

Invloed van de afrondingsradius op het spanningsbeeld in een boutenmatrijs

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Technische Universiteit Eindhoven
Faculteit Werktuigbouwkunde
Vakgroep Produktietechnologie en automatisering

**Invloed van de afrondingsradius
op het spanningsbeeld in een
boutenmatrijs.**

R.E. Boele
Onderzoekverslag

aug 91
IOPH

WPA 1161

Invloed van de matrijsradius ρ op het spanningsbeeld

De afrondingsstralen van de zes hoeken van de boutenmatrijs werden gemeten met behulp van een Profielprojector.

Resultaten:

hoek:	1)	0,7 mm
	2)	0,5 mm
	3)	0,7 mm
	4)	0,6 mm
	5)	0,4 mm
	6)	0,5 mm

De gem. afrondingsstraal bedraagt ongeveer 0,6 mm.

Wordt deze afrondingsstraal in Gifts verwerkt dan moeten er 5 punten berekend worden, die op de cirkelboog van de afronding liggen.

$\rho = 0.6$ mm

1)	20	,	11.6536
2)	19.9756	,	118089
3)	19.9196	,	11.9536
4)	19.8243	,	12.0779
5)	19.7	,	12.1732

$\rho = 0.7$ mm

1)	20	,	11.7113
2)	19.9830	,	11.8407
3)	19.933	,	11.9613
4)	19.8536	,	12.0649
5)	19.75	,	12.1440

$\rho = 0.8$ mm

1)	20	,	11.5381
2)	19.9727	,	11.7452
3)	19.8928	,	11.9381
4)	19.7657	,	12.1038
5)	19.6	,	12.2309

$\rho = 1.0$ mm

1)	20	,	11.4227
2)	19.9659	,	11.6815
3)	19.866	,	11.9227
4)	19.7071	,	12.1298
5)	19.5	,	12.2887

Gifts invoer:

Bulkm

JOBNAME : MAT1

* ETH,1
> 1
? 0.075
* ELMAT,2
> 1
? 2.4E9,2.3E11
>
* KPOINT
> 1,2
? 0.02,0
? 0.02,0.0116536
> 3,4
? 0.0199756,0.0118089

? 0.0199196, 0.0119536
> 5,6
? 0.0198243,0.0120779
? 0.0197,0.0121732
> 7,8
? 0.01,0.018
? 0,0.024
> 9,10
? 0,0.04
? 0.01035,0.03864
> 11,12
? 0.02,0.035
? 0.02828,0.02828
> 13,14
? 0.03464,0.02
? 0.03864,0.01035
> 15
? 0.04,0

BIJ EEN ANDERE ρ VERANDEREN
ALLEEN DE KEYPOINTS 2 T/M 6 !

* SLINE

> L12

? 1,2,29

> L67

? 6,7,29

> L78

? 7,8,30

> L89

? 8,9,30

> L711

? 7,11,30

> L413

? 4,13,30

> L115

? 1,15,30

>

* CARC

> C24

? 2,3,4,3

> C46

? 4,5,6,3

> C911

? 9,10,11,31

> C1113

? 11,12,13,31

> C1315

? 13,14,15,31

>

* COMPLINE

> L14

? L12,C24

> L47

? C46,L67

>

* GETY
> QM4
? 1,1
* GRID4
> G1
? L14 L413 C1315 L115
> G2
? L47 L711 C1113 L413
> G3
? L78 L89 C911 L711
>
* COMPLINE
> C915
? C911,C1113,C1315

loadbc

Jobname: Mat1

* SUPL,1

> L89

>

* SUPL,2

> L115

>

* LOADL,7

> L14

? 3

? -7.5E7,-7.5E7

> L47

? 3

? -7.5E7,-7.5E7

> L78

? 3

? -7.5E7,-7.5E7

> C915

? 3

? -1.5E7,-1.5E7

>

* QUIT

Result

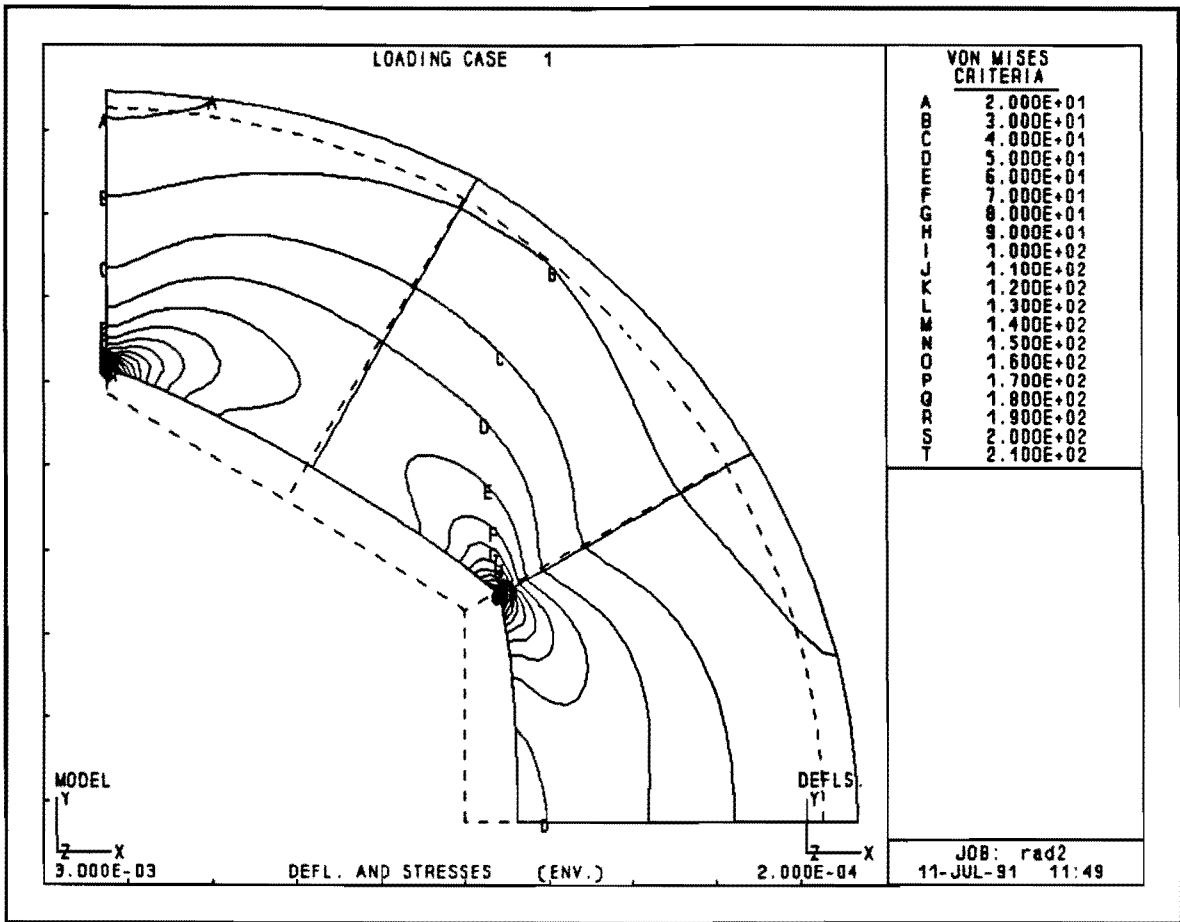
Jobname: Mat1

* contour

> tres

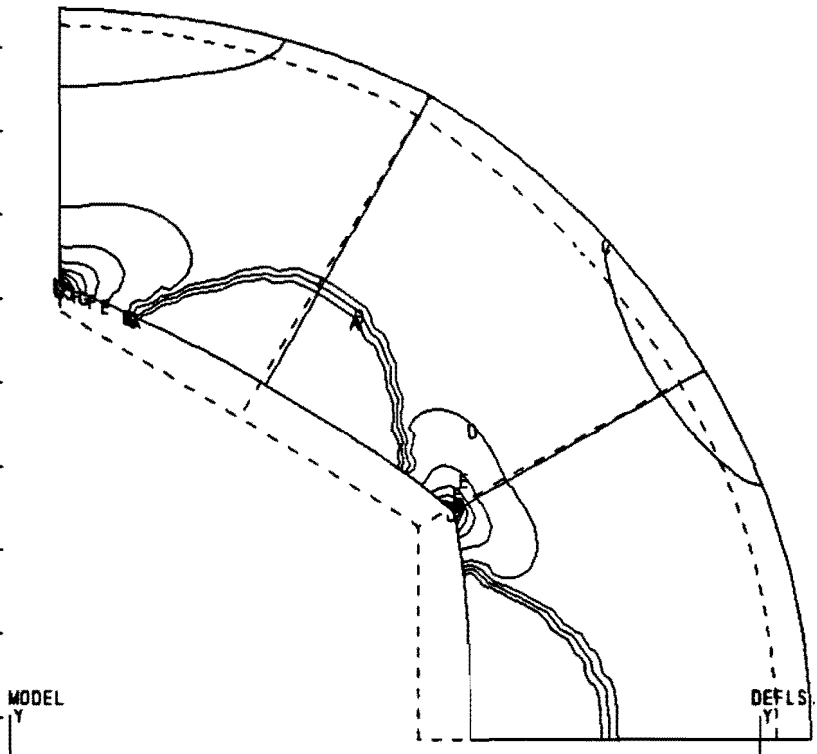
etc.

De resultaten bij de verschillende afrondingsstralen staan afgebeeld in de figuren op de volgende bladzijden.



$$R = 0,6 \text{ mm}$$

LOADING CASE 1



MAXIMUM PRIN. STRESS

A	-5.000E+08
B	.000E+00
C	5.000E+08
D	1.000E+09
E	1.500E+09
F	2.000E+09
G	2.500E+09
H	3.000E+09
I	3.500E+09
J	4.000E+09
K	4.500E+09
L	5.000E+09

MODEL

Y
X
3.000E-03

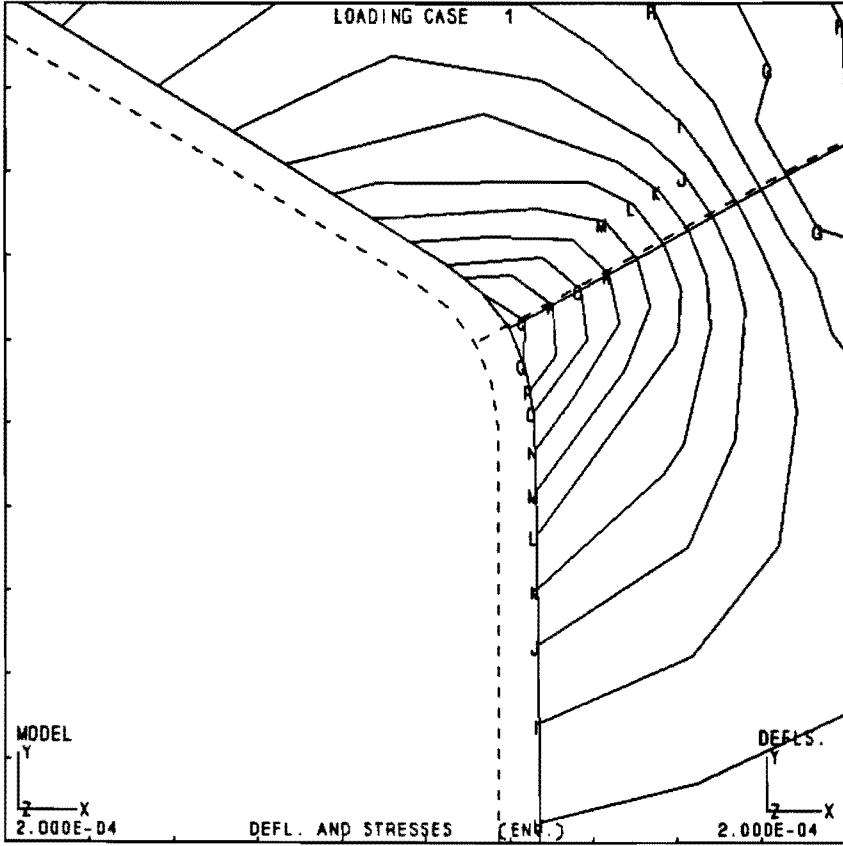
DEFLS

Y
X
2.000E-04

DEFL. AND STRESSES (ENV.)

JOB: rad2
12-JUL-91 11:48

LOADING CASE 1



VON MISES
CRITERIA

A	2.000E+01
B	3.000E+01
C	4.000E+01
D	5.000E+01
E	6.000E+01
F	7.000E+01
G	8.000E+01
H	9.000E+01
I	1.000E+02
J	1.100E+02
K	1.200E+02
L	1.300E+02
M	1.400E+02
N	1.500E+02
O	1.600E+02
P	1.700E+02
Q	1.800E+02
R	1.900E+02
S	2.000E+02
T	2.100E+02

MODEL

Y
Z X
2.000E-04

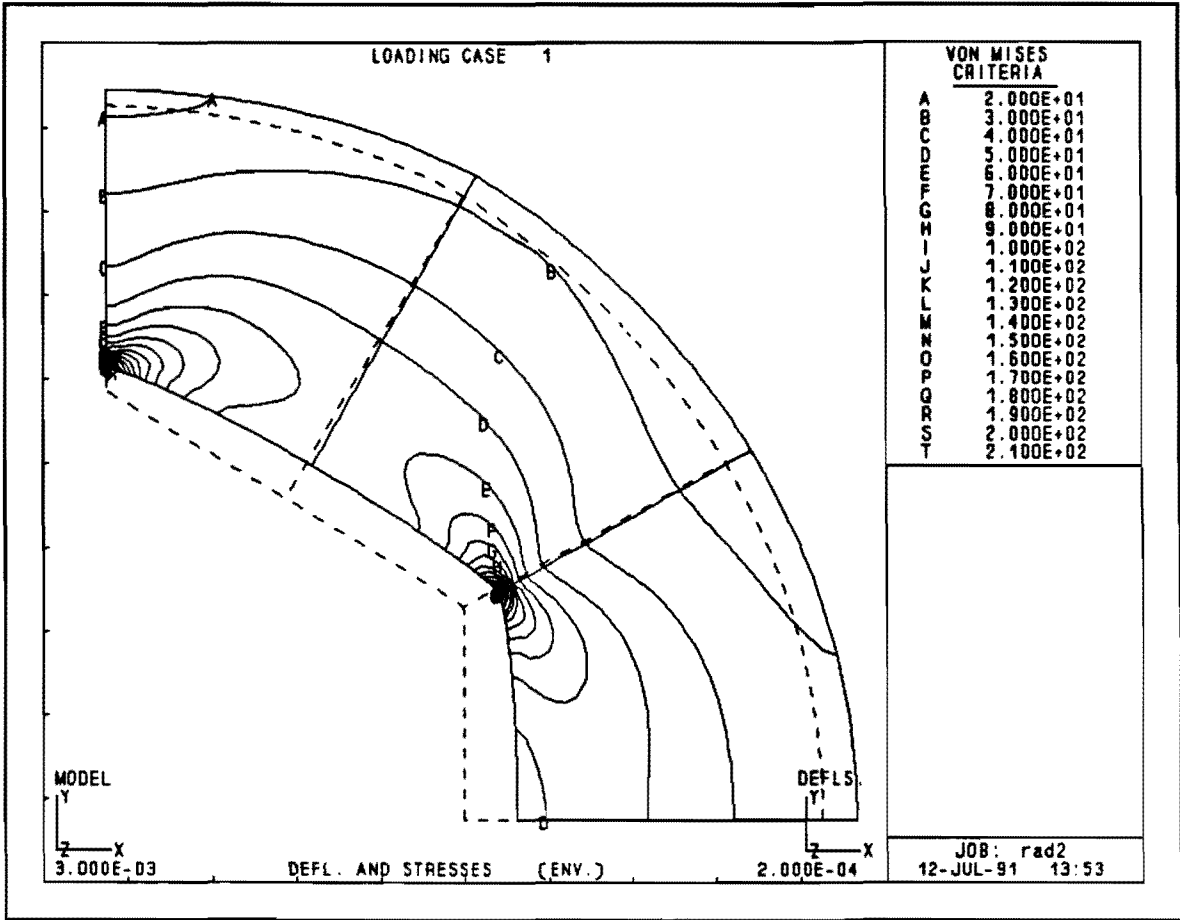
DEFL. AND STRESSES

(ENF.)

DEFLS.

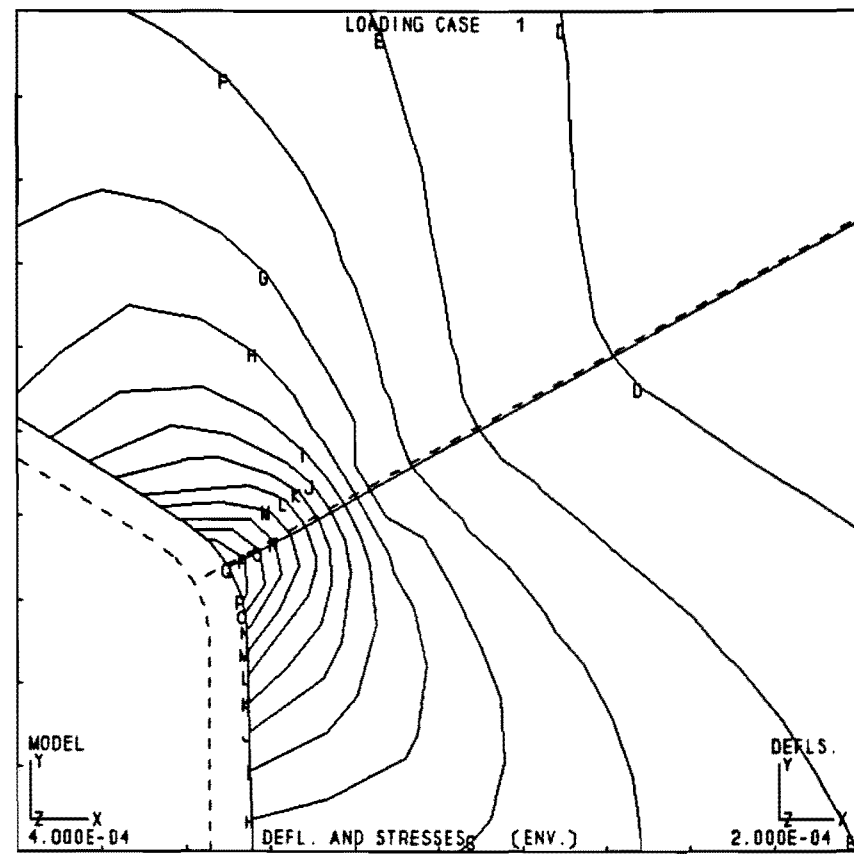
Y
Z X
2.000E-04

JOB: rad2
11-JUL-91 11:45



$R = 0.8 \text{ mm}$

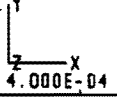
LOADING CASE 1



VON MISES CRITERIA

A	2.000E+01
B	3.000E+01
C	4.000E+01
D	5.000E+01
E	6.000E+01
F	7.000E+01
G	8.000E+01
H	9.000E+01
I	1.000E+02
J	1.100E+02
K	1.200E+02
L	1.300E+02
M	1.400E+02
N	1.500E+02
O	1.600E+02
P	1.700E+02
Q	1.800E+02
R	1.900E+02
S	2.000E+02
T	2.100E+02

MODEL



4.000E-04

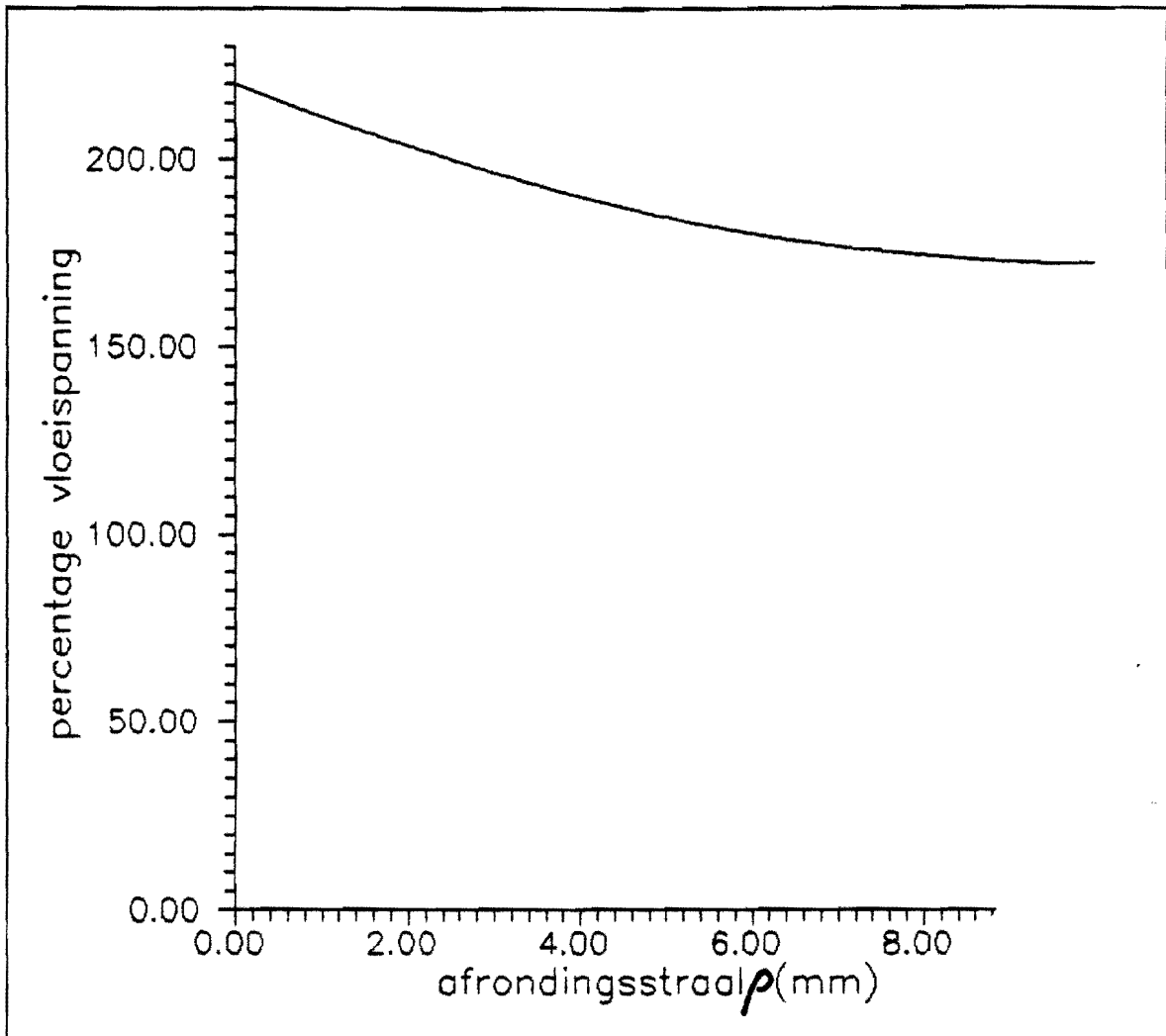
DEFLS.



2.000E-04

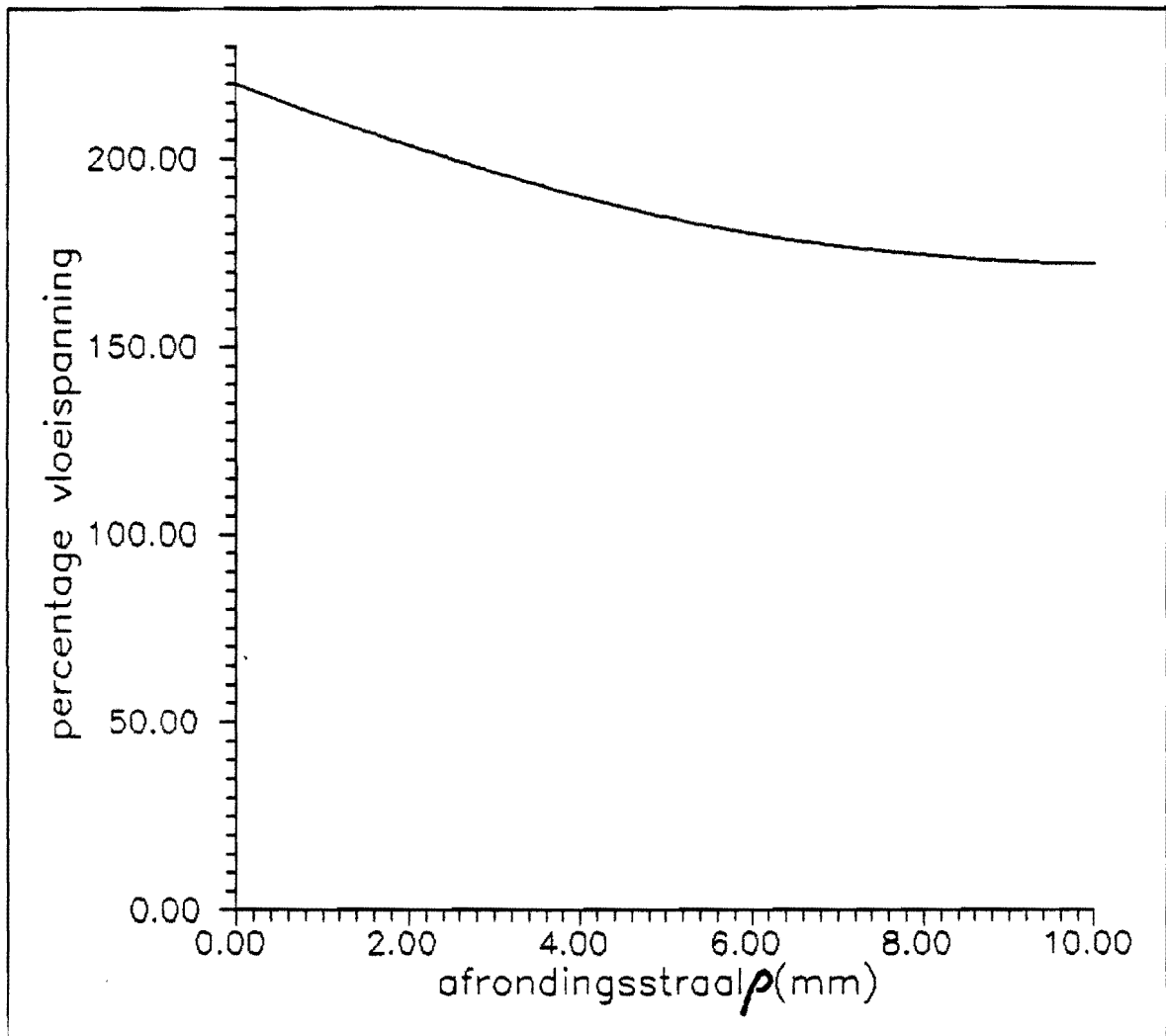
DEFL. AND STRESSES (ENV.)

JOB: rad2
12-JUL-91 13:49



Verband tussen afrondingsstraal ρ en het bereikte percentage van de vloeispanning bij een zeshoekige boutenmatrijs met:

- $P_1 = 1000 \text{ N/mm}^2$
- $P_U = 200 \text{ N/mm}^2$
- $r_1 = 20 \text{ mm}$
- $r_U = 40 \text{ mm}$



Verband tussen afrondingsstraal ρ en het bereikte percentage van de vloeispanning bij een zeshoekige boutenmatrijs met:

- $P_i = 1000 \text{ N/mm}^2$
- $P_U = 200 \text{ N/mm}^2$
- $r_i = 20 \text{ mm}$
- $r_U = 40 \text{ mm}$