

Manufacturing Profile – Design of XML  
to control output of profiles

XML Design Document.doc

Status: Draft

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**HEXAGON**

XML Design Document

August 9<sup>th</sup> , 2021

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## Contents

<b>Revisions .....</b>	<b>6</b>
<b>Introduction .....</b>	<b>7</b>
<b>References.....</b>	<b>7</b>
<b>Definitions.....</b>	<b>7</b>
<b>Requirements .....</b>	<b>8</b>
<b>Examples .....</b>	<b>8</b>
Specifying Upsides.....	8
Changing Output XML.....	9
RectangleTube as Profile: .....	9
RectangleTube as Plates: .....	10
RectangleTube as Two L-Bars: .....	11
Redefining Material .....	12
Controlling offset between faces.....	13
RectangleTube without offset: .....	13
RectangleTube with 50mm offsets:.....	14
RectangleTube with different offsets:.....	14
RectangleTube with offsets based on cross section size:.....	15
<b>XML Schema .....</b>	<b>16</b>
SMS_PROFILE_OUTPUT .....	16
Attributes .....	17
Child Elements.....	17
Sample .....	17
SMS_FACE_LOOKUP .....	17
Attributes .....	17
Child Elements.....	17
Sample .....	17
SMS_MATERIAL_LOOKUP.....	18
Attributes .....	18
Child Elements.....	18
Sample .....	18
SMS_XSECTION_ID_LOOKUP .....	18
Attributes .....	18
Child Elements.....	19



# HEXAGON

Sample .....	19
SMS_XSECTIONS_LOOKUP .....	19
Attributes .....	20
Child Elements.....	20
SMS_XSECTION_LOOKUP.....	20
Attributes .....	20
Child Elements.....	20
Sample .....	20
SMS_MFG_AS_PART .....	21
Attributes .....	21
Child Elements.....	21
Sample .....	21
SMS_FACE.....	22
Attributes .....	22
Child Elements.....	22
SMS_OUTPUT_MATERIAL .....	22
Attributes .....	22
Child Elements.....	23
SMS_XSECTION_ID.....	23
Attributes .....	23
Child Elements.....	23
SMS_XSECTION_SIZE .....	23
Attributes .....	23
Child Elements.....	24
SMS_XSECTION_TYPE .....	24
Attributes .....	24
Child Elements.....	24
Sample .....	24
SMS_PARTS .....	25
Attributes .....	25
Child Elements.....	25
SMS_XSECTION_COMPONENT.....	25
Attributes .....	25
Child Elements.....	26
SMS_CELL_DEF .....	26
Attributes .....	26
Child Elements.....	26
SMS_PART.....	26
Attributes .....	26
Child Elements.....	27
SMS_FACES .....	27
Attributes .....	27



# HEXAGON

Child Elements.....	27
SMS_CELL .....	27
Attributes .....	28
Child Elements.....	28
SMS_OFFSET .....	28
Attributes .....	28
Child Elements.....	28
SMS_UPSIDES.....	28
Attributes .....	29
Child Elements.....	29
SMS_UPSIDE.....	29
Attributes .....	29
Child Elements.....	29
SMS_FACE_OUTPUT .....	29
Attributes .....	29
Child Elements.....	30



## Revisions

Revision #	Date Revised	Revised By	Description
0.1	Sept 12, 2011	Kkamph	Initial Version.
0.2	Oct 12, 2011	Kkamph	Split main file into smaller files. Changed layout so that data for a given cross section is on one external file.
0.3	Aug 6, 2013	Kkamph	Updated document with additional examples and screen shots for controlling output into multiple parts and controlling offset between different faces.
0.4	Aug 9, 2021	aharihar	Added description of new node viz., SMS_XSECTION_ID_LOOKUP that maps ProfileSectionType enumerator value to the Key used for XPath lookup for the cross-section.



## Introduction

This document explains the design of the XML that controls breakdown of Mfg Profile XML output.

## References

CR-CP-189010	Mfg Ref 11 - Mfg Profile - Output Control of Built Up
DM CP 381280	CrossSectionType() condition Function is returning Incorrect values (2L and L)

## Definitions

## Requirements

The customer should be able to control the composition of the Mfg Profile XML output by changing an XML file. The XML file and the changes that can be done to it are described in this document.

## Examples

This section will explain how the XML file should be modified to accomplish various modifications of the Manufacturing output XML for profiles and members. These changes to the output deal primarily with the unfolding choices, structure of the XML, such as SMS\_PLATE vs. SMS\_PROFILE output or attributes such as material or cross-section. For specific geometry related changes the authorized users should utilize the part editor to make the required changes and corrections.

### Specifying Upsides

For a given cross-section it is possible to specify for each cell what the upside is. In the example below we see the definition of the TeeBar. Within the SMS\_UPSIDES node we see initially two different options for upside selection. "webleft" where webleft and the top of the top-flange are upsides for the two cells and "webright" where webright and the top of the top-flange are upsides. This description is independent of the specific cross-section size.

```
<SMS_XSECTION_LOOKUP NAME="TeeBar">
  <SMS_XSECTION_TYPE>
    <SMS_CELL_DEF NAME="WEB" >
      <SMS_FACES SIDE_A="webleft" SIDE_B="webright" ALIGNMENT="Y"/>
    </SMS_CELL_DEF>
    <SMS_CELL_DEF NAME="TOP_FLANGE" >
      <SMS_FACES SIDE_A="top_flange_top" SIDE_B="top_flange_left_bottom,top_flange_right_bottom" ALIGNMENT="X"/>
    </SMS_CELL_DEF>
    <SMS_UPSIDES>
      <SMS_UPSIDE ID="webleft" >
        <SMS_FACE_OUTPUT CELL="WEB" UPSIDE="SIDE_A"/>
        <SMS_FACE_OUTPUT CELL="TOP_FLANGE" UPSIDE="SIDE_A"/>
      </SMS_UPSIDE>
      <SMS_UPSIDE ID="webright" >
        <SMS_FACE_OUTPUT CELL="WEB" UPSIDE="SIDE_B"/>
        <SMS_FACE_OUTPUT CELL="TOP_FLANGE" UPSIDE="SIDE_A"/>
      </SMS_UPSIDE>
    </SMS_UPSIDES>
  </SMS_XSECTION_TYPE>
</SMS_XSECTION_LOOKUP>
```

So if we want to add the possibility of webright and bottom of top-flange to be the upsides we will add the following upside node:

```
<SMS_UPSIDE ID="webright-bottom">
  <SMS_FACE_OUTPUT CELL="WEB" UPSIDE="SIDE_B"/>
  <SMS_FACE_OUTPUT CELL="TOP_FLANGE" UPSIDE="SIDE_B"/>
</SMS_UPSIDE>
```

The specific upside that is used is then picked through the MfgAsPlate process rule. The name of the upside is not significant as long as the same name is used within the Upside process rule, but it can help clarity if it is descriptive of the actual selection of upside faces.

## Changing Output XML

It is possible to control the composition of the manufacturing XML output for the profile. Within this XML file there will be multiple different options. The exact option that will be used when the output is generated is picked by the process rule.

```
<SMS_XSECTION_LOOKUP NAME="TeeBar">
  <SMS_MFG_AS_PART XSECTION="BUT">
    <SMS_PARTS NAME="Plate-Plate">
      <SMS_PART KEY="PLATE_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="PLATE_1">
        <SMS_CELL NAME="WEB" OUTPUT_UPSIDE_FACE="base"/>
      </SMS_PART>
      <SMS_PART KEY="PLATE_2" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="PLATE_2">
        <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="base"/>
      </SMS_PART>
    </SMS_PARTS>
    <SMS_PARTS NAME="Plate-ER">
      <SMS_PART KEY="PLATE_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="PLATE_1" >
        <SMS_CELL NAME="WEB" OUTPUT_UPSIDE_FACE="base"/>
      </SMS_PART>
      <SMS_PART KEY="FB_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="FB_2" >
        <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="webleft"/>
      </SMS_PART>
    </SMS_PARTS>
    <SMS_PARTS NAME="Profile">
      <SMS_PART KEY="ANGLE_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="ANGLE_1" >
        <SMS_CELL NAME="WEB" OUTPUT_UPSIDE_FACE="base"/>
        <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="webleft">
          <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_X="0.0" RATIO_Y="1.0" OFFSET_GAP="0.100"/>
        </SMS_CELL>
      </SMS_PART>
    </SMS_PARTS>
  </SMS_MFG_AS_PART>
</SMS_XSECTION_LOOKUP>
```

If you want to create output as two edge reinforcements you will add the following node in the XML file. The key feature to note here are:

- The SMS\_PARTS name is what will be referenced by the process rule.
- There are two SMS\_PART nodes. Each of these will be output as a separate flat bar.
- Each SMS\_PART has one SMS\_CELL. The name of SMS\_CELL references the cross-section definition that can be seen in previous section in this document.

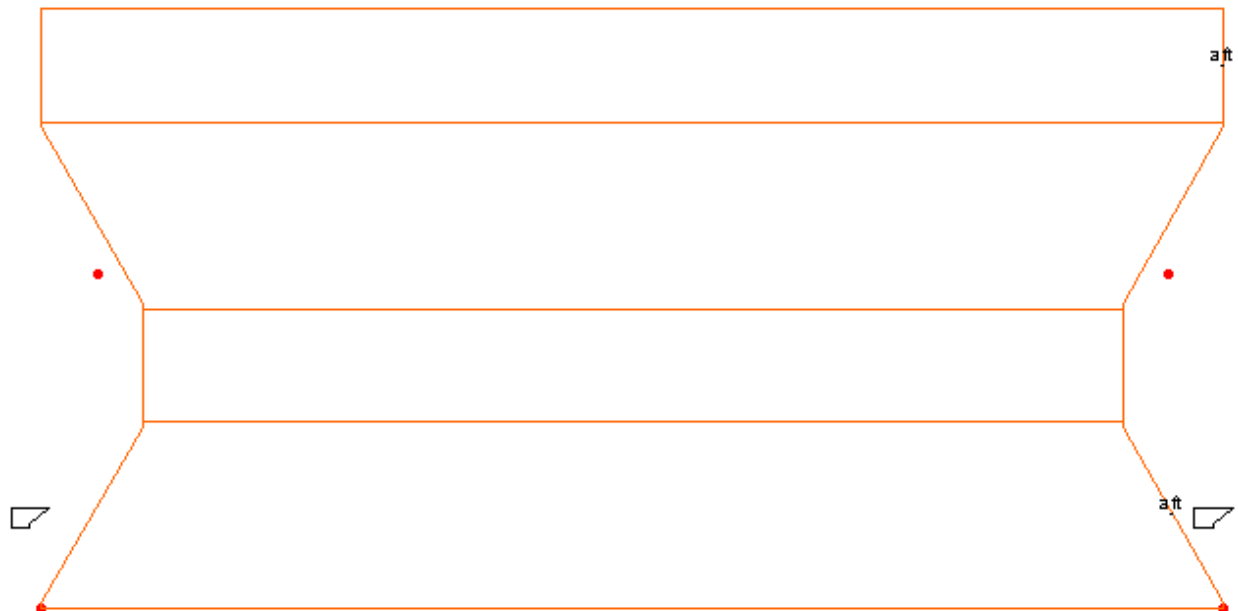
```
<SMS_PARTS NAME="Profile-Profile">
  <SMS_PART KEY="FB_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="FB_1" >
    <SMS_CELL NAME="WEB" OUTPUT_UPSIDE_FACE="webleft"/>
  </SMS_PART>
  <SMS_PART KEY="FB_2" COMPONENT_LOOKUP="FB_2" >
    <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="webleft"/>
  </SMS_PART>
</SMS_PARTS>
```

### RectangleTube as Profile:

In this example we will show how it is possible to output the rectangular tube as a single profile part consisting of all four faces that make up the rectangular tube. This type of output is similar to what is seen

by default for angle and I Bar profiles but when using the XML this approach can be extended to as many faces as needed instead of being limited to web, top flange and bottom flange.

```
<SMS_PARTS NAME="Profile-Profile">
  <SMS_PART KEY="RT_1" TYPE="PROFILE" MATERIAL_LOOKUP="MATERIAL_CARBON_A"
  COMPONENT_LOOKUP="RT_1">
    <SMS_CELL NAME="WEBL" OUTPUT_UPSIDE_FACE="base">
      <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.1"/>
    </SMS_CELL>
    <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="top_flange_top">
      <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y=".5" OFFSET_GAP="0.1"/>
    </SMS_CELL>
    <SMS_CELL NAME="WEBR" OUTPUT_UPSIDE_FACE="webright">
      <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.1"/>
    </SMS_CELL>
    <SMS_CELL NAME="BOTTOM_FLANGE" OUTPUT_UPSIDE_FACE="bottom_flange_bottom">
      <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y=".5" OFFSET_GAP="0.1"/>
    </SMS_CELL>
  </SMS_PART>
</SMS_PARTS>
</SMS_MFG_AS_PART>
```



### RectangleTube as Plates:

It is also possible to export each of the faces of the rectangle tube as a separate flatbar in SMS\_PLATE format. This is similar to the default output seen for built-up profiles such as BUT and BUTL3 cross sections. The two web faces reference the same component look-up which is PLATE\_1 while the flanges reference a second option, PLATE\_2. This is because the dimensions of web left and Web right are identical while the dimensions of the two flanges are identical to each other.

```
<SMS_PARTS NAME="Plate-Plate">
  <SMS_PART KEY="PLATE1" TYPE="PLATE" MATERIAL_LOOKUP="MATERIAL_CARBON_A"
  COMPONENT_LOOKUP="PLATE_1">
    <SMS_CELL NAME="WEBL" OUTPUT_UPSIDE_FACE="base"/>
  </SMS_PART>
  <SMS_PART KEY="PLATE2" TYPE="PLATE" MATERIAL_LOOKUP="MATERIAL_CARBON_A"
  COMPONENT_LOOKUP="PLATE_2">
```



# HEXAGON

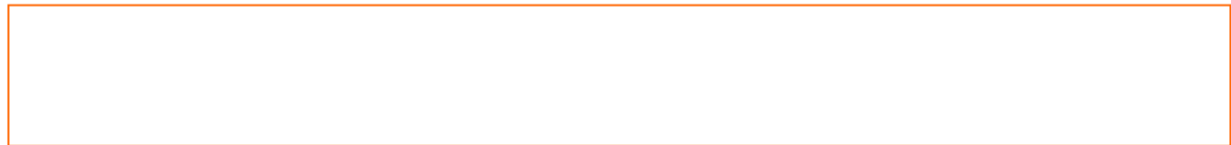
```

    <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="base"/>
  </SMS_PART>
  <SMS_PART KEY="PLATE3" TYPE="PLATE" MATERIAL_LOOKUP="MATERIAL_CARBON_A"
  COMPONENT_LOOKUP="PLATE_1">
    <SMS_CELL NAME="WEBR" OUTPUT_UPSIDE_FACE="base"/>
  </SMS_PART>
  <SMS_PART KEY="PLATE4" TYPE="PLATE" MATERIAL_LOOKUP="MATERIAL_CARBON_A"
  COMPONENT_LOOKUP="PLATE_2">
    <SMS_CELL NAME="BOTTOM_FLANGE" OUTPUT_UPSIDE_FACE="base"/>
  </SMS_PART>
</SMS_PARTS>

```



And



And



And



## RectangleTube as Two L-Bars:

It is possible to export a rectangle tube as two separate L-Bar profiles. To do this the four separate faces of the profile needs to be paired together, the left web with the top flange and the right web with the bottom flange. Then the new construction needs to be given a cross section.

```

  <SMS_PARTS NAME="Profile-Profile">
    <SMS_PART KEY="ANGLE_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="ANGLE_1">
      <SMS_CELL NAME="WEBL" OUTPUT_UPSIDE_FACE="base"/>
      <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="base"/>
    </SMS_PART>
    <SMS_PART KEY="ANGLE_2" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="ANGLE_1">
      <SMS_CELL NAME="WEBR" OUTPUT_UPSIDE_FACE="base"/>
      <SMS_CELL NAME="BOTTOM_FLANGE" OUTPUT_UPSIDE_FACE="base"/>
    </SMS_PART>
  </SMS_PARTS>

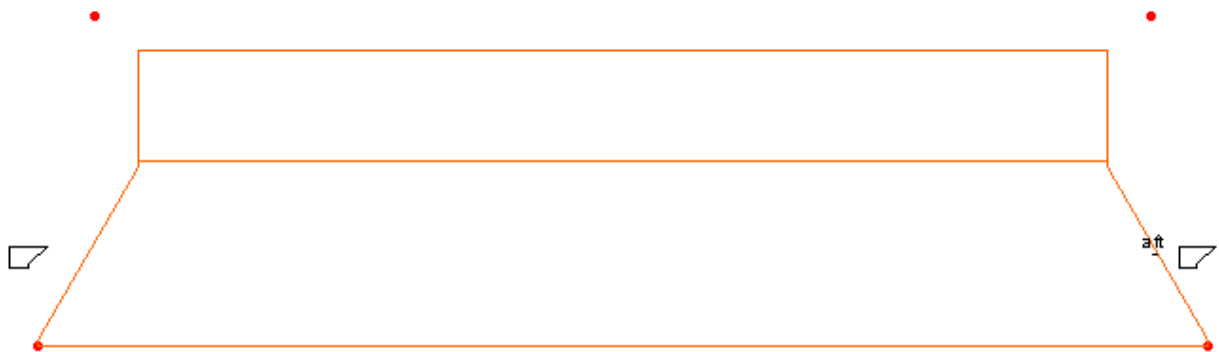
```

...  
 Additionally the cross section specific information needs to be updated with the size and type of the angle bars. The component key given below should match with the component look-up given in the section above:

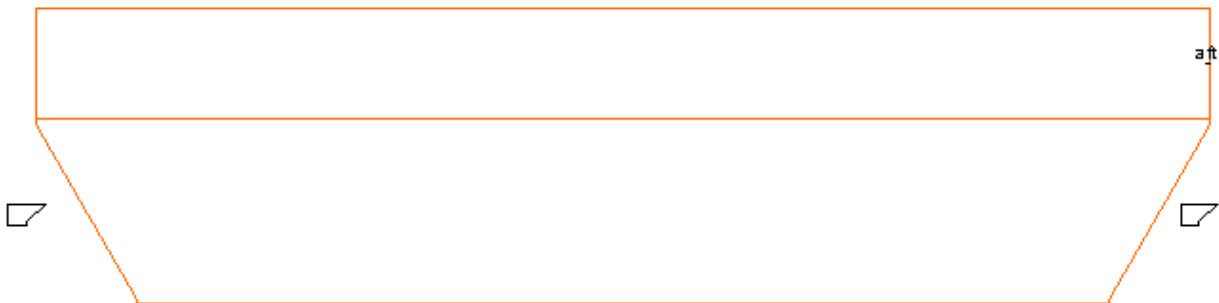
```

<SMS_XSECTION_SIZE NAME="HSS20X12X.500">
  <SMS_XSECTION_COMPONENT KEY="RT_1" TYPE="PROFILE" XSECTION_TYPE="HSSR"
XSECTION_SIZE="HSS20X12X.500"/>
  <SMS_XSECTION_COMPONENT KEY="PLATE_1" TYPE="PLATE" THICKNESS="20" THICKNESS_UOM="mm"/>
  <SMS_XSECTION_COMPONENT KEY="PLATE_2" TYPE="PLATE" THICKNESS="12" THICKNESS_UOM="mm"/>
  <SMS_XSECTION_COMPONENT KEY="FB_1" TYPE="PLATE" XSECTION_TYPE="FB" XSECTION_SIZE="FB 20x0.625"/>
  <SMS_XSECTION_COMPONENT KEY="FB_2" TYPE="PLATE" XSECTION_TYPE="FB" XSECTION_SIZE="FB 12x0.625"/>
  <SMS_XSECTION_COMPONENT KEY="ANGLE_1" TYPE="PROFILE" XSECTION_TYPE="UA" XSECTION_SIZE="UA
12x0.625"/>
  <SMS_OFFSET KEY="WEB_OFFSET" OFFSET_X="0.0" OFFSET_Y=".500"/>
</SMS_XSECTION_SIZE>
  
```

Giving this XML to control the output, results in two separate parts being named in the output XML, each of them being L-Bars of the same size as seen in the screen shots below.



And



## Redefining Material

An extension to the previous example is the ability to change the material of the parts in the XML output. Within the SMS\_PART node simply specify the new material within the MATERIAL\_LOOKUP attribute. The value should reference a node in the SMS\_MATERIAL\_LOOKUP table. This value will be used to lookup material type and grade which will then be added in the XML output instead of the original material of the profile part.

```

<SMS_PARTS NAME="Profile-Profile">
  <SMS_PART KEY="FB_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="FB_1" >
    <SMS_CELL NAME="WEB" OUTPUT_UPSIDE_FACE="webleft"/>
  </SMS_PART>
  
```

```
<SMS_PART KEY="FB_2" COMPONENT_LOOKUP="FB_2" >
  <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="webleft"/>
</SMS_PART>
</SMS_PARTS>
```

## Controlling offset between faces

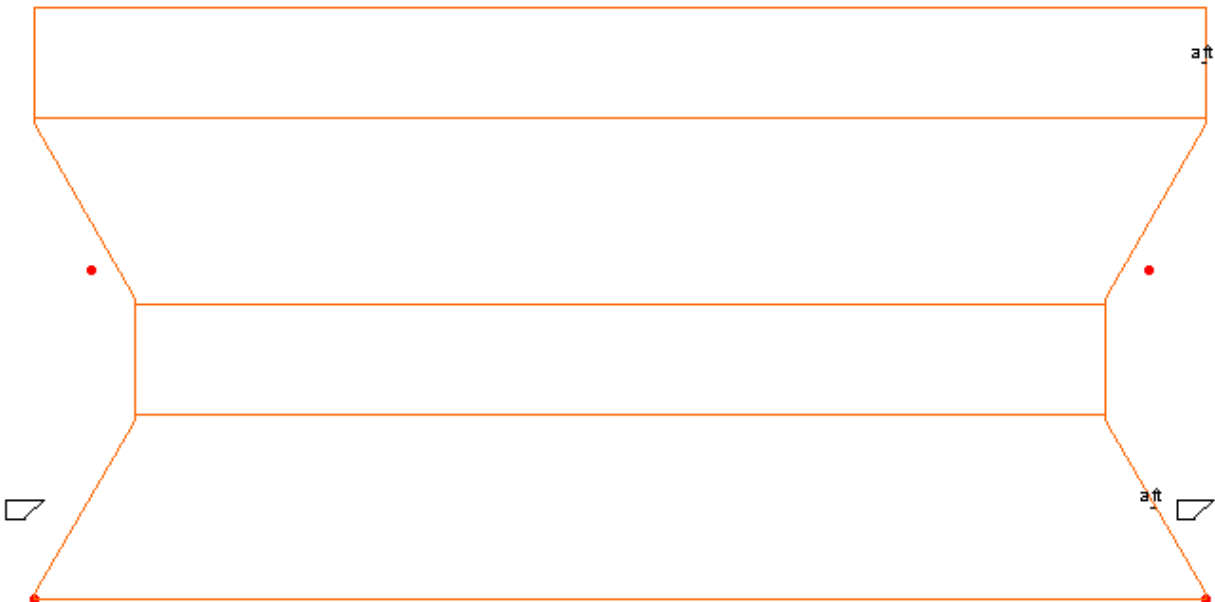
The user also has the ability to control the offset between faces. For each cell the offset can be specified within the SMS\_PART node. The value RATIO\_Y is the fraction of the web height the cell is offset. The web height itself for this purpose is given as the OFFSET\_Y for the specific cross section size. The value of the OFFSET\_GAP attribute is the absolute offset that is applied to the cell. In the example below the top flange face is offset a distance so that there is a gap of 100mm between the top of the web to the top flange.

```
<SMS_PARTS NAME="Profile">
  <SMS_PART KEY="ANGLE_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="ANGLE_1" >
    <SMS_CELL NAME="WEB" OUTPUT_UPSIDE_FACE=" webleft ">
      <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.100"/>
    </SMS_CELL>
    <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="top_flange"/>
  </SMS_PART>
</SMS_PARTS>
```

## RectangleTube without offset:

In this example it is shown that when no offsets are given there will not be a gap between the different faces.

```
<SMS_PARTS NAME="Profile-Profile">
  <SMS_PART KEY="RT_1" TYPE="PROFILE" MATERIAL_LOOKUP="MATERIAL_CARBON_A"
  COMPONENT_LOOKUP="RT_1">
    <SMS_CELL NAME="WEBL" OUTPUT_UPSIDE_FACE="base"/>
    <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="top_flange_top"/>
    <SMS_CELL NAME="WEBR" OUTPUT_UPSIDE_FACE="webright"/>
    <SMS_CELL NAME="BOTTOM_FLANGE" OUTPUT_UPSIDE_FACE="bottom_flange_bottom"/>
  </SMS_PART>
</SMS_PARTS>
</SMS_MFG_AS_PART>
```



### RectangleTube with 50mm offsets:

In this example it is shown that adding an OFFSET\_GAP value of "0.05" (50mm) will create a 50mm gap after the face where the gap is specified. The gap specified for the BOTTOM\_FLANGE cell will not be used in this case because the BOTTOM\_FLANGE is the last cell.

```

<SMS_PARTS NAME="Profile ">
  <SMS_PART KEY="RT_1" TYPE="PROFILE" MATERIAL_LOOKUP="MATERIAL_CARBON_A"
  COMPONENT_LOOKUP="RT_1">
    <SMS_CELL NAME="WEBL" OUTPUT_UPSIDE_FACE="base">
      <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.05"/>
    </SMS_CELL>
    <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="top_flange_top">
      <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.05"/>
    </SMS_CELL>
    <SMS_CELL NAME="WEBR" OUTPUT_UPSIDE_FACE="webright">
      <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.05"/>
    </SMS_CELL>
    <SMS_CELL NAME="BOTTOM_FLANGE" OUTPUT_UPSIDE_FACE="bottom_flange_bottom">
      <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.05"/>
    </SMS_CELL>
  </SMS_PART>
</SMS_PARTS>
</SMS_MFG_AS_PART>

```



### RectangleTube with different offsets:

In this example it is shown how different offsets can be added to different cells. This allows for some cells to be grouped together and other cells to be kept apart. In the example there is no gap between the TOP\_FLANGE and the WEBR cells and as a result it can be seen in the screen shot that the two cells are right up against each other.

```

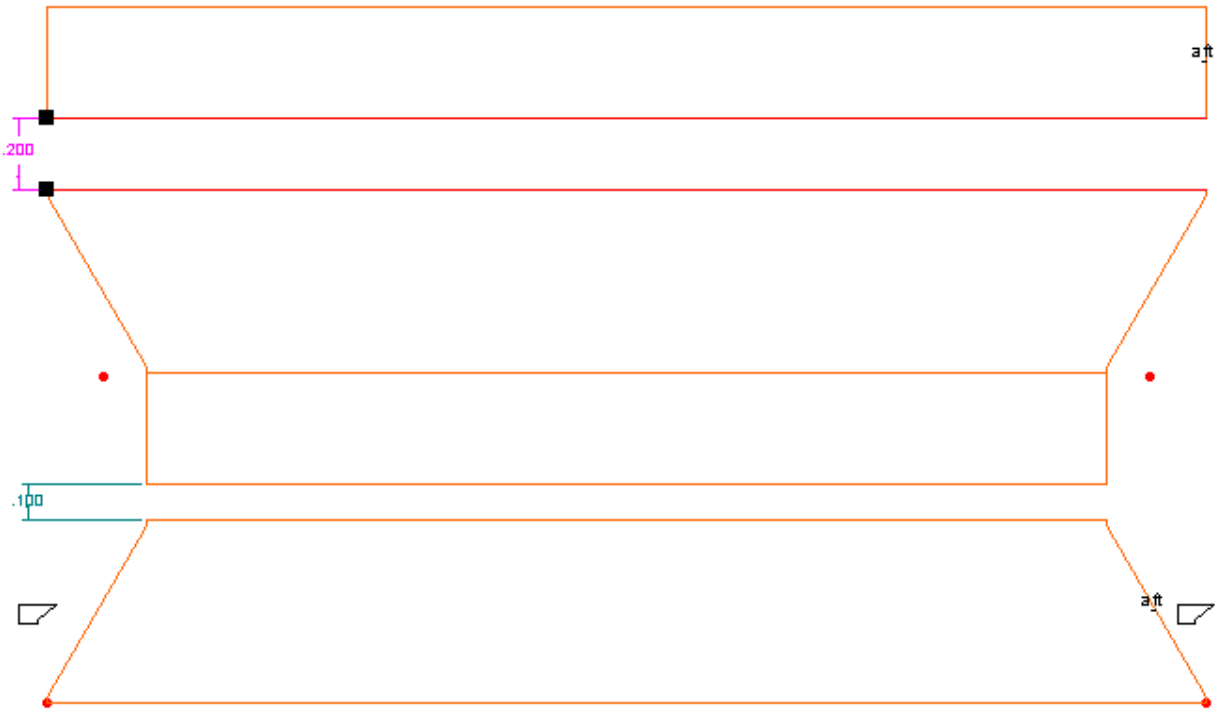
<SMS_PARTS NAME="Profile ">
  <SMS_PART KEY="RT_1" TYPE="PROFILE" MATERIAL_LOOKUP="MATERIAL_CARBON_A"
  COMPONENT_LOOKUP="RT_1">

```

```

<SMS_CELL NAME="WEBL" OUTPUT_UPSIDE_FACE="base">
  <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.1"/>
</SMS_CELL>
<SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="top_flange_top">
</SMS_CELL>
<SMS_CELL NAME="WEBR" OUTPUT_UPSIDE_FACE="webright">
  <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.2"/>
</SMS_CELL>
<SMS_CELL NAME="BOTTOM_FLANGE" OUTPUT_UPSIDE_FACE="bottom_flange_bottom">
  <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.05"/>
</SMS_CELL>
</SMS_PART>
</SMS_PARTS>
</SMS_MFG_AS_PART>

```



## RectangleTube with offsets based on cross section size:

This example shows how different offsets can be assigned based on the cross section size or the profile/member. It is given in the XML that the gap after the WEBL cell should be 1.0 times the web offset which is given in the XML under the specific cross section size entry, plus 100mm (600mm). The gap after the TOP\_FLANGE cell is then .5 times the web height plus 100mm (350mm). Finally the gap after WEBR is 1.0 times web height plus 100mm (600mm). By using different OFFSET\_LOOKUPS and with corresponding SMS\_OFFSET nodes under the cross section, separate offsets could be given based on e.g. flange width or thickness.

```

<SMS_PARTS NAME="Profile ">
  <SMS_PART KEY="RT_1" TYPE="PROFILE" MATERIAL_LOOKUP="MATERIAL_CARBON_A"
COMPONENT_LOOKUP="RT_1">
  <SMS_CELL NAME="WEBL" OUTPUT_UPSIDE_FACE="base">
    <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.1"/>
  </SMS_CELL>
  <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="top_flange_top">
    <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y=".5" OFFSET_GAP="0.1"/>
  </SMS_CELL>
  <SMS_CELL NAME="WEBR" OUTPUT_UPSIDE_FACE="webright">
    <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y="1.0" OFFSET_GAP="0.1"/>
  </SMS_CELL>
  <SMS_CELL NAME="BOTTOM_FLANGE" OUTPUT_UPSIDE_FACE="bottom_flange_bottom">

```

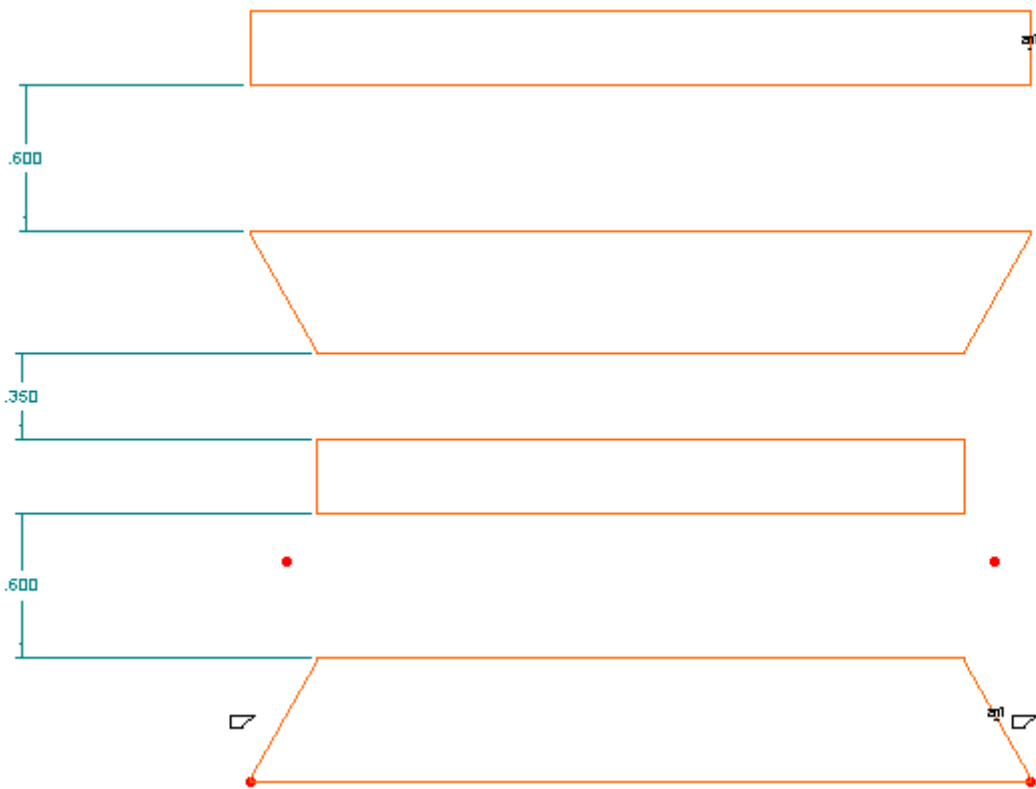
```

<SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_Y=".5" OFFSET_GAP="0.1"/>
</SMS_CELL>
</SMS_PART>
</SMS_PARTS>
</SMS_MFG_AS_PART>

...
<SMS_XSECTION_SIZE NAME="HSS20X12X.500">
  <SMS_XSECTION_COMPONENT KEY="RT_1" TYPE="PROFILE" XSECTION_TYPE="HSSR"
XSECTION_SIZE="HSS20X12X.500"/>
  <SMS_XSECTION_COMPONENT KEY="PLATE_1" TYPE="PLATE" THICKNESS="20" THICKNESS_UOM="mm"/>
  <SMS_XSECTION_COMPONENT KEY="PLATE_2" TYPE="PLATE" THICKNESS="12" THICKNESS_UOM="mm"/>

<SMS_XSECTION_COMPONENT KEY="FB_1" TYPE="PLATE" XSECTION_TYPE="FB" XSECTION_SIZE="FB 20x0.625"/>
  <SMS_XSECTION_COMPONENT KEY="FB_2" TYPE="PLATE" XSECTION_TYPE="FB" XSECTION_SIZE="FB 12x0.625"/>
  <SMS_OFFSET KEY="WEB_OFFSET" OFFSET_X="0.0" OFFSET_Y=".500"/>
</SMS_XSECTION_SIZE>

```



## XML Schema

This section gives the definition of the schema for the XML control how to unfold and generate output for various cross section types. Each different type of node is described here with an explanation of the

### SMS\_PROFILE\_OUTPUT

This is the root element of the document. It holds information about how to about any cross-section that has special instructions. Cross-sections that as not specifically mentioned in this XML file will be unfolded and converted to XML output similar to what was seen prior to v2011R1

## Attributes

This element has no attributes

## Child Elements

Name	Description	Type	Required
<a href="#">SMS_FACE_LOOKUP</a>	Element containing a lookup table for face name string to face id long value	-	yes
<a href="#">SMS_MATERIAL_LOOKUP</a>	Element containing a lookup table for material types	-	yes
	Node containing a lookup table that maps ProfileSectionType enumerator value to the Key used for XPath lookup for the cross-section		no
<a href="#">SMS_XSECTIONS_LOOKUP</a>	Element containing a lookup table for cross-sections. This will describe the sub-parts a cross section can possibly be broken down into.	-	yes

## Sample

```
<SMS_PROFILE_OUTPUT>
  <SMS_FACES>...</SMS_FACES>
  <SMS_MATERIAL_LOOKUP>...</SMS_MATERIAL_LOOKUP>
  <SMS_XSECTIONS_LOOKUP>...</SMS_XSECTION_LOOKUP>
</SMS_SMS>
```

## SMS\_FACE\_LOOKUP

Within this element is a table describing for to translate face name strings to face id long values. The strings will be used elsewhere in the XML file and translated to long values which will be used internally during unfolding and output XML generation

## Attributes

This element has no attributes

## Child Elements

Name	Description	Type	Required
<a href="#">SMS_FACE</a>	Element describing each pair of face name string and face id long value.	-	yes

## Sample

```
<SMS_FACE_LOOKUP>
  <SMS_FACE ID="257" NAME="webleft"/>
  <SMS_FACE ID="258" NAME="webright"/>
```



# HEXAGON

```

<SMS_FACE ID="513" NAME="bottom_flange_bottom"/>
<SMS_FACE ID="514" NAME="top_flange_top"/>
<SMS_FACE ID="770" NAME="top_flange_left_bottom"/>
<SMS_FACE ID="772" NAME="top_flange_right_bottom"/>
<SMS_FACE ID="769" NAME="bottom_flange_left_bottom"/>
<SMS_FACE ID="771" NAME="bottom_flange_right_bottom"/>
<SMS_FACE ID="3329" NAME="inner_webleft"/>
<SMS_FACE ID="3330" NAME="inner_webright"/>

```

```

<SMS_FACE ID="3586" NAME="inner_bottom"/>
<SMS_FACE ID="3585" NAME="inner_top"/>
<SMS_FACE ID="3073" NAME="outer"/>
<SMS_FACE ID="3074" NAME="outer"/>
<SMS_FACE ID="1" NAME="base"/>
<SMS_FACE ID="2" NAME="offset"/>
</SMS_FACE_LOOKUP>

```

## SMS\_MATERIAL\_LOOKUP

This element contains a table with material type and grade which is referenced elsewhere in this XML file. It is possible for the customer to change the material type and grade for some or all types of outputs of a cross-section independently of the material selected within SM3D modeling task.

### Attributes

This element has no attributes

### Child Elements

Name	Description	Type	Required
<a href="#">SMS_OUTPUT_MATERIAL</a>	Element describing material type and grade referenced by a key used elsewhere in this XML file	-	yes

### Sample

```

<SMS_MATERIAL_LOOKUP>
<SMS_OUTPUT_MATERIAL KEY="MATERIAL_CARBON_A" MATERIAL_TYPE="Steel - Carbon" MATERIAL_GRADE="A" />
<SMS_OUTPUT_MATERIAL KEY="MATERIAL_CARBON_D" MATERIAL_TYPE="Steel - Carbon" MATERIAL_GRADE="D" />
<SMS_OUTPUT_MATERIAL KEY="MATERIAL_CARBON_E" MATERIAL_TYPE="Steel - Carbon" MATERIAL_GRADE="E" />
<SMS_OUTPUT_MATERIAL KEY="MATERIAL_CARBON_A36" MATERIAL_TYPE="Steel - Carbon" MATERIAL_GRADE="A36" />
</SMS_MATERIAL_LOOKUP>

```

## SMS\_XSECTION\_ID\_LOOKUP

Within this node are a set of [SMS\\_XSECTION\\_ID](#) elements. These collectively define a table that maps ProfileSectionType enumerator value to the Key used for XPath lookup for the corresponding cross-section.

### Attributes

This element has no attributes

## Child Elements

Name	Description	Type	Required
<a href="#">SMS_XSECTION_ID</a>	Element describing a mapping of the integer defined within ProfileSectionType enumeration value to the @NAME attribute of the <a href="#">SMS_XSECTION_LOOKUP</a> element	-	yes

## Sample

```

<SMS_XSECTION_ID_LOOKUP>
  <!-- Bulb crosssections -->
  <SMS_XSECTION_ID ID="8" NAME="BulbFlat" />
  <SMS_XSECTION_ID ID="72" NAME="BulbFlat" />

  <!-- Flat-bar crosssections -->
  <SMS_XSECTION_ID ID="256" NAME="FlatBar" />

  <!-- Tee crosssections -->
  <SMS_XSECTION_ID ID="32" NAME="TeeBar" />
  <SMS_XSECTION_ID ID="33" NAME="TeeBar" />
  <SMS_XSECTION_ID ID="16387" NAME="TeeBar" />
  <SMS_XSECTION_ID ID="16388" NAME="TeeBar" />

  <!-- L-shaped Profile crosssections -->
  <SMS_XSECTION_ID ID="64" NAME="EqualAngle" />
  <!--SMS_XSECTION_ID ID="64" NAME="UnequalAngle" /-->
  <SMS_XSECTION_ID ID="65" NAME="EqualAngle" />

  <!-- C-shaped crosssections -->
  <SMS_XSECTION_ID ID="128" NAME="Channel" />
  <SMS_XSECTION_ID ID="16384" NAME="Channel" />

  <!-- I-shaped crosssections -->
  <SMS_XSECTION_ID ID="16" NAME="IBar" />
  <SMS_XSECTION_ID ID="18" NAME="IBar" />
  <SMS_XSECTION_ID ID="16385" NAME="IBar" />

  <!-- Hollow Rectangle crosssections -->
  <SMS_XSECTION_ID ID="2560" NAME="RectangleTube" />
  <SMS_XSECTION_ID ID="16392" NAME="RectangleTube" />

  <!-- Hollow Circular Profile crosssections; the circle is composed of eight arcs -->
  <SMS_XSECTION_ID ID="3072" NAME="Profile_RoundTube" />

  <!-- L-shaped Member crosssections -->
  <SMS_XSECTION_ID ID="16389" NAME="LBar" />

  <!-- Hollow Circular Member crosssections; one curve for outer circle and one for inner circle -->
  <SMS_XSECTION_ID ID="16393" NAME="Member_RoundTube" />

  <!-- Solid (i.e., NOT tubular) circular crosssections -->
  <SMS_XSECTION_ID ID="5120" NAME="RoundBar" />

  <!-- Two angle bars placed back-to-back with a gap between the flanges -->
  <SMS_XSECTION_ID ID="16390" NAME="TwoL" />
</SMS_XSECTION_ID_LOOKUP>

```

## SMS\_XSECTIONS\_LOOKUP

This element has information for each cross-section size describing the outputs that are possible for this cross-section. The information contained here includes cross-section size for sub-parts of the given cross-section.



# HEXAGON

## Attributes

This element has no attributes

## Child Elements

Name	Description	Type	Required
<a href="#">SMS_XSECTION_LOOKUP</a>	Each cross-section which is described here. The faces that make up the cross section, the possible decompositions of the output and the thickness and cross section of sub-parts	-	yes

## SMS\_XSECTION\_LOOKUP

### Attributes

Name	Description	Type	Required
NAME	Name of the cross section type of the currently part.	string	yes

### Child Elements

Name	Description	Type	Required
<a href="#">SMS_XSECTION_SIZE</a>	For each specific cross-section there will be a list of possible component that can be generated as output. E.g. a TeeBar can generate two plates or two flat bars or the original built-up T profile.	-	yes
<a href="#">SMS_MFG_AS_PART</a>	Element containing one or more description of how the XML output for a profile should be generated. This includes control of output as Plate or Profile and control of which faces are included in a given output group.	-	yes
<a href="#">SMS_XSECTION_TYPE</a>	This element gives definitions of all the Cells that make up a cross-section. For each cell the faces of each side of the cell are listed	-	yes

### Sample

```

<SMS_XSECTIONS_LOOKUP>
  <SMS_XSECTION_LOOKUP NAME="TeeBar">
    <SMS_XSECTION_TYPE>...<SMS_XSECTION_TYPE/>
    <SMS_MFG_AS_PART XSECTION="BUT">
      <SMS_PARTS NAME="Plate-Plate">
        <SMS_PART KEY="PLATE_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="PLATE_1">
          <SMS_CELL NAME="WEB" OUTPUT_UPSIDE_FACE="base"/>
        </SMS_PART>
        <SMS_PART KEY="PLATE_2" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="PLATE_2">
          <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="base"/>
        </SMS_PART>
      </SMS_PARTS>
    </SMS_MFG_AS_PART>
  </SMS_XSECTION_LOOKUP>

```



# HEXAGON

```

</SMS_PARTS>
</SMS_MFG_AS_PART>
<SMS_XSECTION_SIZE NAME="BUT 150x120">
  <SMS_XSECTION_COMPONENT KEY="PLATE_1" TYPE="PLATE" THICKNESS=".007" THICKNESS_UOM="m"/>

<SMS_XSECTION_COMPONENT KEY="PLATE_2" TYPE="PLATE" THICKNESS=".010" THICKNESS_UOM="m"/>
  <SMS_XSECTION_COMPONENT KEY="ANGLE_1" TYPE="PROFILE" XSECTION_TYPE="BUT" XSECTION_SIZE="BUT
150x120"/>
  <SMS_XSECTION_COMPONENT KEY="FB_1" TYPE="PROFILE" XSECTION_TYPE="FB" XSECTION_SIZE="FB 140x7"/>
  <SMS_XSECTION_COMPONENT KEY="FB_2" TYPE="PROFILE" XSECTION_TYPE="FB" XSECTION_SIZE="FB 120x10"/>
</SMS_XSECTION_SIZE>
<SMS_XSECTION_SIZE NAME="BUT 300x200">
  <SMS_XSECTION_COMPONENT KEY="PLATE_1" TYPE="PLATE" THICKNESS=".010" THICKNESS_UOM="m"/>
  <SMS_XSECTION_COMPONENT KEY="PLATE_2" TYPE="PLATE" THICKNESS=".020" THICKNESS_UOM="m"/>
  <SMS_XSECTION_COMPONENT KEY="FB_1" TYPE="PROFILE" XSECTION_TYPE="FB" XSECTION_SIZE="FB 280x10"/>
  <SMS_XSECTION_COMPONENT KEY="FB_2" TYPE="PROFILE" XSECTION_TYPE="FB" XSECTION_SIZE="FB 200x20"/>
</SMS_XSECTION_SIZE>
</SMS_XSECTIONS_LOOKUP>

```

## SMS\_MFG\_AS\_PART

This element has information for each cross-section size describing the outputs that are possible for this cross-section. The information contained here includes cross-section size for sub-parts of the given cross-section

### Attributes

Name	Description	Type	Required
XSECTION	This is the cross-section of the profile. In the delivered catalog possible values include B, EA, FB, BUT, RT etc. In customer catalog the values depend on the naming of the cross-sections that have been bulk loaded	String	yes

### Child Elements

Name	Description	Type	Required
<a href="#">SMS_PARTS</a>	Element containing a list of the parts this profile will be output as.	-	yes

### Sample

```

<SMS_MFG_AS_PART XSECTION="BUT">
  <SMS_PARTS NAME="Plate-Plate">
    <SMS_PART KEY="PLATE_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="PLATE_1">
      <SMS_CELL NAME="WEB" OUTPUT_UPSIDE_FACE="base"/>
    </SMS_PART>
    <SMS_PART KEY="PLATE_2" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="PLATE_2">
      <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="base"/>
    </SMS_PART>
  </SMS_PARTS>
  <SMS_PARTS NAME="Plate-ER">
    <SMS_PART KEY="PLATE_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="PLATE_1" >
      <SMS_CELL NAME="WEB" OUTPUT_UPSIDE_FACE="base"/>
    </SMS_PART>
    <SMS_PART KEY="FB_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="FB_2" >
      <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="webleft"/>
    </SMS_PART>
  </SMS_PARTS>

```

```

</SMS_PART>
</SMS_PARTS>
<SMS_PARTS NAME="Profile-Profile">

```

```

<SMS_PART KEY="FB_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="FB_1" >
  <SMS_CELL NAME="WEB" OUTPUT_UPSIDE_FACE="base"/>
</SMS_PART>
<SMS_PART KEY="FB_2" MATERIAL_LOOKUP="MATERIAL_" COMPONENT_LOOKUP="FB_2" >
  <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="webleft"/>
</SMS_PART>
</SMS_PARTS>
<SMS_PARTS NAME="Profile">
  <SMS_PART KEY="ANGLE_1" MATERIAL_LOOKUP="MATERIAL_CARBON_A" COMPONENT_LOOKUP="ANGLE_1" >
    <SMS_CELL NAME="WEB" OUTPUT_UPSIDE_FACE="base"/>
    <SMS_CELL NAME="TOP_FLANGE" OUTPUT_UPSIDE_FACE="webleft">
      <SMS_OFFSET OFFSET_LOOKUP="WEB_OFFSET" RATIO_X="0.0" RATIO_Y="1.0" OFFSET_GAP="0.100"/>
    </SMS_CELL>
  </SMS_PART>
</SMS_PARTS>
</SMS_MFG_AS_PART>

```

## SMS\_FACE

These nodes are used for lookup of the face name to convert it into the face id integer value. E.g. webleft = 257 and webright = 258 etc. The face id for a given face should match with the value given in the cross section symbol. The name of the face is the value that is specified elsewhere in this XML file and used for the look-up.

### Attributes

Name	Description	Type	Required
ID	Attribute that holds the long value of a face ID. E.g. 257 or 258	int	yes
NAME	Name of the face. E.g. webleft or webright.	string	yes

### Child Elements

This element has no children.

## SMS\_OUTPUT\_MATERIAL

This is an element in the material look up table. Each element describes material type and grade which can be used instead of the material specified in modeling. The key will be used elsewhere in this XML file to reference this element.

### Attributes

Name	Description	Type	Required
KEY	Lookup key used elsewhere in this document	string	yes

MATERIAL_TYPE	Material type string that will be used in the manufacturing XML output for the part referencing this key	string	no
MATERIAL_GRADE	Material grade string that will be used in the manufacturing XML output for the part referencing this key	string	no

### Child Elements

This element has no children.

## SMS\_XSECTION\_ID

These nodes collectively specify a mapping table between internal product identifier (ID) to a NAME. This NAME is used to determine which CrossSection-LookUp to use.

For example, let's say you are manufacturing a member with a cross-section whose shape looks like the letter 'C'. Per S3D, the internal product identifier for this shape is 128. The lookup specifies this:

```
<SMS_XSECTION_ID ID="128" NAME="Channel" />
```

The value of the corresponding NAME attribute will be used to drive the XPath query //SMS\_XSECTION\_LOOKUP[@NAME="Channel"] which is the CBarLookup.xml.

### Attributes

Name	Description	Type	Required
ID	Attribute that holds the integer value corresponding to the ProfileSectionType enumeration defined in CommonStruct's StructInterop type-library.	int	yes
NAME	Name of the crosssection as specified by the @NAME attribute of the <a href="#">SMS_XSECTION_LOOKUP</a> element.	string	yes

### Child Elements

This element has no children.

## SMS\_XSECTION\_SIZE

This element will be present for each cross-section size. It describes the possible components that can be generated as output for this cross-section. The actual selection of which of the components will be selected will be specified in the SMS\_MFG\_AS\_PARTS section in this XML file but the components must be chosen from the available options in this list.

### Attributes

Name	Description	Type	Required
------	-------------	------	----------



NAME	This attributes is used to look up the current cross-section that is used	string	yes
------	---	--------	-----

## Child Elements

This element has no children.

Name	Description	Type	Required
<a href="#">SMS_XSECTION_COMPONENT</a>	Element describing the component of the cross-section for which output can be generated.	-	yes
<a href="#">SMS_OFFSET</a>	This node will have specific offsets for each cross section size.	-	No

## SMS\_XSECTION\_TYPE

This element contains the definition of the cells that make up this type of cross section. Each cross section type has a distinct number of cells and each cell is made up of two groups of faces. This is defined in the SMS\_CELL\_DEF child node. When unfolding a profile one group of faces must be selected for each cell to be the upside (or marking side) of the cell and consequently the other group of faces for the cell becomes the anti-marking side.

## Attributes

Name	Description	Type	Required
NAME	Attribute defining the cross section that these nodes applies to	string	yes

## Child Elements

Name	Description	Type	Required
<a href="#">SMS_CELL_DEF</a>	These elements will defines each cell in terms of which faces make up this face	-	yes
<a href="#">SMS_UPSIDES</a>	This element describes the possible selection of upsides for this cross section.	-	yes

## Sample

```

<SMS_XSECTION_TYPE>
  <SMS_CELL_DEF NAME="WEB">
    <SMS_FACES SIDE_A="webleft" SIDE_B="" ALIGNMENT="Y" />
  </SMS_CELL_DEF>
  <SMS_CELL_DEF NAME="TOP_FLANGE">
    <SMS_FACES SIDE_A="top_flange_top" SIDE_B="top_flange_left_bottom,top_flange_right_bottom" ALIGNMENT="X" />
  </SMS_CELL_DEF>
  <SMS_UPSIDES>

```



```

<SMS_UPSIDE ID="webleft">
  <SMS_FACE_OUTPUT CELL="WEB" UPSIDE="SIDE_A" />
  <SMS_FACE_OUTPUT CELL="TOP_FLANGE" UPSIDE="SIDE_A" />
</SMS_UPSIDE>
<SMS_UPSIDE ID="webright">
  <SMS_FACE_OUTPUT CELL="WEB" UPSIDE="SIDE_B" />
  <SMS_FACE_OUTPUT CELL="TOP_FLANGE" UPSIDE="SIDE_A" />
</SMS_UPSIDE>
</SMS_UPSIDES>
</SMS_XSECTION_TYPE>

```

## SMS\_PARTS

When XML is generated a collection of parts is used to describe the composition of the output. Each SMS\_PART child node will result in a SMS\_PLATE or SMS\_PROFILE node in the output. Each of these parts will be made up of the cells given for the part.

### Attributes

Name	Description	Type	Required
NAME	Attribute identifying this selection about how the output is generated. This SMS_PARTS element will specify one or more parts that will be generated as manufacturing XML output.	string	yes

### Child Elements

Name	Description	Type	Required
<a href="#">SMS_PART</a>	This element describes one section of the output for this cross section. E.g. if a TeeBar is output as plate and edge reinforcement two separate SMS_PART nodes will describe each section of this output.	-	yes

## SMS\_XSECTION\_COMPONENT

This node has attributes that can be plugged into SMS\_PART\_INFO if they need to be modified from the original output. E.g. if the cross-section of this component is different from the cross-section of the original part a new cross-section type and cross-section size attribute value can be specified here. This node also specifies if the output that is created should be in the form of SMS\_PLATE or SMS\_PROFILE.

### Attributes

Name	Description	Type	Required
KEY	This is the key identifying this node. It will be referenced from other nodes in this XML file.	string	yes
TYPE	Attribute identifying the output style of the manufacturing XML for this part. A value of PLATE will result in output as	PLATE	yes



	SMS_PLATE and a value of PROFILE will result in out as SMS_PROFILE	PROFILE	
THICKNESS	If the thickness desired for this cell is different from the modeled cell thickness then the new value can be specified here. Nothing is required is desired thickness is the same as original thickness.	double	no
THICKNESS_UOM	This attribute allows the costumer to specify the unit of measurement used for the given thickness		no
XSECTION_TYPE	Allows the user to specify the new cross-section type of the output.	string	no
XSECTION_SIZE	Allows the user to specify the new cross-section size of the output.	string	no

## Child Elements

This element has no children

## SMS\_CELL\_DEF

This node defines as cell of a cross-section. A cell is defined by that faces that make up the cell.

## Attributes

Name	Description	Type	Required
NAME	Identifies this cell of the cross section	string	yes

## Child Elements

Name	Description	Type	Required
<a href="#">SMS_FACES</a>	This element describes the cell in terms of the faces the make up the cell.	-	yes

## SMS\_PART

This node will have children that identify all the cells that will be output into XML as part of this component. The cells given within one SMS\_PART will all be included within one SMS\_PLATE or SMS\_PROFILE.

## Attributes

Name	Description	Type	Required
------	-------------	------	----------



# HEXAGON

KEY	This attribute is a key that identifies this node.	string	yes
MATERIAL_LOOKUP	This attribute is used as a lookup key so the material to be shown in the XML output can be found in the material lookup table	string	yes
COMPONENT_LOOKUP	This attribute is used as a lookup key so the component information to be shown in the XML output can be found in the component lookup table	string	yes

## Child Elements

Name	Description	Type	Required
<a href="#">SMS_CELL</a>	This element describes the cell that will be part of this output object. If this SMS_PART is a profile multiple cells can be specified	-	yes

## SMS\_FACES

The cell will be defined by a collection of faces that make up the cell. There will be two groups of faces, one of which will later be identified as upside and the other will be identified as anti-marking side.

## Attributes

Name	Description	Type	Required
SIDE_A	This is a comma-separated list of faces that make up one side of this cell. The values must be present in the SMS_FACE_LOOKUP table	string	yes
SIDE_B	This is a comma separated list of faces that make up the other side of this cell. The values must be present in the SMS_FACE_LOOKUP table	string	yes
ALIGNMENT	This attributes describes how this cell is aligned. A value of X means the cell is aligned with the WEB, a value of Y means the cell is aligned with top flange.	X   Y	yes

## Child Elements

This element has no children

## SMS\_CELL

This element describes a cell that is part of a given output.



## Attributes

Name	Description	Type	Required
NAME	Attribute that references a cell that will be part of this output	string	Yes
OUTPUT_UPSIDE_FACE	Attribute that can be used in the XML output to describe the upside of this face in terms of the new output.	string	No

## Child Elements

Name	Description	Type	Required
<u>SMS_OFFSET</u>	This element describes the offset that will be applied to this cell in the output	-	No

## SMS\_OFFSET

This element describes the offset that will be applied to this cell in the XML output. For profiles made up of multiple cells this will control to the gap between the separate cells.

## Attributes

Name	Description	Type	Required
OFFSET_LOOKUP	Lookup of offsets gaps specific for the cross section size	String	No
OFFSET_GAP	Describes the vertical gap between different cells	Float	No
RATIO_X	The value RATIO_X is the fraction of the web length the cell is offset	Float	No
RATIO_Y	The value RATIO_Y is the fraction of the web height the cell is offset vertically	Float	No
OFFSET_X	For a given cross section size this is the offset that should be applied	Float	No
OFFSET_Y	For a given cross section size this is the vertical offset that should be applied. Value for the cross section size is multiplied by the ratio given for the output format.	Float	No

## Child Elements

This element has no child elements.

## SMS\_UPSIDES

This element contains descriptions of possible upside selections for this cross-section.

## Attributes

This element has no attributes

## Child Elements

Name	Description	Type	Required
<a href="#">SMS_UPSIDE</a>	This element describes upsides for each cell of the cross-section in terms of SIDE_A or SIDE_B of the cell definition	-	Yes

## SMS\_UPSIDE

This element describes for a cross-section type the upsides for each cell.

## Attributes

Name	Description	Type	Required
ID	This attribute is a key that identifies the upside to be used. This XML document can specify multiple difference upside options for a cross section and a specific upside option will be picked in the process rule and selected from the XML document.	-	Yes

## Child Elements

Name	Description	Type	Required
<a href="#">SMS_FACE_OUTPUT</a>	This is an element indicating which side is upside for a given cell. It will reference SIDE_A or SIDE_B from the SMS_FACES node.	-	Yes

## SMS\_FACE\_OUTPUT

Within the output XML the cell specific in the attribute CELL will have the upside specified in UPSIDE attribute. The UPSIDE references the SMS\_CELL\_DEF for this cell.

## Attributes

Name	Description	Type	Required
CELL	Attribute describing which cell the upside is given for	string	yes
UPSIDE	Attribute describing which side is the upside for this cell	SIDE_A   SIDE_B	yes



**HEXAGON**

Child Elements

This element has no children