Procedure to organise the files in an analysis that combines FDS and SAFIR.

1) Make a model of the different sections, with a name of the files that is meaningful, and analyse these files under, for example, the ISO fire.
   For example: “ColumnsISO.in”, “MainBeamsISO.in” and “SegBeamsISO.in”. This allows verifying the models and tuning the mesh with short CPU times. This also gives you a first feeling of the thermal response of the sections; which ones heat up faster or slower.
   Make also the torsion analysis for these sections.
2) Make the structural model “FrameISO.in” that is using the recently created TEM and TOR files; in our example, “ColumnsISO.tem” and “ColumnsISO-t.tor”, etc. This will allow verifying the model with respect to loads, supports, and section types allocated.
   The BEAM finite elements, for example, are grouped in different section types. The number of the section types is given by the order in which the names of the tem files are given in the input file of the structure.
   The structure in Figure 1 shows an example in which:
   members with section “ColumnsISO” are parallel to the z-axis,
   members with section "MainBeamsISO” are parallel to the x-axis,
   members with section “SegBeamsISO” are parallel to the y-axis.

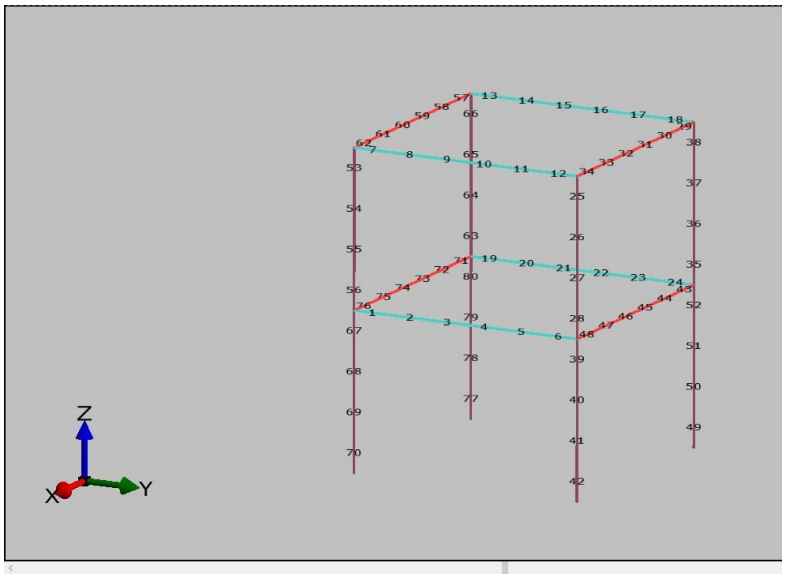

Figure 1: element numbers

The elements are described in “frame.in” by the following lines in which the first digit is the element number, shown on Figure 1, and the last digit is the section type.

```
ELEM   1   1   97 33   98 1
…
ELEM 24 52 124   8 119 1
ELEM 25   9 125 53 126 2
…
ELEM 28 55 129 10 126 2
ELEM 29 11 130 56 131 3
…
ELEM 34 60 136 12 131 3
ELEM 35 13 137 61 138 2
…
ELEM 42 66 146 16 143 2
ELEM 43 17 147 67 148 3
…
```

```
ELEM 48 71 153 18 148 3
ELEM 49 19 154 72 155 2
…
ELEM 56 77 163 22 160 2
ELEM 57 23 164 78 165 3
…
ELEM 62 82 170 24 165 3
ELEM 63 25 171 83 172 2
…
ELEM 70 88 180 28 177 2
ELEM 71 29 181 89 182 3
…
ELEM 76 93 187 30 182 3
ELEM 77 31 188 94 189 2
…
ELEM 80 96 192 32 189 2
```

The name of the TEM files must then be given in the following order.

```
NODOFBEAM
SegBeamsISO.tem
TRANSLATE 1 1
END_TRANS
MontanteISO.tem
TRANSLATE 1 1
END_TRANS
CISO.tem
TRANSLATE 1 1
END_TRANS
```

Figure 2 allows checking that the correct files have been allocated to the relevant section types.

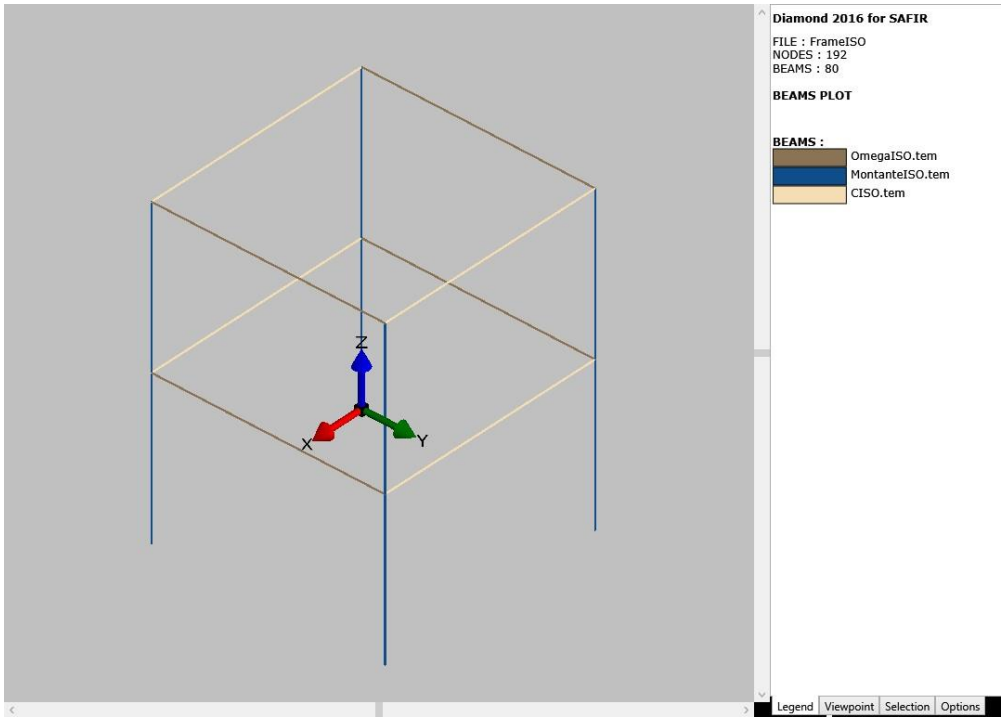

Figure 2: section types

The verification will be even easier with the version 2025 of Diamond, see Figure 3, which has been released with SAFIR 2025.

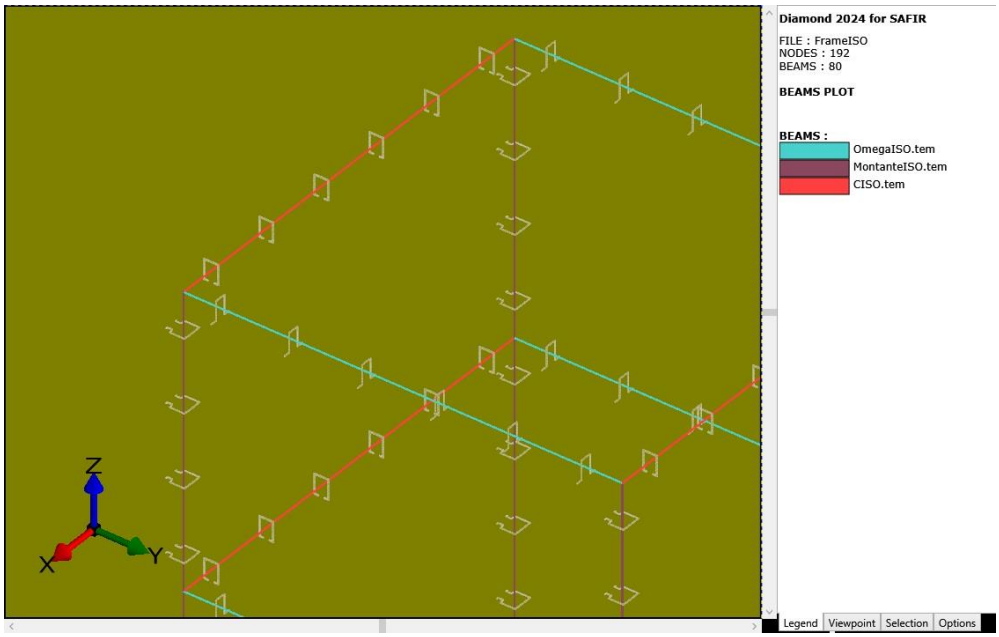

Figure 3: sections drawn on the lines

With the loads applied in 20 seconds in a dynamic analysis, the last converged point is obtained at 1358,91896 seconds. Figure 4 shows the displaced structure at that time.

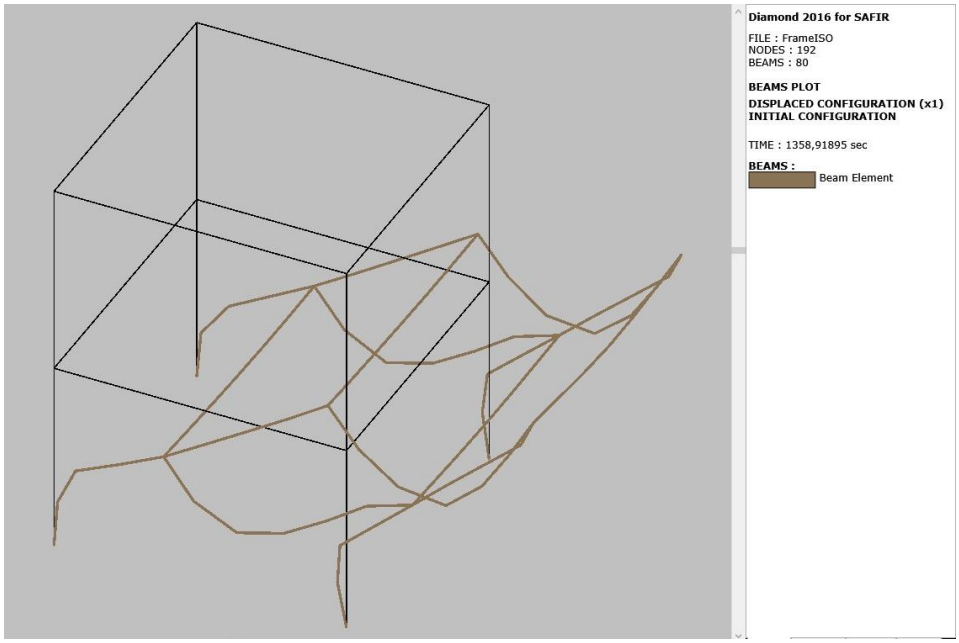

Figure 4: deformed shape under ISO fire

3) The file “frameCFD.in” is created from “frameISO.in”, just replacing:

- “OmegaISO.tem” by “b00001_1.tem” because the first element of section type 1 is element 1, written as “00001”,
- “MontanteISO.tem” by “”b00025_1.tem” because the first element of section type 2 is element 25, written as “00025”,
- “CISO.tem” by “b00029_1.tem” because the first element of section type 3 is element 29, written as “000029”.

4) The files for thermal analyses under the transfer file created by FDS can now be created.

The file for the first section type “OmegaISO.in” leads to the file “b00001_1.in”, in which the analysed section type is type 1, present in the structure “frameCFD.in”.

```
MAKE.TEMCD
FrameCFD.in
BEAM_TYPE  1
```

The file for the second section type “MontanteISO.in” leads to the file “b00025_1.in”, in which the analysed section type is type 2, present in the structure “frameCFD.in”.

```
MAKE.TEMCD
FrameCFD.in
BEAM_TYPE  2
```

The file for the third section type “CISO.in” leads to the file “b00029_1.in”, in which the analysed section type is type 3, present in the structure “frameCFD.in”.

```
MAKE.TEMCD
FrameCFD.in
BEAM_TYPE  3
```

5) The TOR files can be copied without any modification,
    - “OmegaISO-t.tor” into “b00001_1-t.tor”
    - “MontanteISO-t.tor” into “b00025_1-t.tor”
    - “CISO-t.tor” into “b00029_1-t.tor”

6) The file “frame.CFD.in” can be launched in SAFIR.