



应用实例:

1、基准为单平面的孔组位置度评价(允许旋转和平移)

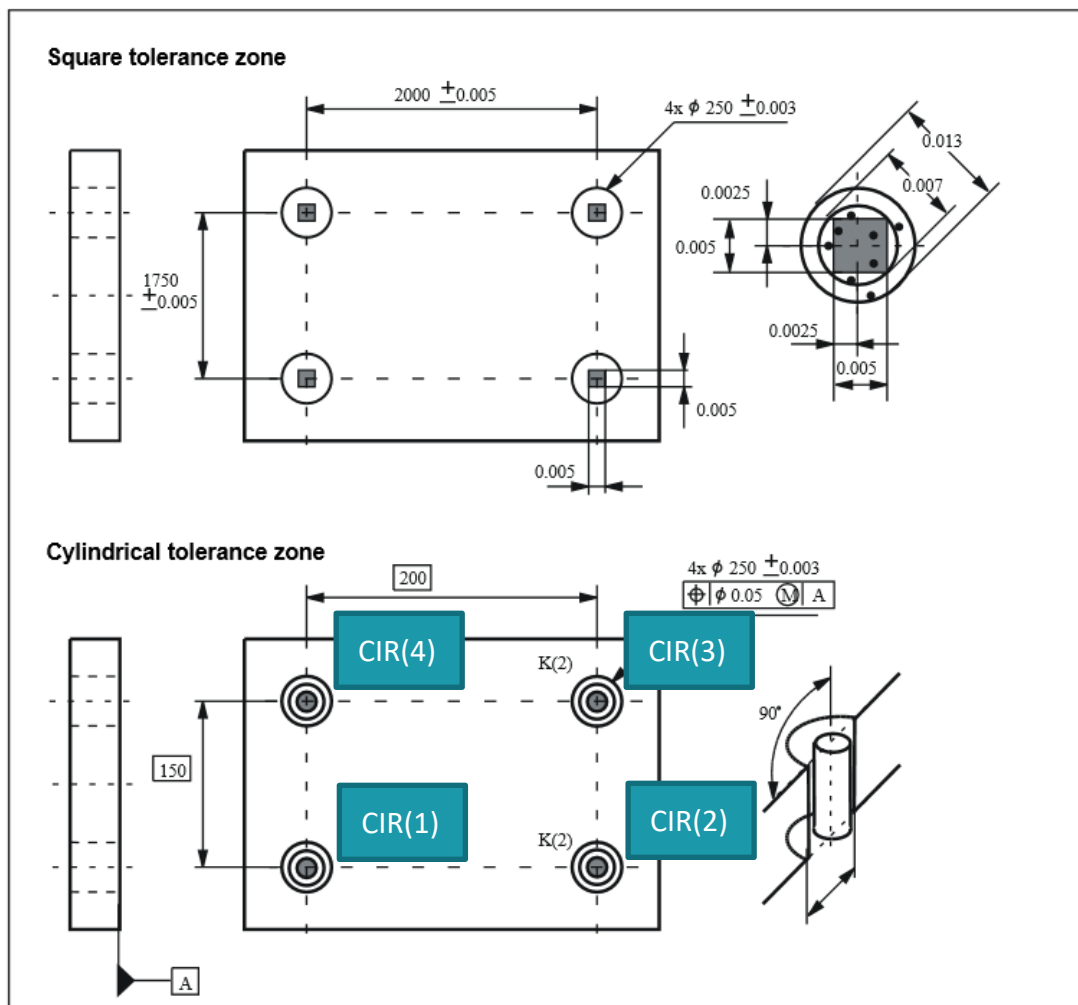


图 1、公差带为方形或者圆柱形的孔组位置度

对于只有一个面基准 A 位置评估, 该基准确定孔组评价坐标系的空间方向。单个孔可以测量为圆形或者圆柱形。该位置度主要控制孔组相对于基准的垂直度。





QUINDOS 的评价过程如下:

1、测量基准平面 (Datum_A)

```
MEPLA (NAM=Datum_A, CSY=REFR$CSY, ITY=GSS)
```

2、测量被评价孔组 (CIR(1)\CIR(2)\CIR(3)\CIR(4)), 投影平面为 Datum_A

```
MECIR (NAM=(CIR(1)), CSY=CSY, PRO=Datum_A, PTY=EX)
```

```
MECIR (NAM=(CIR(2)), CSY=CSY, PRO=Datum_A, PTY=EX)
```

```
MECIR (NAM=(CIR(3)), CSY=CSY, PRO=Datum_A, PTY=EX)
```

```
MECIR (NAM=(CIR(4)), CSY=CSY, PRO=Datum_A, PTY=EX)
```

Measure circle

Element: [CIR(1)]

☐ Calculate nominal element from nominal points

Coordinate system: CSY

Mode: ☒ Measure ☒ Evaluate ☒ Calculate

Projection into: Datum_A

Calculation type: ☒ Bestfit (Gauss) ☐ Minimum (Chebyshev) ☐ MaxInscribed ☐ Minimum Circumscribed ☐ Minimum Circumscribed on Arc

Message/Image/Sound: []

Delete first: ☐ Points ☐ Evaluations

3、使用其中两个圆构造直线 (AXI)

```
COLPTS (NAM=AXI, CSY=REFR$CSY, ELE=(CIR(1), CIR(2)), TYP=AXI, EVA=N)
```





4、建立坐标系

基准面 Datum_A 空间找正、轴线 AXI 水平旋转

BLDCSY (NAM=CSY(1), SPA=Datum_A, SDR=+Z, PLA=AXI, PDR=+X, XZE=CIR(1), YZE=CIR(1), ZZE=Datum_A)

Build coordinate system

New coordinate system: CSY(1)
☐ Create CAD coord.system

Spatial Alignment: Datum_A Axis: +Z

Planar Alignment: AXI Axis: +X

Origin:
X: CIR(1)
Y: CIR(1)
Z: Datum_A

Extended ...

5、使用 COLPTS 命令，搜集所有测量的孔组圆，并命名为 ACTPOS

COLPTS (NAM=ACTPOS, CSY=CSY(1), ELE=(CIR(1), CIR(2), CIR(3), CIR(4)))

Collect calculated points (ACT)

Result element: ACTPOS
Coordinate system: CSY(1)

☒ Delete existing points
☐ Create CAD
☐ Calculate

Elements of which the calculated points will be collected:
CIR(1), CIR(2), CIR(3), CIR(4)

注意圆的搜集顺序





Name : LDBELE:ACTPOS - Type : - Csy : LDBCsy:CSY(1) - IsNotBoundToCad BoundTo :							
EditAPt							
X-Coord	Y-Coord	Z-Coord	RotTbl	U-Dir	V-Dir	W-Dir	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
200.0008	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	
200.0054	149.9998	0.0000	0.0000	0.0000	0.0000	1.0000	
0.0018	150.0028	0.0000	0.0000	0.0000	0.0000	1.0000	

- 6、使用 DFNELE 命令定义一个新的空元素，命名为 NOMPOS，该新元素用于存放孔组每个圆的理论圆心位置，该元素类型必须为 2D 曲线

DFNELE (NAM=NOMPOS, TYP=2DE, CSY=CSY(1), DEL=*)

Define element (ELE)

Element
NOMPOS
☐ Create in NDB as well

Coordinate system
CSY(1)

Type of element
2D Profile
元素类型为 2D 曲线

Delete...
☐ No ☐ NPT's only ☒ All

Copy element for evaluations





- 7、使用 EDTAPT 命令，按照 ACTPOS 元素的搜集顺序，依次输入每个圆的圆心理论位置

EDTAPT (NAM=NOMPOS, RCO=N)

The 'Edit objects' dialog box is shown. It has a title bar 'Edit objects'. Inside, there are several fields: 'Object name' with a dropdown menu showing 'NOMPOS', 'Object type' with a dropdown menu showing 'ELE', 'Object subtype' with a dropdown menu showing 'APT', and 'Display Mask' with a dropdown menu. There are also two checkboxes: 'Create only?' and 'Visualisation incl. radius correction'. A large green pencil icon is visible in the background of the dialog box.

注意理论圆心坐标输入顺序与实际圆心收集的顺序保持一致，具体如下图。

Name : LDBELE:NOMPOS - Type : 2DE - Csy : LDBCSY:CSY(1) - IsNotBoundToCad | BoundTo : |

Edit Apt	X-Coord	Y-Coord	Z-Coord	RotTbl	U-Dir	V-Dir	W-Dir
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
	200.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
	200.0000	150.0000	0.0000	0.0000	0.0000	0.0000	1.0000
	0.0000	150.0000	0.0000	0.0000	0.0000	0.0000	1.0000

- 8、使用 DFNQUE 命令定义一个新的队列，命名为\$POS, 其中 MAXPOS 用于存放孔组位置度每个孔中的最差位置度结果，POS (1), POS (2), POS (3), POS (4) 分别依次存放最佳拟合后对应孔的位置度结果

DFNQUE (NAM=\$POS, MBR=(MAXPOS, POS (1), POS (2), POS (3), POS (4) ,), DEL=Y)

The 'Define name list' dialog box is shown. It has a title bar 'Define name list'. Inside, there are two main sections: 'Name' and 'Members'. The 'Name' section has a dropdown menu showing '\$POS' and a checkbox 'Delete old content'. The 'Members' section has a text input field containing 'MAXPOS.POS(1).POS(2).POS(3).POS(4).'. There is also a 'Members' label above the input field.





9、使用 GAUG2D 命令进行孔组位置度评价

GAUG2D (ACT=ACTPOS, NOM=NOMPOS, RES=\$POS, TRA=TRA, TOL=0.01, MMA=N)

Bore Pattern Fitting

List of result elements:

Result transformation:

Measured element:

Nominal element:

Measuring plane: ☒ XY ☐ YZ ☐ ZX

Fit to ...: ☒ Tolerance circle ☐ Nominal position

Tolerance of elements:

Material condition for holes: ☐ MMC ☐ LMC ☒ No

1st Datum:

2nd Datum:

Evaluation range for cylinder: Lower limit Upper limit

Fixed parameters ...: ☐ Abscissa ☐ Ordinate ☐ Rotation

Iteration control ...: Maximum number Limit value

Copy element for evaluations:

孔组评价结果元素

实际圆心点集合

理论圆心点集合

孔组测量评价平面

公差

拟合方式设定

文本报告

MAXPOS		ZDE					
POSITN		0.0042	0.0000	0.0100	0.0000	0.0042	
POS (1)		ZDE					
Localisation		0.0042	0.0000	0.0100	0.0000	0.0042	
X_CORR		-0.0015					
Y_CORR		-0.0015					
POS (2)		ZDE					
Localisation		0.0029	0.0000	0.0100	0.0000	0.0029	
X_CORR		-0.0007					
Y_CORR		0.0013					
POS (3)		ZDE					
Localisation		0.0042	0.0000	0.0100	0.0000	0.0042	
X_CORR		0.0018					
Y_CORR		0.0011					
POS (4)		ZDE					
Localisation		0.0042	0.0000	0.0100	0.0000	0.0042	
X_CORR		-0.0017					
Y_CORR		0.0012					





10、 使用 GAUG2D_P 进行孔组位置度绘图

GAUG2D_P (RES=\$POS, NOM=NOMPOS, MFC=2000, TOL=0.01, MMA=N, PFR=HP_A4Q, WKP=Example_1)

Plot Bore Pattern Fitting

List of result elements: \$POS

Nominal element: NOMPOS

Plot factors:
Error magnification: 2000
Magnification factor:

Measuring plane: ☒ XY ☐ YZ ☐ ZX

Tolerance of holes:
Position tolerance: 0.01

Material condition for holes:
☐ MMC ☐ LMC ☒ No

Datums specified?:
☐ 1st Datum
☐ 2nd Datum

Name of workpiece (WKP): Example_1

Name of plot form: HP_A4Q

理论圆心点集合

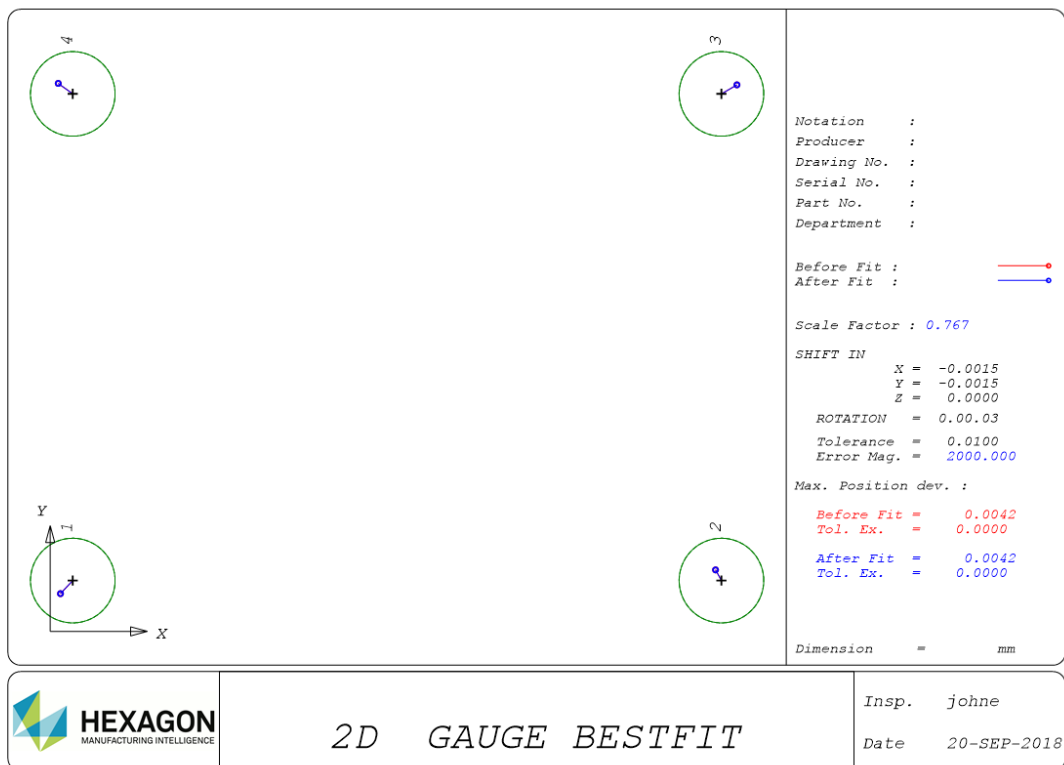
测量评价平面

公差

孔组评价结果元素

放大倍率

图形报告:





样例程序:

```
START (WKP=Example_1, RPO=Y, TOP=N, EDT=N)

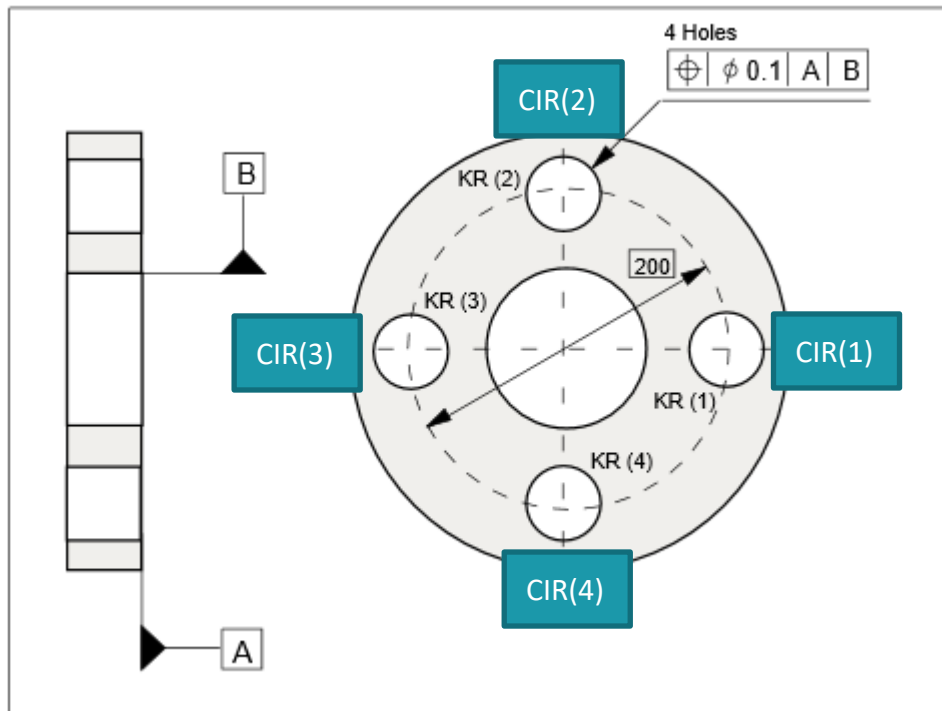
UseEleView
!测量基准平面
MEPLA (NAM=Datum_A, CSY=REFR$CSY, ITY=GSS)
!测量孔组圆
MECIR (NAM={CIR(1)}, CSY=CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM={CIR(2)}, CSY=CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM={CIR(3)}, CSY=CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM={CIR(4)}, CSY=CSY, PRO=Datum_A, PTY=EX)
!构造直线
COLPTS (NAM=AXI, CSY=REFR$CSY, ELE={CIR(1), CIR(2)}, TYP=AXI, EVA=N)
!建立坐标系
BLDCSY (NAM=CSY(1), SPA=Datum_A, SDR=+Z, PLA=AXI, PDR=+X, XZE=CIR(1), YZE=CIR(1), ZZE=Datum_A)
!搜集孔组圆实际圆心点
COLPTS (NAM=ACTPOS, CSY=CSY(1), ELE={CIR(1), CIR(2), CIR(3), CIR(4)})
!定义新元素
DFNELE (NAM=NOMPOS, TYP=2DE, CSY=CSY(1), DEL=*)
!编辑新元素APT
EDTAPT (NAM=NOMPOS, RCO=N)
!定义评价队列
DFNQUE (NAM=$POS, MBR={MAXPOS, POS(1), POS(2), POS(3), POS(4)}, DEL=Y)
!孔组位置度评价
GAUG2D (ACT=ACTPOS, NOM=NOMPOS, RES=$POS, TRA=TRA, TOL=0.01, MMA=N)
!孔组位置度绘图
GAUG2D_P (RES=$POS, NOM=NOMPOS, MFC=2000, TOL=0.01, MMA=N, PFR=HP_A4Q, WKP=Example_1)

STOP
SAVE (FIL=D:\软件应用\QUINDOS应用\QUINDOS培训\培训教材\孔组位置度\Example 1, KEP=0)
```





2、一个孔做基准的孔组位置度



1、依据图纸建立坐标系

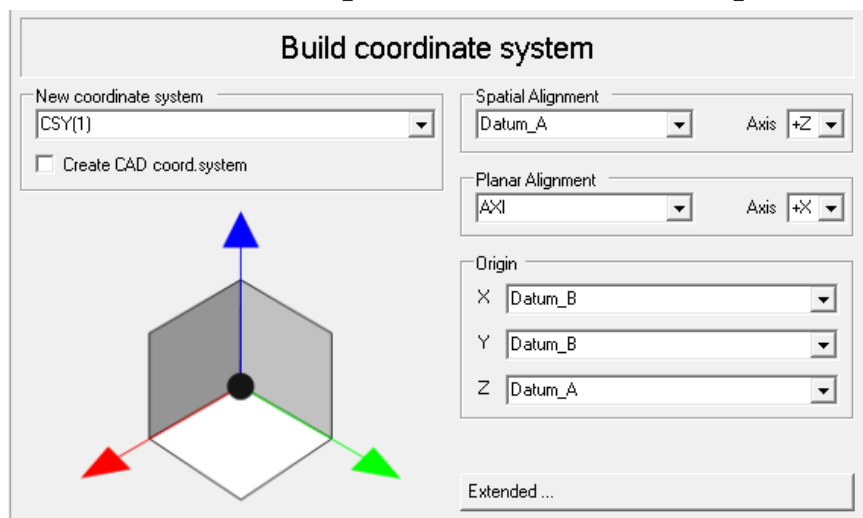
```
MEPLA (NAM=Datum_A, CSY=REFR$CSY, ITY=GSS)

MECIR (NAM=Datum_B, CSY=REFR$CSY, PRO=Datum_A, PTY=EX)

MECIR (NAM=CIR(1), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM=CIR(2), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM=CIR(3), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM=CIR(4), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)

COLPTS (NAM=AXI, CSY=REFR$CSY, ELE=(Datum_B, CIR(1)), TYP=AXI, EVA=N)

BLDCSY (NAM=CSY(1), SPA=Datum_A, SDR=+Z, PLA=AXI, PDR=+X, XZE=Datum_B, YZE=Datum_B, ZZE=Datum_A)
```





2、使用 COLPTS 命令，搜集所有测量的孔组圆，并命名为 ACTPOS

COLPTS (NAM=ACTPOS, CSY=CSY(1), ELE={CIR(1), CIR(2), CIR(3), CIR(4)})

Collect calculated points (ACT)

Result element: ACTPOS Coordinate system: CSY(1)

☒ Delete existing points
☐ Create CAD
☐ Calculate

Elements of which the calculated points will be collected: CIR(1), CIR(2), CIR(3), CIR(4)

注意圆的搜集顺序

Name : LDBELE:ACTPOS - Type : - Csy : LDBCSY:CSY(1) - IsNotBoundToCad | BoundTo : |

Edit tAPt

X-Coord	Y-Coord	Z-Coord	RotTbl	U-Dir	V-Dir	W-Dir
99.9965	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
0.0020	99.9948	0.0000	0.0000	0.0000	0.0000	1.0000
-99.9968	-0.0032	0.0000	0.0000	0.0000	0.0000	1.0000
0.0038	-99.9977	0.0000	0.0000	0.0000	0.0000	1.0000

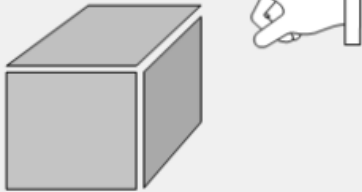
3、使用 DFNELE 命令定义一个新的空元素，命名为 NOMPOS，该新元素用于存放孔组每个圆的理论圆心位置，该元素类型必须为 2D 曲线

DFNELE (NAM=NOMPOS, TYP=2DE, CSY=CSY(1), DEL=*)





Define element (ELE)

Element NOMPOS	Coordinate system CSY(1)
☐ Create in NDB as well	Type of element 2D Profile
	Delete... ☐ No ☐ NPT's only ☒ All
	Copy element for evaluations

元素类型为 2D 曲线

- 4、使用 EDTAPT 命令，按照 ACTPOS 元素的搜集顺序，依次输入每个圆的圆心理论位置

EDTAPT (NAM=NOMPOS, RCO=N)

Edit objects

Object name NOMPOS	Object type ELE
☐ Create only? ☐ Visualisation incl. radius correction	Object subtype APT
	Display Mask

注意理论圆心坐标输入顺序与实际圆心收集的顺序保持一致，具体如下图。





Name : LDLELE:NOMPOS - Type : 2DE - Csy : LDBCSY:CSY(1) - IsNotBoundToCad | BoundTo : |

Edit tAPt

X-Coord	Y-Coord	Z-Coord	RotTbI	U-Dir	V-Dir	W-Dir
100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
0.0000	100.0000	0.0000	0.0000	0.0000	0.0000	1.0000
-100.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000
0.0000	-100.0000	0.0000	0.0000	0.0000	0.0000	1.0000

- 5、使用 DFNQUE 命令定义一个新的队列，命名为\$POS, 其中 MAXPOS 用于存放孔组位置度每个孔中的最差位置度结果，POS (1), POS (2), POS (3), POS (4) 分别依次存放最佳拟合后对应孔的位置度结果

DFNQUE (NAM=\$POS, MBR=(MAXPOS, POS (1), POS (2), POS (3), POS (4)), DEL=Y)

Define name list

Name
\$POS ☒ Delete old content

Members
MAXPOS.POS(1).POS(2).POS(3).POS(4).

- 6、使用 GAUG2D 命令进行孔组位置度评价

GAUG2D (ACT=ACTPOS, NOM=NOMPOS, RES=\$POS, TRA=TRA, ITY=CEB, TOL=0.01, DT1=Datum_B.\$PT, MMC=N, MMA=N)

Bore Pattern Fitting

List of result elements
\$POS ☒ Evaluate ☐ Create CAD

Result transformation
TRA

Measured element
ACTPOS

Nominal element
NOMPOS

Measuring plane
☒ XY ☐ YZ ☐ ZX

Fit to ...
☒ Tolerance circle ☐ Nominal position

Tolerance of elements
Position tolerance 0.01
Material condition for holes :
☐ MMC ☐ LMC ☒ No

1st Datum
Datum_B.\$PT ☐ MMC ☐ LMC ☒ No

2nd Datum
[]

Fixed parameters ...
☐ Abscissa ☐ Ordinate ☐ Rotation

Iteration control ...
Maximum number []
Limit value []

Copy element for evaluations
[]

Evaluation range for cylinder
Lower limit []
Upper limit []

填写基准



NAMEPOS		ZDE					
	Localisation	0.0111	0.0000	0.0100	0.0000	0.0111	
	X_SHIFT	0.0000					
	Y_SHIFT	0.0000					
	ROTATN	0.0111					
POS (1)		ZDE					
	Localisation	0.0070	0.0000	0.0100	0.0000	0.0070	
	X_CORR	-0.0035					
	Y_CORR	0.0000					
POS (2)		ZDE					
	Localisation	0.0111	0.0000	0.0100	0.0000	0.0111	
	X_CORR	0.0020					
	Y_CORR	-0.0052					
POS (3)		ZDE					
	Localisation	0.0090	0.0000	0.0100	0.0000	0.0090	
	X_CORR	0.0032					
	Y_CORR	-0.0032					
POS (4)		ZDE					
	Localisation	0.0089	0.0000	0.0100	0.0000	0.0089	
	X_CORR	0.0038					
	Y_CORR	0.0023					

7、使用 GAUG2D_P 进行孔组位置度绘图

Plot Bore Pattern Fitting

List of result elements
\$POS

Nominal element
NOMPOS

Plot factors:
Error magnification 2000
Magnification factor

Measuring plane
☒ XY ☐ YZ ☐ ZX

Tolerance of holes
Position tolerance 0.01
Material condition for holes :
☐ MMC ☐ LMC ☒ No

Datums specified?
☒ 1st Datum
☐ 2nd Datum

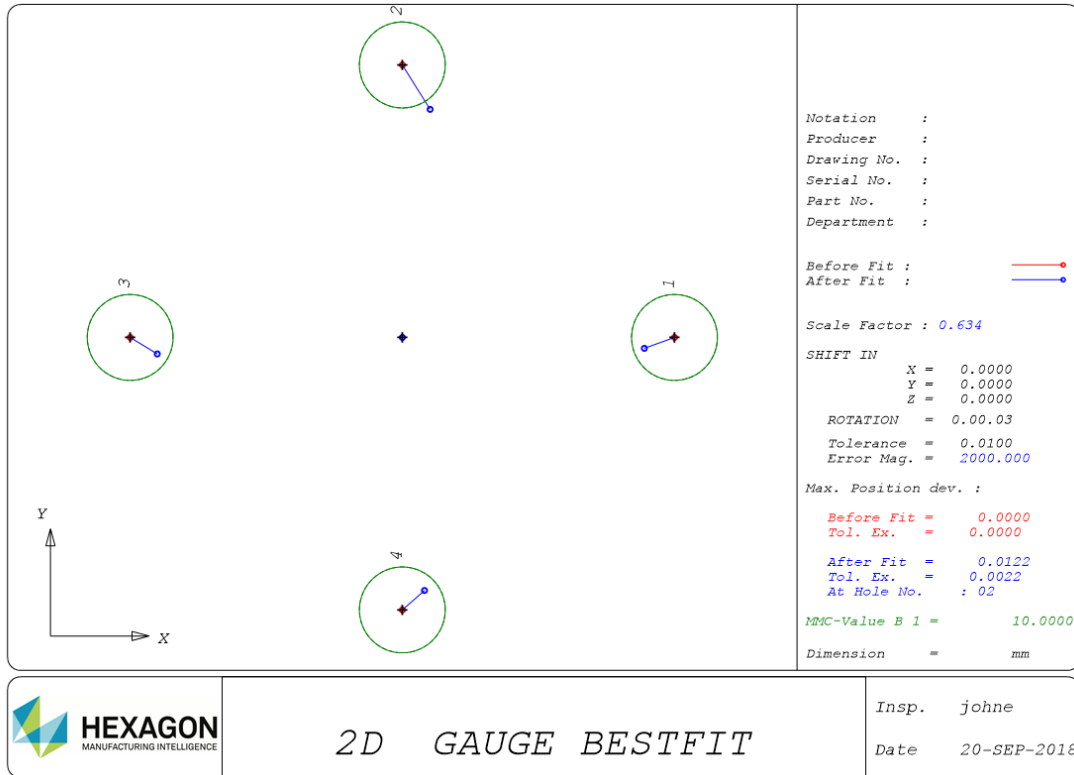
Name of workpiece (WKP)
Example_2

Name of plot form
HP_A4Q





海克斯康
HEXAGON
MANUFACTURING INTELLIGENCE
制造智能



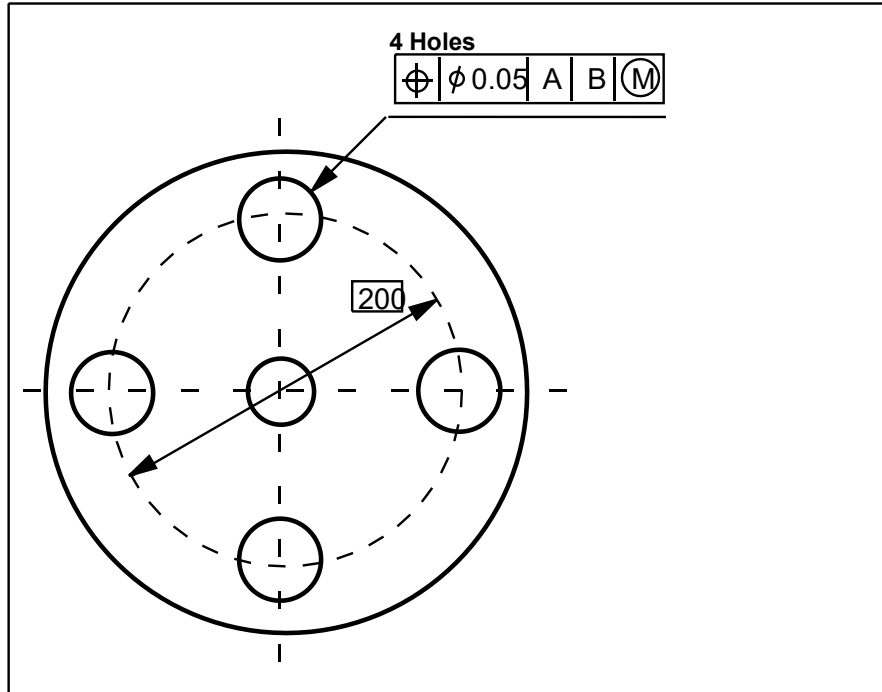
样例程序

```
MEPLA (NAM=Datum_A, CSY=REFR$CSY, ITY=GSS)
MECIR (NAM=Datum_B, CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM=CIR(1), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM=CIR(2), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM=CIR(3), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM=CIR(4), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
COLPTS (NAM=AXI, CSY=REFR$CSY, ELE=(Datum_B, CIR(1)), TYP=AXI, EVA=N)
BLDCSY (NAM=CSY(1), SPA=Datum_A, SDR=+Z, PLA=AXI, PDR=+X, XZE=Datum_B, YZE=Datum_B, ZZE=Datum_A)
COLPTS (NAM=ACTPOS, CSY=CSY(1), ELE=(CIR(1), CIR(2), CIR(3), CIR(4)))
DFNELE (NAM=NOMPOS, TYP=2DE, CSY=CSY(1), DEL=*)
EDTAPT (NAM=NOMPOS, RCO=N)
DFNQUE (NAM=$POS, MBR={MAXPOS, POS(1), POS(2), POS(3), POS(4)}, DEL=Y)
GAUG2D (ACT=ACTPOS, NOM=NOMPOS, RES=$POS, TRA=TRA, ITY=CEB, FIX=(Y,Y), TOL=0.01, DT1=Datum_B.$PT, MMC=N, MMA=N)
GAUG2D_P (RES=$POS, NOM=NOMPOS, MFC=2000, TOL=0.01, DT1=Y, MMA=N, PFR=HP_A4Q, WKP=Example_2)
```





3、一个孔做基准且带 MMC 的孔组位置度

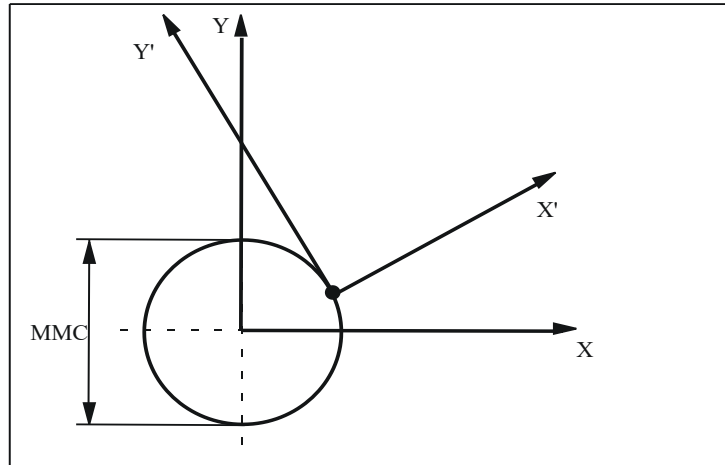


- 1、同实例 2，依据图纸建立坐标系，搜集实际圆心、定义理论圆心、定义孔组位置度队列。

```
HEPLA (NAM=Datum_A, CSY=REFR$CSY, ITY=GSS)
MECIR (NAM=Datum_B, CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM=CIR{1}, CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM=CIR{2}, CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM=CIR{3}, CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR (NAM=CIR{4}, CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
COLPTS (NAM=AXI, CSY=REFR$CSY, ELE={Datum_B, CIR{1}}, TYP=AXI, EVA=N)
BLDCSY (NAM=CSY{1}, SPA=Datum_A, SDR=+Z, PLA=AXI, PDR=+X, XZE=Datum_B, YZE=Datum_B, ZZE=Datum_A)
COLPTS (NAM=ACTPOS, CSY=CSY{1}, ELE={CIR{1}, CIR{2}, CIR{3}, CIR{4}})
DFNELE (NAM=NOMPOS, TYP=2DE, CSY=CSY{1}, DEL=*)
EDTAPT (NAM=NOMPOS, RCO=N)
DFNQUE (NAM=$POS, MBR={MAXPOS, POS{1}, POS{2}, POS{3}, POS{4}}, DEL=Y)
```

由于基准带最大实体补偿，所以基准 B 需要正确评价该圆直径和输入正确公差。基准 B 有最大实体条件，所以允许基准坐标系的原点在以基准 B 实体补偿值为半径的圆内进行移动，如下图所示：





2、使用 GAUG2D 命令进行孔组位置度评价

GAUG2D {ACT=ACTPOS, NOM=NOMPOS, RES=\$POS, TRA=TRA, ITY=CEB, FIX=(N,N), TOL=0.01, DT1=Datum_B.\$PT, MMC=(Y,N), MMA=N)

Bore Pattern Fitting

List of result elements:

Result transformation:

Measured element:

Nominal element:

Measuring plane: ☒ XY ☐ YZ ☐ ZX

Fit to ...: ☒ Tolerance circle ☐ Nominal position

Tolerance of elements: Position tolerance:

Material condition for holes: ☐ MMC ☐ LMC ☒ No

1st Datum: ☒ MMC ☐ LMC ☐ No

2nd Datum:

Fixed parameters ...: ☐ Abscissa ☐ Ordinate ☐ Rotation

Iteration control ...: Maximum number: Limit value:

Copy element for evaluations:

Evaluation range for cylinder: Lower limit: Upper limit:

勾选 MMC





Datum_B		CIR					
	DM	39.9968	40.0000	0.0500	-0.0500	-0.0032	
MAXPOS		ZDE					
	Localisation	0.0086	0.0000	0.0100	0.0000	0.0086	
	MMCDT1	0.0457					
	X_SHIFT	0.0007					
	Y_SHIFT	0.0007					
	ROTATN	0.0086					
POS(1)		ZDE					
	Localisation	0.0086	0.0000	0.0100	0.0000	0.0086	
	X_CORR	-0.0043					
	Y_CORR	0.0004					
POS(2)		ZDE					
	Localisation	0.0086	0.0000	0.0100	0.0000	0.0086	
	X_CORR	0.0025					
	Y_CORR	-0.0035					
POS(3)		ZDE					
	Localisation	0.0048	0.0000	0.0100	0.0000	0.0048	
	X_CORR	0.0024					
	Y_CORR	-0.0003					
POS(4)		ZDE					
	Localisation	0.0086	0.0000	0.0100	0.0000	0.0086	
	X_CORR	0.0018					
	Y_CORR	0.0039					

Plot Bore Pattern Fitting

List of result elements
\$POS

Plot factors:

Error magnification
2000

Magnification factor

Nominal element
NOMPOS

Measuring plane
☒ XY ☐ YZ ☐ ZX

Tolerance of holes

Position tolerance
0.01

Material condition for holes :
☐ MMC ☐ LMC ☒ No

Datums specified?
☒ 1st Datum
☐ 2nd Datum

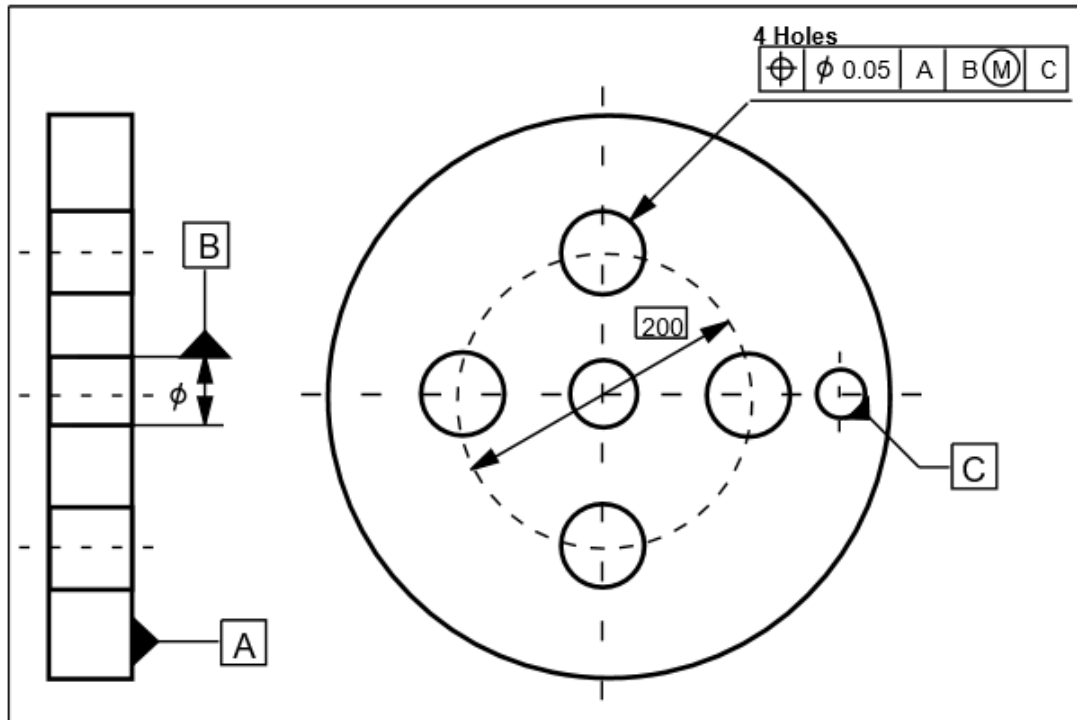
Name of workpiece (WKP)
Example_3

Name of plot form
HP_A4Q

QUALITY DRIVES PRODUCTIVITY
品质驱动生产力

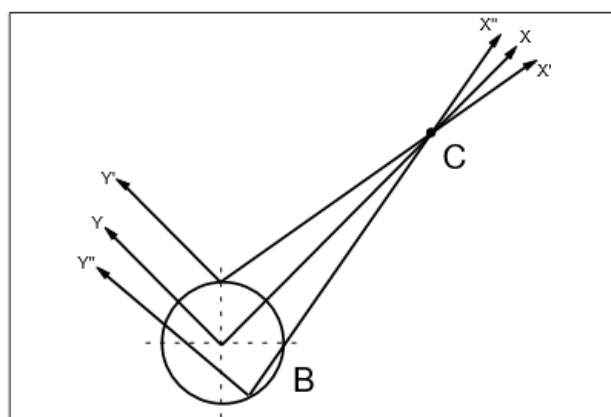


4、两个孔做基准，其中第一个孔带 MMC，第二个孔不带 MMC 的孔组位置度



如上图位置度所定基准系为：

- 1、基准系原点位置在基准 B 上
- 2、基准系的 X 轴向由基准 B 和基准 C 的连线确定



由于基准 B 带 MMC，区别于实例 3，基准系的原点允许在实体补偿量为半径的圆内任意移动，但必须保证 X 轴线穿过基准 C 圆心。





- 1、依据图纸建立坐标系，搜集实际圆心、定义理论圆心、定义孔组位置度队列。注意基准 B 需要正确评价直径。

```
MEPLA      (NAM=Datum_A, CSY=REFR$CSY, ITY=GSS)
MECIR      (NAM=Datum_B, CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR      (NAM=Datum_C, CSY=REFR$CSY, PRO=Datum_A, PTY=EX)

MECIR      (NAM=CIR(1), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR      (NAM=CIR(2), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR      (NAM=CIR(3), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR      (NAM=CIR(4), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)

COLPTS     (NAM=AXI, CSY=REFR$CSY, ELE=(Datum_B, Datum_C), TYP=AXI, EVA=N)
BLDCSY     (NAM=CSY(1), SPA=Datum_A, SDR=+Z, PLA=AXI, PDR=+X, XZE=Datum_B, YZE=Datum_B, ZZE=Datum_A)

COLPTS     (NAM=ACTPOS, CSY=CSY(1), ELE=(CIR(1), CIR(2), CIR(3), CIR(4)))
DFNELE     (NAM=NOMPOS, TYP=2DE, CSY=CSY(1), DEL=*)
EDTAPT     (NAM=NOMPOS, RCO=N)
DFNQUE     (NAM=$POS, MBR=(MAXPOS, POS(1), POS(2), POS(3), POS(4)), DEL=Y)
```

- 2、使用 GAUG2D 命令进行孔组位置度评价

```
GAUG2D      (ACT=ACTPOS, NOM=NOMPOS, RES=$POS, TRA=TRA, ITY=CEB, FIX=(N,N), TOL=0.01, DT1=Datum_B.$PT, DT2=Datum_C.$PT, MMC=(Y,N), MMA=N)
```

The image shows the 'Bore Pattern Fitting' dialog box in a software application. The dialog is divided into several sections:

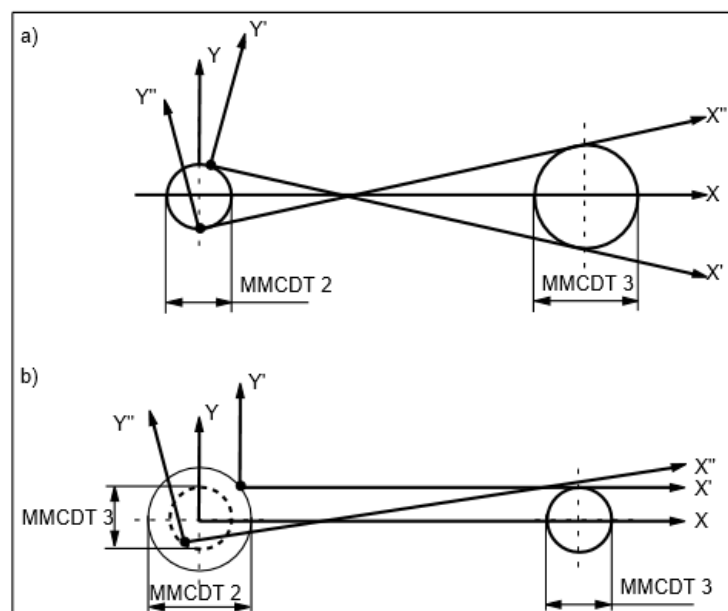
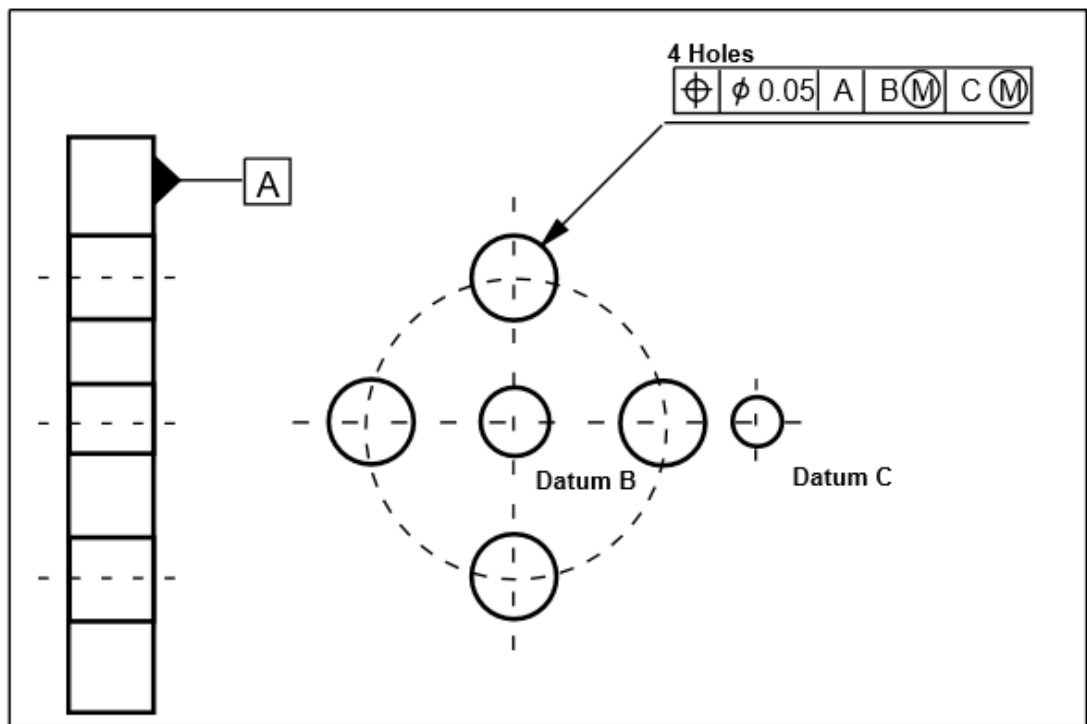
- List of result elements:** A dropdown menu showing '\$POS'. Below it are checkboxes for 'Evaluate' (checked) and 'Create CAD' (unchecked).
- Result transformation:** A dropdown menu showing 'TRA'.
- Measured element:** A dropdown menu showing 'ACTPOS'.
- Nominal element:** A dropdown menu showing 'NOMPOS'.
- Measuring plane:** Radio buttons for 'XY' (selected), 'YZ', and 'ZX'.
- Fit to ...:** Radio buttons for 'Tolerance circle' (selected) and 'Nominal position'.
- Tolerance of elements:** A text input field for 'Position tolerance' with the value '0.01'. Below it is a section for 'Material condition for holes' with radio buttons for 'MMC', 'LMC', and 'No' (selected).
- 1st Datum:** A dropdown menu showing 'Datum_B.\$PT' and radio buttons for 'MMC' (selected), 'LMC', and 'No'.
- 2nd Datum:** A dropdown menu showing 'Datum_C.\$PT' and radio buttons for 'MMC', 'LMC', and 'No' (selected).
- Functional length:** A text input field.
- Evaluation range for cylinder:** Two text input fields for 'Lower limit' and 'Upper limit'.
- Fixed parameters ...:** Checkboxes for 'Abscissa', 'Ordinate', and 'Rotation' (all unchecked).
- Iteration control ...:** Two text input fields for 'Maximum number' and 'Limit value'.
- Copy element for evaluations:** A dropdown menu.

In the center of the dialog, there is a graphical representation of four circles arranged in a square pattern, with a crosshair in the center, representing the bore pattern being fitted.





5、两个孔做基准，两个孔都带 MMC 的孔组位置度





- 1、依据图纸建立坐标系，搜集实际圆心、定义理论圆心、定义孔组位置度队列。注意基准 B 需要正确评价直径。

```
MEPLA      (NAM=Datum_A, CSY=REFR$CSY, ITY=GSS)
MECIR      (NAM=Datum_B, CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR      (NAM=Datum_C, CSY=REFR$CSY, PRO=Datum_A, PTY=EX)

MECIR      (NAM=CIR(1), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR      (NAM=CIR(2), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR      (NAM=CIR(3), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)
MECIR      (NAM=CIR(4), CSY=REFR$CSY, PRO=Datum_A, PTY=EX)

COLPTS     (NAM=AXI, CSY=REFR$CSY, ELE=(Datum_B, Datum_C), TYP=AXI, EVA=N)
BLDCSY     (NAM=CSY(1), SPA=Datum_A, SDR=+Z, PLA=AXI, PDR=+X, XZE=Datum_B, YZE=Datum_B, ZZE=Datum_A)

COLPTS     (NAM=ACTPOS, CSY=CSY(1), ELE=(CIR(1), CIR(2), CIR(3), CIR(4)))
DFNELE     (NAM=NOMPOS, TYP=2DE, CSY=CSY(1), DEL=*)
EDTAPT     (NAM=NOMPOS, RCO=N)
DFNQUE     (NAM=$POS, MBR=(MAXPOS, POS(1), POS(2), POS(3), POS(4)), DEL=Y)
```

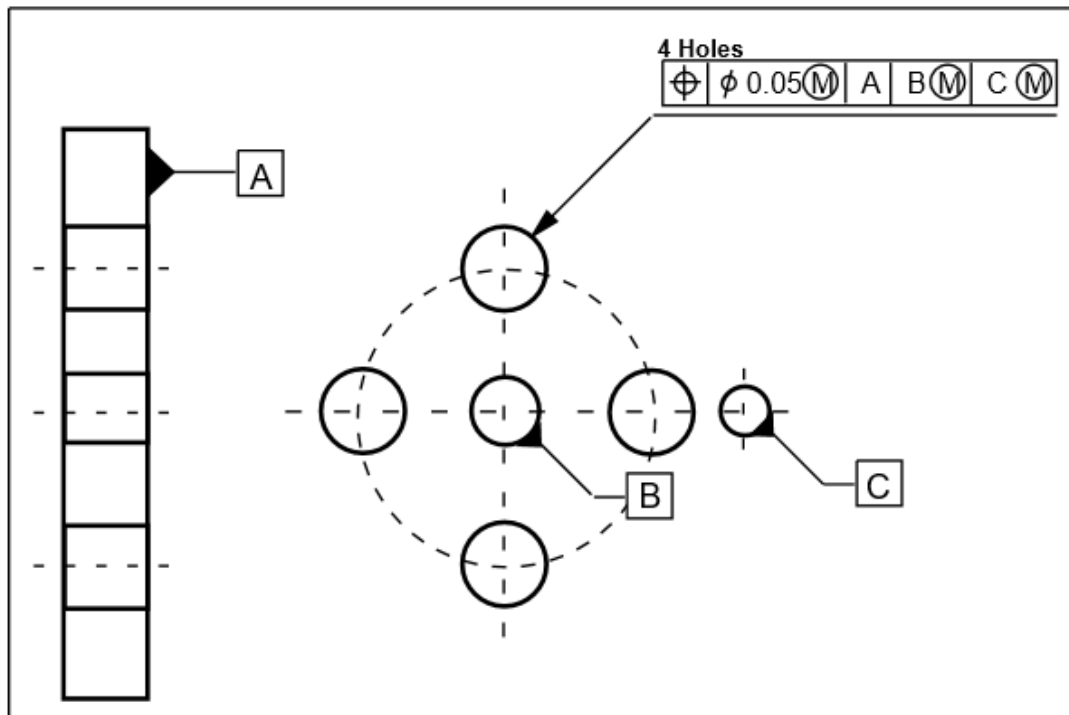
- 2、使用 GAUG2D 命令进行孔组位置度评价

```
GAUG2D      (ACT=ACTPOS, NOM=NOMPOS, RES=$POS, TRA=TRA, ITY=CEB, FIX=(N,N), TOL=0.01, DT1=Datum_B.$PT, DT2=Datum_C.$PT, MMC=(Y,Y), MMA=N)
```





6、两个孔做基准，两个孔都带 MMC 且被评价元素带 MMC 的孔组位置度





- 1、GAUG2D 命令进行孔组位置度评价设置（保证所有孔组孔和基准 B 和基准 C 都正确评价直径）

Bore Pattern Fitting

List of result elements \$POS	Measured element ACTPOS
☒ Evaluate ☐ Create CAD	Nominal element NOMPOS
Result transformation TRA	Measuring plane ☒ XY ☐ YZ ☐ ZX
	Fit to ... ☒ Tolerance circle ☐ Nominal position
	Tolerance of elements Position tolerance 0.01
	Material condition for holes : ☒ MMC ☐ LMC ☐ No
	1st Datum Datum_B.\$PT ☒ MMC ☐ LMC ☐ No
Fixed parameters ... ☐ Abscissa ☐ Ordinate ☐ Rotation	2nd Datum Datum_C.\$PT ☒ MMC ☐ LMC ☐ No
Iteration control ... Maximum number Limit value	Functional length
Copy element for evaluations	Evaluation range for cylinder Lower limit Upper limit

