Macro order MACR_ASPIC_MAIL

1 Goal

To generate the grid of a healthy pricking or with long or short crack.

The lengths must be given in millimetres and the angles in degrees.

The concept produced by this macro order is of type grid, containing the topological entities allowing to apply boundary conditions and loadings. The produced grid can be used only or associated with macro MACR_ASPIC_CALC.

To use MACR_ASPIC_MAIL, it is necessary to be able to reach to GIBI on the same object computer as *Code_Aster* (either all locally, or on central machine *Aster*).

MACR_ASPIC_MAIL fact call to the order MODI_MAILLAGE to transform the grid of the square into grid of pricking.

2 Syntax

```
grid   [grid] = MACR_ASPIC_MAIL      (

    ♦  EXEC_MAILLAGE =_F ( ♦  SOFTWARE     =  /'GIBI98'     ,
                                               /'GIBI2000' ,      [DEFECT]
                           ◊  UNITE_DATG   =  / 70,               [DEFECT]
                                              / unit_d  ,         [I]
                           ◊  UNITE_MGIB   =  / 19      ,         [DEFECT]
                                              / unit_s  ,         [I]
                           ◊  NIVE_GIBI    =  / 10,               [DEFECT]
                                              / 3,4,5,6,7,8,9,11, [I]
                         ),

     ◊ TYPE_ELEM     =  /  'CU20' ,                               [DEFECT]
                        /  'CUB8' ,                               [TXM]

     ◊ RAFF_MAIL     =  /  'LARGE'   ,
    [DEFECT]
                        /  'FINE' ,                               [TXM]

    ♦  PIPE =_F      (  ♦  E_BASE    = thickness  ,          [R]
                           ♦  DEXT_ BASE= diameter   ,          [R]
                           ♦  L_BASE    = length  ,          [R]
                           ♦  L_CHANF   = length  ,          [R]
                           ♦  E_TUBU    = thickness  ,          [R]
                           ♦  DEXT_TUBU = diameter   ,          [R]
                           ♦  Z_MAX     = length  ,          [R]
                           ♦  TYPE      =/'TYPE_1'   ,          [TXM]
                                         / 'TYPE_2' ,
                           ◊  L_PENETR  =/0.         ,          [DEFECT]
                                         / length    ,          [R]
                         ),

    ♦  WELDING =_F      (  ♦  H_SOUD    = height  ,             [R]
                           ♦  ANGL_SOUD = angle   ,             [R]
                           ♦  JEU_SOUD  = game    ,             [R]
                         ),

    ♦  BODY =_F         (  ♦  E_CORP    = thickness  ,          [R]
                           ♦  DEXT_CORP = diameter   ,          [R]
                           ♦  X_MAX     = length  ,          [R]
                         ),

    ◊  FISS_SOUDURE =_F (  ♦  /  TYPE   =  'LONG' ,
                              ◊  AXIS=  / 'YES'   ,
                                        / 'NOT'   ,           [DEFECT]
                               / TYPE   =  'SHORT'   ,
                              ◊  COEF_MULT_RC1    = rc1  ,      [R]
                              ◊  COEF_MULT_RC2    = rc2  ,      [R]
                              ◊  COEF_MULT_RC3    = rc3  ,      [R]
                           ◊  NB_SECTEUR   = NS   ,             [I]
                           ◊  NB_COURONNE  = nc   ,             [I]
                           ◊  NB_TRANCHE   = NT   ,             [I]
                           ◊  RAYON_TORE   = rc0  ,             [R]
                           ♦  DEPTH  = has     ,          [R]
                           ◊  LENGTH    = 2c   ,          [R]
                           ♦  AZIMUTH          = theta,              [R]
```

♦ POSITION = / 'RIGHT' , [TXM]
/ 'INCLINES' ,

```
                        ♦  CRACK     =  /  'DEB_INT' ,        [TXM]
                                        /  'DEB_EXT' ,
                                        /  'NON_DEB' ,
                                        /  'THROUGH' ,
# If CRACK = 'NON_DEB' then
                             ◊  LIGA_INT  =        lig,       [R]
# Finsi
                             ◊  ANGL_OUVERTURE  =  / eps,     [R]
                                                   / 0. ,     [DEFECT]
                    ),

   ◊  =_F IMPRESSION  (  ◊  FILE  = nom_fichier,              [TXM]
                         ◊  UNIT     = unit ,                [I]
                         ◊  /  FORMAT = 'ASTER' ,               [DEFECT]
                         ◊  /  FORMAT = 'CASTEM',
                               ◊  NIVE_GIBI =  / 10,            [DEFECT]
                                               / 3,
                            /  FORMAT =  'IDEAS'
                               ◊  VERSION  =  / 5,              [DEFECT]
                                              / 4,
                    ),

   ◊  INFORMATION =      / 1,
   [DEFECT]
                  / 2,

                                        )
```

3 Geometrical definition of pricking

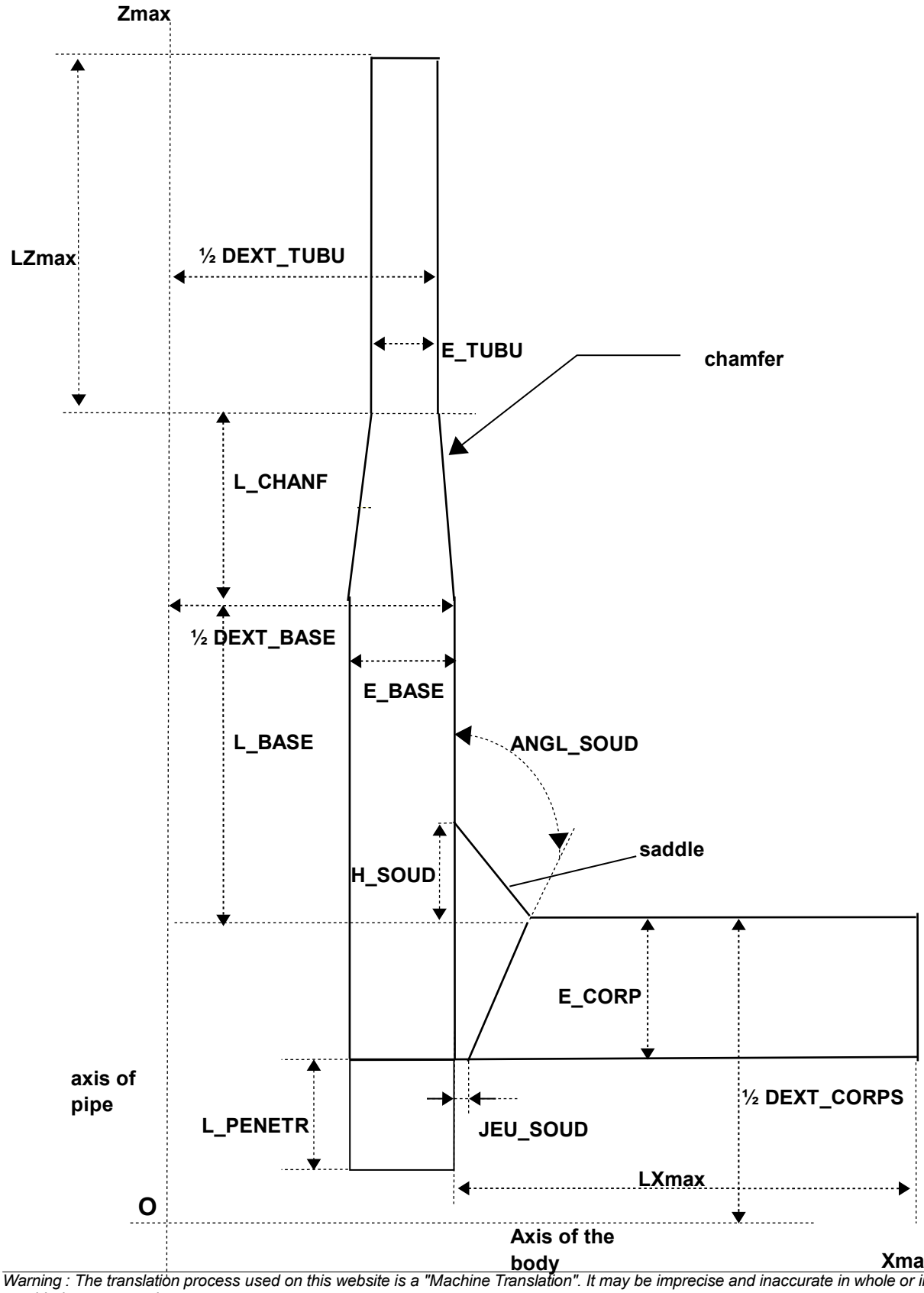
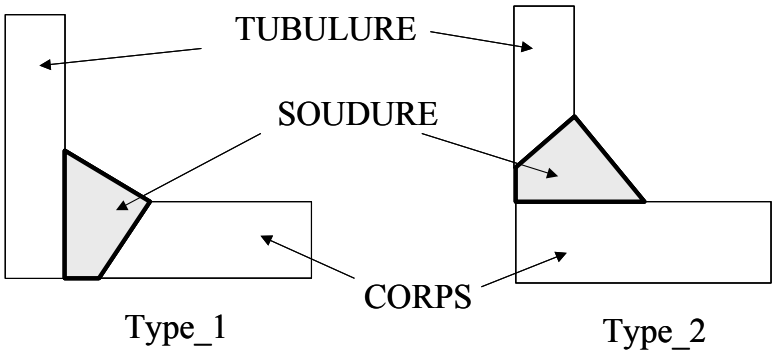


Figure 3-a: description of the various parameters (welding of type_1)

There are two types of welding:



Determination of Xmax and Zmax

In a general way, the maximum dimension of a tube 'Dmax' is defined starting from the length of damping 'Ldmax'. This length is calculated by the following formula: $Max(\frac{3}{2}\sqrt{\frac{R_m^3}{e}}, 3\sqrt{R_m e})$, where R_m is the average radius of the tube considered and *E* its thickness.

- *Calculation of LXmax* (body): one applies the preceding formula with R_m average radius of the body (BODY) and *E* its thickness.

- *Calculation of LZmax* : the ray and the thickness of the pipe are not constant. It is thus necessary to successively twice apply the formula of the maximum, with the following data:
  - R_m average radius of pipe (TUBU) and *E* its thickness;
  - R_m average radius of the base of the pipe (BASE) and *E* its thickness.

  Then one takes the maximum of the two preceding values.

These lengths of damping are counted starting from the edge external of the base of the pipe (according to X) and with the top of the chamfer (according to Z).

One thus obtains finally:

$$X_{max} = LX_{max} + 1/2\, DEXT\_BASE$$
$$Z_{max} = LZ_{max} + 1/2\, DEXT\_CORP + L\_BASE + L\_CHANF$$

These values constitute them **minimal values** for the length of the body and pipe in order to respect the criterion over the length of damping: it is thus licit to do calculations with lengths larger than those.

It is possible to generate grids with lengths of the bodies and pipe smaller than these lengths of damping: a message of alarm however is transmitted and the user is only judge of the relevance of his results.

4 Operands

4.1 Keyword factor EXEC_MAILLAGE

4.1.1 Operand SOFTWARE

♦ SOFTWARE = / 'GIBI98' ,
/ 'GIBI2000',

Software GIBI carried out for the realization of the grid of the square.

◊ UNITE_DATG = unit_d

Number of the logical unit where one can print data GIBI generated for the realization of the grid of the square. By default, 70.

◊ UNITE_MGIB = unit_s

Logical number of unit where one can print the grid of the square generated by GIBI. By default, 19.

◊ NIVE_GIBI =

Level of GIBI used, which is worth 10 by defaults.

4.2 Operand TYPE_ELEM

Allows to choose the type of element which will constitute the grid (linear or quadratic).

/ 'CU20' , [DEFECT]
/ 'CUB8' , [TXM]

4.3 Operand RAFF_MAIL

This operand makes it possible to define the refinement of the grid close to the welding. It is LARGEsier by default, but it can be more END. [Table 4.3-1] the number of nodes indicates on the saddle and the interface (see [Figure 5-a]) when the operand is used RAFF_MAIL in the case of 'healthy' grids.

	Many nodes on the saddle	Many nodes on the interface
LARGE	2	3
END	3	7

Table 4.3-1: Topological definition of the welding

For the fissured grids, this parameter defines the refinement of the grid around the bottom of crack and determines the values by default of the various optional parameters (cf [§4.10] and [§4.11]).

Notice 1:

In the case of a cal thermomechanical bottom on a healthy pricking, the grid with coarse refinement is not sufficient to make it possible to apply the simplified methods of the functions of influence which require to be able to collect the heat gradient correctly, it is thus not validated. An analysis of harmfulness of defect on healthy pricking in linear elasticity with ASPIC must be led on a grid of fine refinement which allows a faithful representation of the field of temperature and constraints during the transient.

Notice 2:

> *In the case of a cal linear elastic bottom on a fissured pricking (short crack), the presence of a fissured block very refined around the crack led, whatever the refinement of the grid of the pipes on both sides of the welding, with a faithful representation of the rate of refund of energy G during the transient. The grids of ASPIC with fine or coarse refinement are thus validated. From a practical point of view and in order to limit the computing times, one can be satisfied with a grid with coarse refinement.*

For the justification of the two remarks above, the reader will be able to consult the reference [1].

4.4 Keyword factor PIPE

All the coasts of the grid must be given in mm.

4.4.1 Operand E_BASE

♦ E_BASE = thickness

Value thickness of the pipe in the zone of connection with the body.

4.4.2 Operand DEXT_BASE

♦ DEXT_ BASES = diameter

Value of the diameter external of the pipe in the zone of connection with the body.

4.4.3 Operand L_BASE

♦ L_BASE = length

Value length of the base of the pipe counted starting from surface external of the body.

4.4.4 Operand L_CHANF

♦ L_CHANF = length

Value length of the chamfer.

4.4.5 Operand E_TUBU

♦ E_TUBU = thickness

Value thickness of the pipe to the top of the chamfer.

4.4.6 Operand DEXT_TUBU

♦ DEXT_TUBU = diameter

Value of the diameter external of the pipe with the top of the chamfer.

4.4.7 Operand Z_MAX

♦ Z_MAX = length

Value of the maximum dimension in Z of the pipe specifying the localization of the torque of effort, cf Appears 3-a.

This value must be higher than the value defined in the §3 and corresponding to the length of damping of the wave of inflection. If this dimension is not reached, a message of alarm not blocking is transmitted.

4.4.8 Operand TYPE

♦ TYPE =

The position of the welding defines.

/'TYPE_1' the bevel of the welding is located in the body
/'TYPE_2' the bevel of the welding is located in the pipe

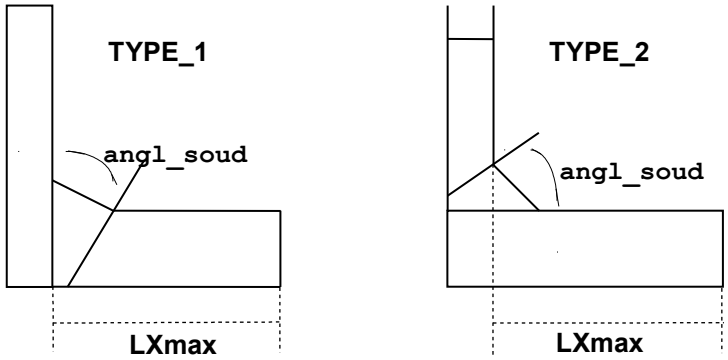


Figure 4.4.8-a: Definition of the position of the welding

4.4.9 Operand L_PENETR

◊ L_PENETR = length

Value length of penetration of the pipe counted starting from the internal skin of the body in the case of a penetrating pricking. By default, pricking is not penetrating (the length of penetration is worthless).
A length of nonworthless penetration is authorized only for the weldings of the type 1.
The case of **tilted cracks emerging in internal skin with a game not no one and a penetrating pricking is prohibited,** because in this case, one cannot net the corner of the penetrating part of the pipe. The user must then choose a null game (operand JEU_SOUD).

4.5 Keyword factor WELDING

4.5.1 Operand H_SOUD

♦ H_SOUD = height

Value height of the welding counted starting from surface external of the body for the weldings of the type 1 and of the pipe for the weldings of the type 2.

4.5.2 Operand ANGL_SOUD

♦ ANGL_SOUD = angle

Value of the angle of the welding, in degrees.

4.5.3 Operand JEU_SOUD

♦ JEU_SOUD = game

Value of the space located between the body and the pipe representing the game of the welding.

4.6 Keyword factor BODY

4.6.1 Operand E_CORP

♦ E_CORP = thickness

Value thickness of the body.

4.6.2 Operand DEXT_CORP

♦ DEXT_CORP = diameter

Value of the diameter external of the body.

4.6.3 Operand X_MAX

♦ X_MAX = length

Value of the maximum dimension in X of the body specifying the localization of the torque of effort, cf Appears 3-a.

This value must be higher than the value defined in the §3 and corresponding to the length of damping of the wave of inflection. If this dimension is not reached, a message of alarm not blocking is transmitted.

4.7 Keyword factor FISS_SOUDURE

Keyword specific to fissured prickings.

4.7.1 Operand TYPE

♦ TYPE =

The type of crack defines: long crack or short crack.

/'LONG' one considers the case of long but not very deep cracks (1/8 or 1/4 thickness)
/'SHORT' one considers the case of cracks of maximum depth equal to the half thickness of pricking

4.7.2 Operand CRACK

♦ CRACK =

Give the position of the crack

/'DEB_INT' emerging in internal skin
/'DEB_EXT' emerging in internal skin
/'NON_DEB' not emerging
/'THROUGH' crossing

4.7.3 Operand AXIS

◊ AXIS =

To be able to treat the case of the axisymmetric cracks ('YES') or not axisymmetric ('NOT') (if parameter fissures **long** exclusively).

Caution:

> *If the crack is axisymmetric (AXIS=' OUI') and if the crack is tilted (POSITION=' INCLINE'), the depth of the crack will be corrected only if ANGL_SOUD lies between 8 and 26 degrees, this whatever the type of the welding (TYPE_1 or TYPE_2). If the crack is axisymmetric and right (POSITION=' DROIT') the correction of depth is carried out whatever the value authorized of ANGL_SOUD .*

4.7.4 Operand AZIMUTH

♦ AZIMUTH = theta

Position of the center of the crack, counted positively starting from axis X of the body, in degrees.

4.7.5 Operand POSITION

♦ POSITION =

/ 'RIGHT' The crack is located at the interface between the pipe and the welding for a welding of the type 1 and at the interface between the body and the welding for a welding of the type 2.

/ 'INCLINES' The crack is located at the interface between the body and the welding for a welding of the type 1 and at the interface between the pipe and the welding for a welding of the type 2.

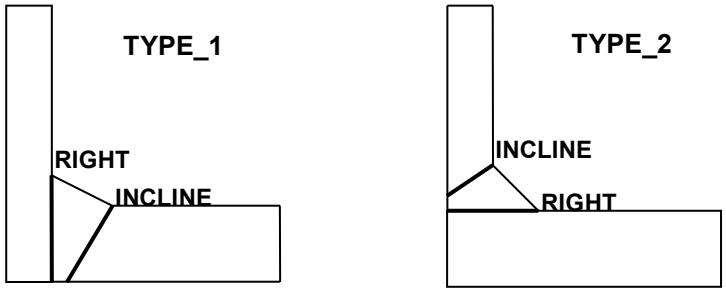


Figure 4.7.13-a: Definition of the position of a crack according to the type of the welding

4.7.6 Operand DEPTH

♦ DEPTH = has

If TYPE = 'LONG' has = depth of the crack if the crack is emerging

= half - depth of the crack if the crack is not emerging

If TYPE = 'SHORT' has = size of **small half centers** elliptic cracks

= depth of the crack if the crack is emerging

= half-depth if the crack is not emerging

Note:

In the case of a crack of the type 'SHORT' and emerging ('DEB_INT' or 'DEB_EXT'), the real depth of the crack in the generated grid is calculated. That thus makes it possible to the user to check coherence between its data input and the grid obtained. This information appears in the file MESSAGE, at the end of the messages associated with the macro-order MACR_ASPIC_MAIL:

```
<MACR_ASPIC_MAIL> DEPTH OF THE CRACK IN THE GRID: 29.99
```

4.7.7 Operand LENGTH

◊ LENGTH = 2c

If TYPE = 'LONG' length of the crack

If TYPE = 'SHORT' size of **main roads** elliptic cracks

For the short cracks (elliptic), a/c must be ranging between 1 and 0.2.
When the crack is axisymmetric (AXIS), it is useless to give a length, and this one is then not taken into account. This operand is on the other hand obligatory in the case of a nonaxisymmetric crack.

4.7.8 Operand LIGA_INT

◊ LIGA_INT

Defines the length in mm of the interior ligament for a crack not emerging.

4.7.9 Operand ANGL_OUVERTURE

◊ ANGL_OUVERTURE = eps

The half angle of opening of the crack in degrees (0 by default) defines.

4.7.10 Operand RAYON_TORE

◊ RAYON_TORE = rc0

Ray of the torus of the zone with imposed grid of type radiating around the bottom of crack, cf Figure 4.7.10.
For the long cracks, this parameter is calculated automatically.

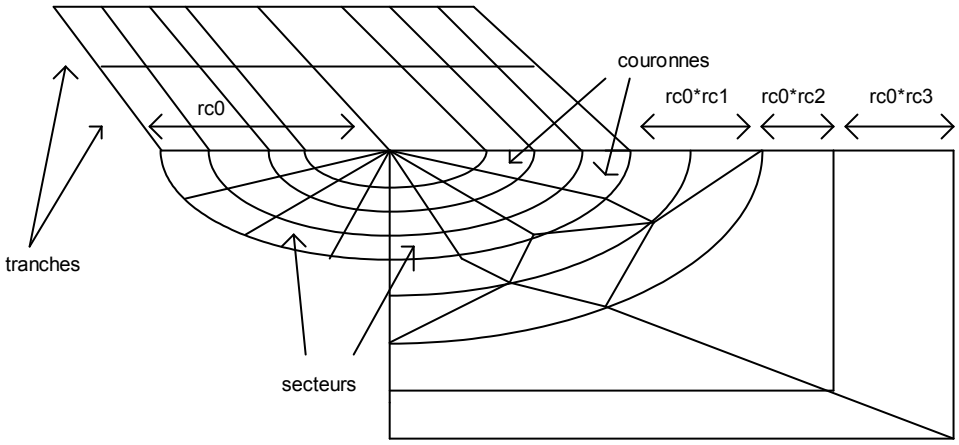


Figure 4.7.10: Parameters of the basic grid radiating of crack

4.7.11 Operand COEF_MULT_RC1

◊ COEF_MULT_RC1 = rc1

Multiplying coefficient of the parameter rc0 allowing déraffinement to define the thickness of the crown of sectors (if parameter fissures **short** exclusively, with two values by default according to the refinement of the grid).

4.7.12 Operand COEF_MULT_RC2

◊ COEF_MULT_RC2 = rc2

Multiplying coefficient of the parameter rc0 allowing to define the thickness of the first crown of déraffinement of the slices (if parameter fissures **short** exclusively, with two values by default according to the refinement of the grid).

4.7.13 Operand COEF_MULT_RC3

◊ COEF_MULT_RC3 = rc3

Multiplying coefficient of the parameter rc0 allowing to define the thickness of the second crown of déraffinement of the slices (if parameter fissures **short** exclusively, with two values by default according to the refinement of the grid).

4.7.14 Operand NB_SECTEUR

◊ NB_SECTEUR = NS

Many sectors on **90°**, which is worth 2 or 4 in general.

4.7.15 Operand NB_COURONNE

◊ NB_COURONNE = nc

Many crowns, which are worth 3 or 4 in general.

4.7.16 Operand NB_TRANCHE

◊ NB_TRANCHE = NT

Many slices corresponding to one **elliptic quarter of crack**, which is worth 8 or 16 in general (16 or 32 for the cracks with strong eccentricity).
For the long cracks, the minimal value of 8 is imposed.

4.8 Keyword factor IMPRESSION

4.8.1 Operand FILE

Name given to the print file. By default, the print file is the file of type grid ASTER (.mast type). It is thus important to put this kind of file in the profile of study if one uses the options by default of the keyword IMPRESSION.

4.8.2 Operand UNIT

Logical number of unit associated with the file.

4.8.3 Operand FORMAT

Specify the format of impression of the grid of pricking. By default, the format is ASTER.

4.8.4 Operand VERSION

File IDEAS has a structure different according to the version from the software. This operand is thus licit only when the operand FORMAT is worth IDEAS. By default, VERSION is worth 5. Only versions 4 and 5 are supported.

4.8.5 Operand NIVE_GIBI

File CASTEM has a structure different according to the level from exit of the Gibi software. This operand is thus licit only when the operand FORMAT is worth CASTEM. By default, VERSION is worth 10. Only levels 3 and 10 are supported.

4.9 Operand INFORMATION

◊ INFORMATION = /1 , [DEFECT]

/2 , [I]

Level of information.
To have the detail of the operators called by the macro-order in the file message, it is necessary to specify IMPR_MACRO=' OUI' in the order BEGINNING.

4.10 Parameters by default for the short cracks

- two values according to the refinement of the grid,
- variable values according to the eccentricity of the crack.

	a/c > 0.4999		a/c > 0.3499		a/c < 0.3499	
standard grid	large	end	large	end	large	end
NT	8	16	8	16	16	32
nc	3	4	3	4	3	4
NS	2	4	2	4	2	4
ndt (*)	1	2	1	2	2	2
nsdt (*)	2	4	2	4	4	4
rc0	a*0.12	a*0.10	a*0.12	a*0.10	a*0.08	a*0.08
rc1	1.2	1.0	1.2	1.0	1.2	1.0
rc2	1.4	1.2	1.4	1.2	1.4	1.2
rc3	*	2.2	*	2.0	2.5	2.0
beta (*)	1	1	1	1	1	1
alpha (*)	0	0	0.4	0.4	0.8	0.8

Table 4.10-1: Parameters by default of the short cracks

(*) Parameters nonaccessible to the user

4.11 Parameters by default for the long cracks

- two values according to the refinement of the grid

standard grid	large	end
nc	3	4
NS	2	4
ndt (*)	2	3
rc0	has (ndt+1)	has (ndt+1)
f_etir_f (*)	$30*L^{square}/L^{pricking}$	$15*L^{square}/L^{pricking}$
f_etir_p (*)	$60*L^{square}/L^{pricking}$	$30*L^{square}/L^{pricking}$

Table 4.11-1: Parameters by default of the long cracks

(*) Parameters nonaccessible to the user

4.12 Digital values for the geometrical parameters

The values of the geometrical parameters must be understood in the following forks:

21 mm < epC < 60 mm	epC	→	E_CORP,
406 mm < DEC < 1500 mm	DEC	→	DEXT_CORP,
141 mm < epT1 < 70 mm	epT1	→	E_BASE,
8 mm < epT2 < 56 mm	epT2	→	E_TUBU,
140 mm < DeT1 < 880 mm	DeT1	→	DEXT_BASE,
114 mm < DeT2 < 812.8 mm	DeT2	→	DEXT_TUBU,
41 mm < d1 < 825 mm	d1	→	L_BASE,
22 mm < d2 < 135 mm	d2	→	L_CHANF,
15 mm ≤ H ≤ 30 mm according to UTO/SIS	H	→	H_SOUD,
0 mm < game < 20 mm	game	→	JEU_SOUD,
15° < alpha < 50°	alpha	→	ANGL_SOUD.

5 Topological grid and groups

The macro order MACR_ASPIC_MAIL generate the grid [Figure 5-a].

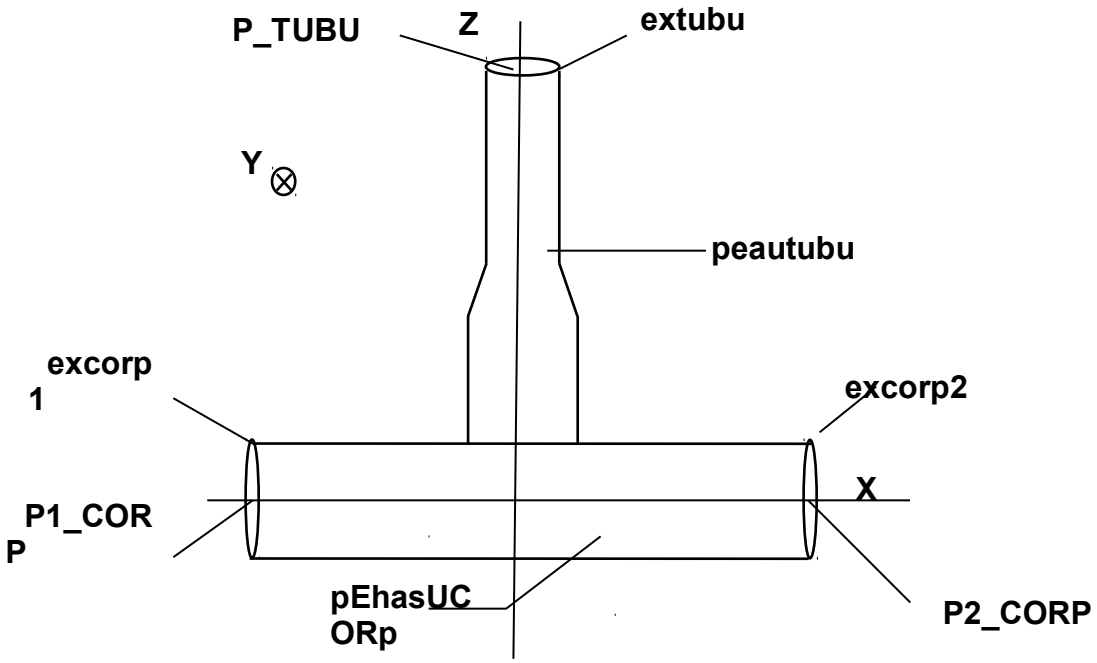


Figure 5-a: Grid obtained

One notes:

- peautubu : interior skin of the pipe,
- peaucorp : interior skin of the body,
- excorp1 : the extreme section of the body, located at the dimension X = - Xmax,
- excorp2 : the extreme section of the body, located at the dimension X = +Xmax,
- P1_CORP : the node located at the center of excorp1,
- P2_CORP : the node located at the center of excorp2,
- extubu : the extreme section of the pipe, located at the dimension Z = Zmax,
- P_TUBU : the node located at the center of extubu.

Note:

The groups of meshs TUBU, BODIES and SOUD are present only in the case of healthy pricking. They are replaced by TUBU and SOUDCORP or SOUDTUBU and BODY, according to the type of the welding and the position of the crack (see the documentation of MACR_ASPIC_CALC , [§3.5.1]).

For postprocessings of healthy pricking, the nodes located at the ends of each segment, the various azimuths, whose whole forms an interface between the welding and the body, on the one hand, and between the welding and the pipe, on the other hand, are created so that one can record the normal and tangential constraints there.

For fissured prickings, one notes also the following objects:

- levrtubu : the lip on the crack, the side pipe (surface meshs),
- levrcorp : the lip on the crack, the side body (surface meshs),
- fondfiss : bottom of crack (meshs SEG3), in the case of the unspecified emerging cracks or not emerging short which have one bottom of crack,
- fond_sup : bottom of crack (meshs SEG3) higher (external side skin) in the case as of long or axisymmetric cracks not emerging which have two funds of crack,
- fond_inf : bottom of crack (meshs SEG3) lower (side skin interns) in the case of the long or axisymmetric cracks not emerging which have two funds of crack.

Pfondfis, pfondsup and pfondinf are the groups of meshs POI1 respectively associated with the fondfiss groups, fond_sup and fond_inf.

The table below presents the groups of meshs suitable for the breaking process:

crack	**not emerging**	**crack**	**emerging**
name of Gibi object	description	name of Gibi object	description
vfcos1	1/8 **v**olume block **F**issuré **Co**rps **S**uperior side Y0	vfco1	1/4 **v**olume block **F**issuré **Co**rps on the side Y0
vftus1	1/8 **v**olume block **F**issuré **you**bulure **S**uperior side Y0	vftu1	1/4 **v**olume block **F**issuré **you**bulure on the side Y0
torecos1	1/8 of torus pertaining to vfcos1	toreco1	1/4 of torus pertaining to vfco1
toretus1	1/8 of torus pertaining to vftus1	toretu1	1/4 of torus pertaining to vftu1
vfcos2	1/8 **v**olume block **F**issuré **Co**rps **S**uperior side Y**<**0	vfco2	1/4 **v**olume block **F**issuré **Co**rps on the side Y**<**0
vftus2	1/8 **v**olume block **F**issuré **you**bulure **S**uperior side Y**<**0	vftu2	1/4 **v**olume block **F**issuré **you**bulure on the side Y**<**0
torecos2	1/8 of torus pertaining to vfcos2	toreco2	1/4 of torus pertaining to vfco2
toretus2	1/8 of torus pertaining to vftus2	toretu2	1/4 of torus pertaining to vftu2
vfcoi1	1/8 **v**olume block **F**issuré **Co**rps **I**nferior side Y0		
vftui1	1/8 **v**olume block **F**issuré **you**bulure **I**nferior side Y0		
torecoi1	1/8 of torus pertaining to vfcoi1		
toretui1	1/8 of torus pertaining to vftui1		
vfcoi2	1/8 **v**olume block **F**issuré **Co**rps **I**nferior side Y**<**0		
fvtui2	1/8 **v**olume block **F**issuré **you**bulure **I**nferior side Y**<**0		
torecoi2	1/8 of torus pertaining to vfcoi2		
toretui2	1/8 of torus pertaining to vftui2		

Table 5-1: Location of geometrical entities for the breaking process

The other groups of meshs, not specified here, are used with the geometrical transformation of the square into pricking, (sticking together of surfaces and suppression of the double nodes) and for the automatic calculation of the basic effect, in the macro-orders.

For healthy prickings:

one notes for the azimuth n°x (X ranging between 1 and 48 for the refined grids and between 1 and 40 for the coarse grids):

- nedx : node external of the right segment,
- nidx : interior node of the right segment,
- neix : node external of the inclined segment,
- niix : interior node of the inclined segment,
- ldx : line going of nidx with nedx,
- lix : line going of niix with neix.

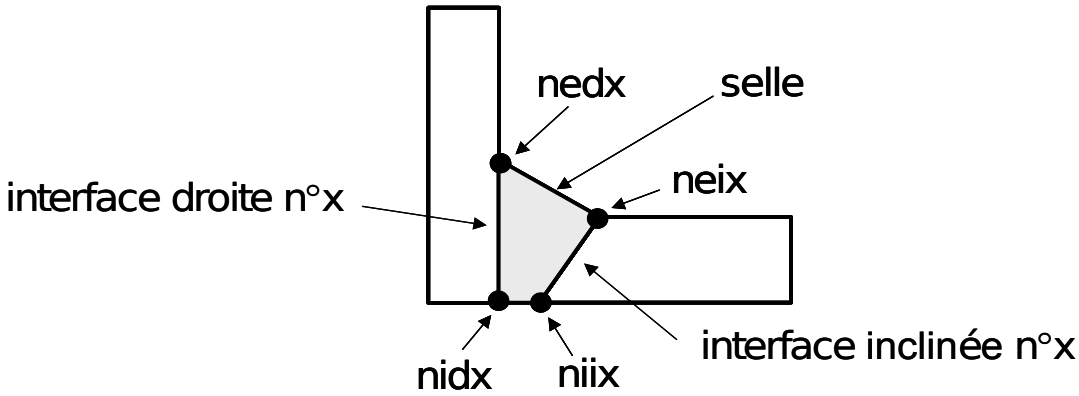


Figure 5-b: Names of the groups of nodes to the azimuth n°x of healthy pricking

The classification of the azimuths (from 1 to 40 for the coarse grids or from 1 to 48 for the fine grids) is done in the trigonometrical direction around axis Z starting from axis X of the body.

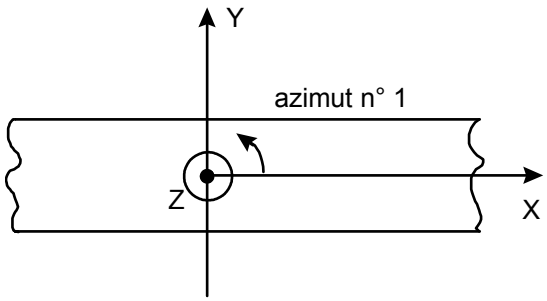


Figure 5-c: Classification of the azimuths for healthy prickings

6 Example

Besides the examples described here one will be able to consult the command files (file .comm) cases tests. The latter are in the repertoire “astest” of the installation and bear the names aspic*.

```
MA=MACR_ASPIC_MAIL (

             EXEC_MAILLAGE=_F (  SOFTWARE = 'GIBI2000'),

             TUBULURE=_F (  E_BASE = 60.0,
                            DEXT_BASE = 872.0,
                            L_BASE = 298.0,
                            L_CHANF = 102.0,
                            TYPE=' TYPE_1',
                            E_TUBU = 27.0,
                            DEXT_TUBU = 812.8,
                            Z_MAX = 3398.2),

             RAFF_MAIL=' GROS',

             SOUDURE=_F (  H_SOUD = 15.0,
                           ANGL_SOUD = 25.0,
                           JEU_SOUD = 10.0),

             CORPS=_F (  E_CORP = 60.0,
                         DEXT_CORP = 1500.0,
                         X_MAX = 4177.2),

             FISS_SOUDURE=_F (  TYPE = 'LONG',
                                DEPTH = 30.0,
                                LENGTH = 300.0,
                                AZIMUTH = 0.0,
                                POSITION = 'INCLINES',
                                CRACK = 'DEB_INT'),

             IMPRESSION=_F (
                   FILE   = 'FICH_MA',
                   UNIT     = 37,
                   FORMAT    = 'CASTEM',
                        )
                   )
```

7 Bibliography

[1] S. MUSI. Tool - trade ASPIC – Validations of the grids for the calculation of the transients thermics. Note SEPTEN E-N-T-MS/00-01108-A of the 1/25/2001.