manual.*

The PartData command has an option for result visualization on the actual part. In the case to the right the "fringe switch" is set to zero.



Equipment with visualization of temperature.

("fringe" option = 1 in PartData)

Equipment without visualization of temperature.

("fringe" option = 0 in PartData)

Figure 3-3 – Visualization of temperatures could be switched OFF (right).

3.4.4 Visualization of Shields

If the new SHIELD command is used, each triangular shield is visualized as follows:

- The colour is grey
- No temperature info on the shield
- The transparency of the shield reflects the shield's blocking factor:
  - Shield factor = 1.0 : The shield is visualized with no transparency
  - Shield factor = 0.0 : The shield is "invisible", (almost 100% transparent)
  - Else : The shield is transparent

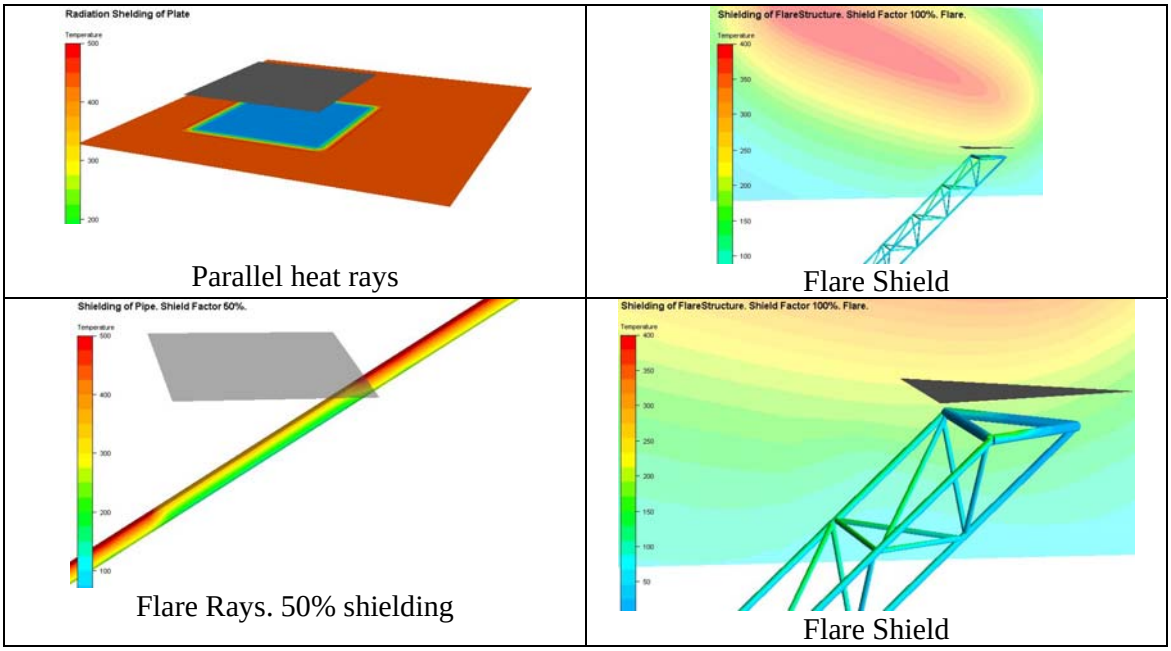


Figure 3-4 – Visualization of SHIELD.

3.5 PFP

3.5.1 Uneven U-values over Cross-Section

The thermal conduction (U-Value) assigned to an element is by default used for all cross section parts.

The new command “PFPSCALE” makes it possible to scale the “U-Value” for the different section parts:

- I-Profile : Web, Upper Flange and Lower Flange
- BOX : Left Side, Right Side, Upper Flange and Lower Flange.

The U-Value is scaled with the specified factor. (Factor < 1 improves the insulation).

3.5.2 Assigning PFP on element groups

The command INS_GRUP makes it possible to assign PFP (Insulation ID) to groups. It is recommended to utilize the NAME GROUP to ease the overview.

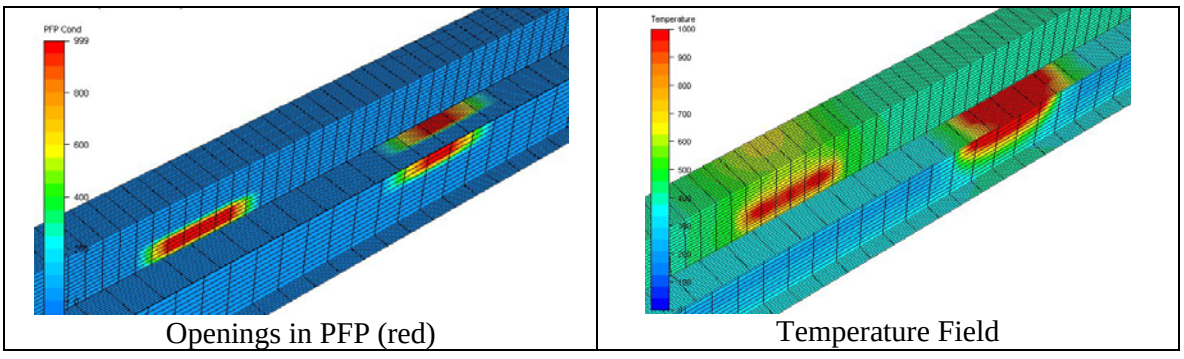
For example:

```
'           ID      GroupID
 INS_GRUP   100
                    101       ! Columns
                    102       ! Main Girders

Name Group   101    PFP_Col
Name Group   102    PFP_Main
```

3.5.3 Local openings in PFP

The new command PFPLOCAL makes it possible to define areas within the cross section with/without PFP.



Openings in PFP (red) | Temperature Field

Figure 3-5 – Openings in PFP on BOX- and I-Profiles.

3.6 Heat Exposure

3.6.1 Assigning Exposure on element groups

The command EXP_GRUP makes it possible to assign specific heat exposure (and PFP cover) on groups of elements. The command has similar structure as EXP_ELEM.

3.6.2 Local areas without Exposure

The EXPLOCAL makes it possible to define local areas within a cross-section at “unexposed.

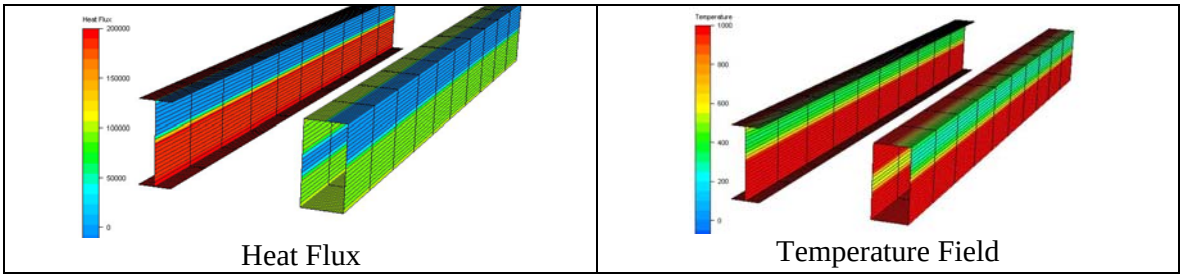


Figure 3-6 – Areas without heat exposure (blue) on BOX- and I-Profiles.

3.7 Different Linearization rules on different elements

The LIN_RULE command is extended. This makes it possible to define different rules for the different elements.

In addition: It is added an option for “search for sections with lowest temp”.

3.8 Initial temperatures

3.8.1 Extended definition.

The INITEMP command is extended. In addition to the mean temperature (T0), the two gradients could be specified.

Different Initial temperatures could be defined on the different elements.

3.8.2 Print of initial temperature on the BELTEMP file.

The new USFOS version (8-8) could assign initial temperatures on individual elements. FAHTS has an option, which supports this new feature. If the print switch is set to ON (see SWITCHES below), the initial temperatures are printed on the top of the BELTEMP result file.

3.9 Miscellaneous

3.9.1 Defining beginning- and end-times for exposure from KFX

The new command KamelEXP (Kameleon Exposure) makes it possible to user-define when the heat flux from KFX should start and end for selected structural elements.

If, for example, only one K2F file exists for a case, the user may define that the heat should be "Switched OFF" after a certain time in order to simulate the cooling process (as well as temperature equalization within elements).

3.9.2 Preparation for "pushdown" analysis in USFOS

The new command "**PushDown**" used together with **Lin_Rule 2** means that additional temperature data are printed on the BELTEMP file.

The actual (un-processed) flange temperatures in the FAHTS model are stored after the linearized values. The flange temperatures are utilized by USFOS when the degraded section capacities are computed.

The option is important when sections have large temperature gradients (for example unprotected section-parts).

3.9.3 New module for energy calculation

FAHTS 6-6 has a completely new-written module for the energy exchange computation. The normal use of FAHTS gives no practical differences in the results.

Areas, which are improved with the new energy module:

- Internal radiation of elements with PFP (With SHAPFACT activated)
- RadGroup

It is possible to switch back to the "old" energy module using:

Switches FahtsOpt NewEnergy OFF

3.10 SWITCHES, (Special Options).

Defaults could be re-defined using the “Switches” command, and following “Switches” sub-commands are available in FAHTS 6-6:.

KeyWord	SubKey	Value	*Val_2*	Description	Default
FahtsOpt	*Cryogen*	ON	(TempLim)	Switch ON handling of low temperatures, (below zero). The low temperature limit could be set.	OFF
	FluxDelay	Delay	N/A	Smooth transition between one KFX-fire to the next.	0.0
	NewEnergy	ON/OFF	N/A	Using new or “old” energy module	ON
	ShieldViz	ON/OFF	N/A	Visualization of Shield	ON
	PriIniTemp	ON/OFF	N/A	Print of initial temperatures on the beltemp file.	OFF

Table 3-1 SWITCHES options

3.11 Updates FAHTS and utility tools

News, corrections and updates are described on the web, and it is recommended to check the following link:

http://www.usfos.no/news/index.html

3.12 New/modified input commands

Since last main release (6-5), following input identifiers are added/extended:

PushDown	:	New command	: Fire Degradation analysis
PFPScale	:	New command	: Uneven U-value over cross section.
FatGroup	:	New command	: Switch ON visualization of groups.
KamelExp	:	New command	: KFX Exposure limitation.
Exp_Grup	:	New command	: Exposure for groups
Ins_Grup	:	New command	: Assign PFP to groups
PFPLocal	:	New command	: PFP on local areas within an element cross sect.
ExpLocal	:	New command	: Local areas without fire exposure.
Shield	:	New command	: Definition of radiation shield(s)
Equip_2N	:	New command	: 2-Node Mass Object.
Equip_4N	:	New command	: 4-Node Mass Object.
SWITCHES	:	New command	: Redefine analysis default parameters.
UserTemp	:	Extended command	*: Extended "Limit" library.*
UserFire	:	Extended command	*: Extended "fire-ball" option.*
Lin_Rule	:	Extended command	*: Rules for individual elements*
IniTemp	:	Extended command	*: Mean and Gradients on specific elements*

3.13 Documentation

The following documentation, (updated or new), is available on the web:

- User's manual : Updated document