

20% ϵ to 25% ϵ

#153 - #187

RAM displ = 2400 μm
Bam Pos
29.12LOAD
-202 kNJ
259.03 MPa

2012 July 11

Plans: Perform constant ram rate test to get data for RAM h vs. % ϵ for steel B (young). Then continue to test a second sample of steel B at strain increments.

- DIC calibration

SD = 0.031

JR

File:
NiYoung/2012July11/Calibration

bel"

1-3 and

el. So

Balanced biaxial data for Bsteel (IF) was obtained between 2012JUL11 and 2012JUL12 - Data obtained during this time was used for the IJP paper published in 2014.

List of the Proto X-ray data points are:

11JUL12_0007	12JUL12_0001
11JUL12_0008	12JUL12_0002
11JUL12_0009	12JUL12_0003
11JUL12_0010	12JUL12_0004
11JUL12_0011	12JUL12_0005
11JUL12_0012	12JUL12_0006
11JUL12_0013	12JUL12_0007
11JUL12_0014	12JUL12_0008
11JUL12_0015	12JUL12_0009
11JUL12_0016	
11JUL12_0017	

In total 20 X-ray scans were conducted

#1-3 RBM
#4 Aligned
#5 ~~Clamped~~ Flat
#6 Clamped
#7 RAM Touch

- 5.673 mm w/ 1800kN
- 57.31 mm

#8 Clamped @ 400 kN (ready to start waveform)
#9 - #388 test at 0.1 mm/s ram rate for "40mm" recording at 1s/iframe images;

Machine control
Control to go in to
OFF control
(reported)

V. But
g the
017
mple.

Steel B1-2_B13 - 2012 July 11.

#0 time-synced

Sample prep RAM and head are brushed with oil.

#1~3 RBM

#4 Align

#5 Flat

#6 Clamped

#7 RAM Touch

#8 Clamped at -400 kN

0007.tr are not written in the book but saved in the computer

- Stress measurement.

Principal stress max : 49.63
#9 ~ #67 50.36 RAM. 3.809 mm : CLAMP -22 kN

Fn: 0008.tr principal max 218.69

RAM; -5.21

V. But
g the
017
mple.RJ (force
control)

RAM 12 x

RJ (force
control)

#69 ~ #91 RAM pos: 48.98 mm -32 kN
CLAMP pos: 3.788 mm

principal max stress: 203.85
0001.tr

#92 ~ #104 RAM pos: 47.88 mm force: -40.3 kN
CLAMP pos: 3.711 mm

0010.tr
principal max stress: 223.94

#109 ~ #124 RAM pos: 46.90 mm force: -49.3 kN
CLAMP pos: 3.790 mm

0011.tr
principal max stress: 216.17

#125 ~ #139 RAM pos: 46.03 force: -58.56
CLAMP pos: 3.727 mm

0012.tr
principal max stress: 215.64

#140 ~ #154 RAM pos: 45.24 mm force: -65 kN
CLAMP 3.701 mm

0013.tr
max principal stress: 211.82

#155 ~ #168 RAM pos: 44.51 mm force: -73 kN
CLAMP 3.678 mm

0014.tr
max principal stress: 220.08

#169 ~ #181 RAM pos: 43.84 -80.6 kN
CLAMP 3.655 mm

0015.tr

mx. stress: 215

#182 ~ #193 RAM pos: 43.22 -88 kN
CLAMP: 3.634 mm

mx. stress: 211.84

0016.tr

mx. stress:

#194 ~ #206

RAM pos 42.64 mm -93 kN
CLAMP 3.614 mm

mx. stress: 216.82

12JUL12 0017.tr

RAM = -58068.6 (done)

(a~q3)

→ RAM pos 42.64mm ~92 kN

CLAMP 3.614 mm

X-Ray is moved up to -55 along z.

→ ~~12JUL12~~: plan: set right RAM pos back.

and image taken.

→ then loading while taking pictures.
→ only X-ray is off. The rest stays as it is

→ July 12; RAM pos: 42.64mm -93 kN

CLAMP: 3.611 mm
#207 (single image taken)

#208 ~ #218

RAM pos 42.09mm -100 kN
CLAMP 3.597 mm

~~12 JUL 12 - 0001.tr~~
mx. stress: 207.09

RAM: -0.548779

#219 ~ #228

RAM pos: 41.57 mm -106 kN
CLAMP: 3.581 mm

12 JUL 12 - 0002.tr

MX. STRESS: 215

RAM: -0.524722

#229 ~ #238

RAM pos: 41.07 mm -111 kN
CLAMP: 3.565 mm

12 JUL 12 - 0003.tr

MX. STRESS: 211

RAM: -0.493620

92

#239 ~ #247 $\Delta RAM = -0.466705$
 RAM POS ~~40.09 mm~~ ~~-119 kN~~
 CLAMP 3.549

12 JUL 12 - 0004.tr
 max stress: 212.82

#248 ~ #255 $\Delta RAM = -0.459469$
 RAM POS 40.15mm ~~-120 kN~~
 CLAMP 3.534mm

12 JUL 12 - 0005.tr
 max stress: 201

#256 ~ #319 $\Delta RAM: \Delta -9.9820746$
 RAM POS 34.16mm ~~-175 kN~~
 CLAMP 3.259mm
 12 JUL 12 - 0006.tr
 max stress: 200

#320 ~ #366 $\Delta RAM: -4.071084$
 RAM POS 30.09 ~~-193 kN~~
 CLAMP 3.280 ~~-400 kN~~
 12 JUL 12 - 0007.tr
 max stress: 206

H36n ~ #416 $\Delta RAM: -3.284046$
 RAM POS

↳ failed.

I ended up having RAM POSITION | 30.08mm
 CLAMP | -17.4 kN
 | 3.418mm

→ Decided to give $\Delta RAM: -0.79\text{mm}$.

→ RAM POS 30.09, -189 kN
 CLAMP 3.286mm

#417 ~ #456 $\Delta RAM: -3.284046$
 RAM POS 26.01mm ~~-196 kN~~
 CLAMP 3.259
 max stress: 184.29
 12 JUL 12 - 0008.tr

#457 ~ #490 $\Delta RAM: -2.802365$
 RAM POS 24.00 ~~-190 kN~~
 CLAMP 3.259mm
 max stress: 170.89
 12 JUL 12 - 0009.tr

powder check.

12 JUL 12 - 0010.st
 - "powder correction unchecked. "phi Horing" checked
 - triaxial: 12 JUL 12 - 0010.tr
 - Grain 12 JUL 12
 - single gain 0012.st
 - multi gain 12 JUL 12 - 0013.mnt
 - powder again: 0015.tr

16.mt: multi-gain
 gain corrected
 powder result:
 $[0] \rightarrow [16.30 \quad 0.4n \quad 1.96 \quad 0.33 \quad 0.31 \quad 0.08]$
 $8.06 \quad -9.54 \quad -0.00 \quad 0.33 \quad 0.08 \quad 0.15]$

Abel"

A1-3 and

steel. So

BB if

kN". But
ng the
0017
ample.

KO (force
con
ram 2)

2012 July 12

B steel plane strain preliminary test.

- RD \hat{x} is along the longitudinal direction of the sample.

$T_{2,0}^{TP}$ → sample is taken for this spot.
 T_{11}/RD

- Made a mistake over speckle-spray. Left the small window in the center. It should be a problem to get the E-Ram position spots.

#0 - time-synced.

~~#1~~

#1~ calibration.

 $\epsilon_{rot} \rightarrow 0.078$

15, 16, 17, 18, 41, 47, 48, 57 are excluded

 $\rightarrow 0.05$

14, 24, 35, 40, 46, 52, 54

 $\rightarrow 0.045$ accepted.

#0 - time-synced.

#1 aligned.

#2 flat.

#3 RAM TOUCH

#4 CLAMPED at ~60kN

#5 ~ #334 test at ~0.1mm/s ram rate for ~40mm

~400 seconds

 \rightarrow one frame/s acquisition rate

~~Turn off~~
 Turned off the pump, X-ray. Need to turn off X-ray chiller
 after an hour.

Tomorrow's plan : Do a plane-strain test.

- DIC, X-ray calibration.

- Calibration

DIC - in the calibration folder

#0 - time synced.

#1 - #175 calibration target $9 \times 12 \times 6.20$

standard deviation : 0.046

#31, 38, 46, 51, 1, 5, 11, 15, 20, 31, - excluded

 $\rightarrow 0.04$

B2-1 PS RD folder.

#0 - time-synced

XRAY

• powder correction #0

- single exposure - 0001.st

- triaxial method - 0002.tr

• gain on brass

- single exposure to check the level of intensity. 0003.st

- multi-axial method

0004.M.GRAZN

37.71 21.12 -0.33

13.44 -5.48

-0.00

• powder correction ~~in~~ #1 the same boat as #0

- triaxial method - 0005.tr

• gain on brass

- multi-gain - 0006.M.gain

$$\sigma = \begin{bmatrix} 18.51 & -2.96 & 3.26 \\ -8.08 & -9.84 & 0.0 \end{bmatrix}$$

• powder correction #2

the same boat. - 0007.tr

using this gain

21.28 11.76 4.93

10.86 -7.05

150

• Get a new gain

36.59 10 5

27 -7

-10.16

Subject: Re: A recent talk of mine to my group
From: Youngung Jeong <youngung.jeong@gmail.com>
Date: Thu, 21 Mar 2013 20:48:55 -0400
To: "Iadicola, Mark" <mark.iadicola@nist.gov>
CC: "Gnaeupel-Herold, Thomas H." <thomas.gnaeupel-herold@nist.gov>, "Creuziger, Adam Abel" <adam.creuziger@nist.gov>, Frederic Barlat <f.barlat@postech.ac.kr>

Mark,

Which material(s) are we going to strain as well? On the shelf they are labeled B1-3, B2-1, A1-3 and A2-1, and I assume they might have slightly different ram height vs. strain curves.

It is 'B' that we'll use. It is single phase mild steel. B1-3 is the third sheet on the 1st stack of B steel. So I'd go with that.

If you can tell me the settings you used to get to the target strain. We could run it today if necessary.

What was the hold down (clamp) force and the ram height to get to the target strain (20% BB if that is what is needed).

Clamping force should be the default one as written in the Adam's flow chart. I believe it is '400kN'. But the information such as the ram height is actually written in Dave's note. I tested the sample during the stay last year for 3 weeks. For the B steel biaxial, the file names are 11JUL12_0007 - 11JUL12_0017 and 12JUL12-0001-12JUL12_0009 for one sample. It seems that I spent two days to finish this sample. In blow is my full record of the balanced biaxial for the B steel.

filename	E_xx	E_yy
11JUL12_0007	+0.00001	+0.00010
11JUL12_0008	+0.00447	+0.00477
11JUL12_0009	+0.00858	+0.00899
11JUL12_0010	+0.01267	+0.01312
11JUL12_0011	+0.01689	+0.01731
11JUL12_0012	+0.02105	+0.02152
11JUL12_0013	+0.02536	+0.02582
11JUL12_0014	+0.02976	+0.03030
11JUL12_0015	+0.03415	+0.03455
11JUL12_0016	+0.03850	+0.03899
11JUL12_0017	+0.04292	+0.04346
12JUL12_0001	+0.04985	+0.05038
12JUL12_0002	+0.05213	+0.05263
12JUL12_0003	+0.05652	+0.05712
12JUL12_0004	+0.06090	+0.06144
12JUL12_0005	+0.06537	+0.06595
12JUL12_0006	+0.14932	+0.15037
12JUL12_0007	+0.24496	+0.24691
12JUL12_0008	+0.34935	+0.35351

48.98
40.15
34.16
30.09
26.01

clamp 0 - 400kN (force control)
0.1 mm/s ram rate

15.0
10.5
8.5

#008+3SA

24.00-12JUL

96

By the way, a
email separat

Youngung

software crashed - wrong gain method from triaxial option.

→ manually initialize phi.

→ get a new "gain"

- 001M.gain + 000N.tr

→ 34.02 11 5

14.59 -4

→ another powder correction 0015.tr + 0014M.gain

28.9 13.8 57

20.4 -85

0

 $\bar{g} =$

#1 ~ #3 RDM

#4 align

#5 flat

#6 clamped

#7 ram touch

- time sync off a bit off

14192.344
14192.328

CLAMP: 4.591 mm -380 kN

RAM: 56.98 mm -0.12 kN

#8 CLAMPED at -400 kN.

CLAMP: 4.570 mm -400 kN

RAM: 56.98 mm -0.09 kN

) time back
to sync.

initial X-Ray triaxial measurement - 0016.tr

use 0015.tr as powder correction

(phi -59.)
(z -10%)

CLAMP: 4.573 mm -400 kN

RAM: 56.96 mm -0.12 kN

#9 ~ #14

CLAMP: 4.510 mm

RAM: 50.9 mm -21.35 kN

0017.tr

212 -21 -23

58 14

0

#15 ~ #93 CLAMP: 4.478

RAM: 49.53 mm -29 kN

0018.tr 207 -20 -21

73 14

0

97

#94 ~ #110 CLAMP: 4.493 mm

RAM: 48.39 mm -36 kN

ΔR = -1.135628

0019.tr 228.51 -30 -23

62 12

0

#111 ~ #123 CLAMP: 4.428 mm

RAM: 47.42 mm -42 kN

ΔR = -0.9737

0020.tr 233 -18 -20

50 13

#124 ~ #136 CLAMP: 4.404 mm

RAM: 46.57 mm -49 kN

ΔRAM = -0.8440

0021.tr 227 -5 -20

48 13.7

0

#137 ~ #148 CLAMP: 4.382 mm

RAM: 45.81 mm -55 kN

Δ -0.762833

0022.tr 226 -23 -19

51 12

0

#149 ~ #163 CLAMP: 4.361

RAM: 45.10 mm -61 kN

Δ -0.7115

0023.tr 238 -17 -17

55 10

0

#164 ~ #175 CLAMP: 4.340

RAM: 44.42 mm -66 kN

Δ -0.6735

0024.tr 249.53 -28.25 -18

58 9.1

0

#176 → time-synced!

#177 ~ #188 CLAMP: 4.319 mm

RAM: 43.82 -72 kN

Δ -0.604343

0025.tr 233 24 -16

72 9

0

1.0-12JUL12_000

#18a ~ #201 12-0026.tr $\Delta = -0.584674$

CLAMP 4.301mm

RAM 43.24 mm -76 kN

$$\Delta = \begin{bmatrix} 244 & -23.8 & -15 \\ 58 & 7.29 & 0 \end{bmatrix}$$

By the way, as in TI
email separately.

Youngung

#202 ~ #211 0027.tr

CLAMP 4.284mm

RAM 42.68 -81.1kN

$$\Delta = \begin{bmatrix} 256.95 & -33.42 & -14.75 \\ 60.75 & 9.27 & 0 \end{bmatrix}$$

#212 ~ #222

WRONG Y input.

hit the wall. < Adam fixed it.

→ initializing.

2012 July 16. - under 2012July16 folder.

- calibration again while warming up the oil.

#10 - time-synched.

$$\rightarrow 0.044$$

exclude 4, 9, 14, 15, 16, 17, 24, 33, 35, 41, 42, 44

$$\rightarrow 0.039$$

exclude 46

$$\rightarrow 0.036$$

#223 CLAMP back at ~ 350 kN CLAMP: 4.696mm

→ CLAMP released to calibrate X-ray.

- X-Ray, Powder

- single acquisition 16Jul12-0002.tr

- triaxial method 16Jul12-0003.tr

$$\Delta = \begin{bmatrix} 19.23 & 3.72 & 3.05 \\ -7.91 & -6.76 & -0 \end{bmatrix} \quad \Delta\theta = \begin{bmatrix} 5.7 & 9.34 & 1.4 \\ -2.55 & 5.7 & 1.4 \end{bmatrix}$$

$$\Delta = \begin{bmatrix} 23.49 & -0.39 & 4.61 \\ -9.42 & -6.06 & 0.0 \end{bmatrix} \quad \Delta\theta = \begin{bmatrix} 3.56 & 8.10 & 2.13 \\ 8.53 & 2.13 & 3.83 \end{bmatrix}$$

- #224 CLAMP ~ -380 kN POSITION: 4.483mm

time-synched, too.

- #225 RAM TOUCH at RAM: 43.49, -0.23 kN
CLAMP: 4.483mm -389.1kN

- #226 CLAMP ~ -400 kN CLAMP: 4.465 mm

- #227 RAM back at 42.68 mm 43.49
42.68 0.8

CLAMP: 4.367 mm

RAM : 42.68 mm -44.32 kN

- X-Ray - triaxial method.

$$\begin{bmatrix} 138.62 & 4.39 & -11.77 \\ -4.58 & -4.99 & 0.00 \end{bmatrix}$$

16JUL12-0003.tr as "concrete"
→ 16Jul12-0005.tr

#228 ~ #237

CLAMP: 4.230mm

RAM: 42.15, -74.68 kN

$$\Delta = \begin{bmatrix} 273.35 & 1.99 & -15.52 \\ 76.05 & 2.23 & -0.00 \end{bmatrix}$$

ΔRAM -0.529420

$$\gamma = -113$$

$$\phi_i = -5^\circ$$

16JUL12
0006.tr

#238 ~ #248

CLAMP: 4.205mm

RAM: 41.68mm, -86 kN 16JUL12-0007.tr

$$\Delta = \begin{bmatrix} 2070 & -0.26 & -15.64 \\ 68.44 & 1.72 & -0.00 \end{bmatrix}$$

ΔRAM -0.506260

#249 ~ #258 ΔRAM: 0.481910 16Jul12-0008.tr

CLAMP: 4.183

RAM: -91.4 kN

$$\Delta = \begin{bmatrix} 282.03 & 1.79 & -17 \\ 74.65 & 0.26 & 0 \end{bmatrix}$$

Next →

24.00+2JUL12

100

2012 JULY 17th

B21-P9-TD.

By the way, as ir
email separately

Youngung

#259 ~ #268 $\Delta RAM = \sim 0.410414$

CLAMP: 4.171 mm

RAM: 40.69 mm - 95 kN

$$\Delta = \begin{bmatrix} 285.67 & -4.83 & -14.16 \\ 16.12 & 1.78 & -0 \\ -0 & -0 & -0 \end{bmatrix}$$

0009.tr

*** DIC calibration 2012 JULY 17th / calibration#0 - ^{time}sync 12xax 6.00mm

#1 w #83 calibration images

~ 0.645

#1, 7, 13, 17, 18, 20, 23, 24, 34, 35, 40, 51, 54, 59, 61, 65, 70, 78

~ 0.035

#269 ~ #324 $\Delta RAM = -4.915179$

CLAMP: 3.998 mm

RAM: 35.78 mm - 134 kN

$$\Delta = \begin{bmatrix} 303.42 & -6.37 & -1.71 \\ 92.48 & 0.17 & -0.00 \\ -0.00 & -0.00 & -0.00 \end{bmatrix}$$

16JUL12-0010.tr

#325 ~ #391 $\Delta RAM = -4.098554$

CLAMP: 3.888 mm

RAM: 31.68 ~ 161 kN

$$\Delta = \begin{bmatrix} 304.99 & 6.80 & -1.44 \\ 103.57 & 0.02 & -0.00 \\ -0.00 & -0.00 & -0.00 \end{bmatrix}$$

16JUL12-0011.tr

→ X-ray powder check.

• Single exposure: 17JUL12-0001.st

$$\begin{bmatrix} 35.91 & 13.27 & 5.70 \\ -7.86 & -6.92 & 0 \end{bmatrix} \rightarrow \text{triaxial } 17JUL12-0002.tr$$

#372 ~ #47 $\Delta RAM = -3.983028$

CLAMP: 3.845 mm

RAM: 27.70 mm - 163 kN

$$\Delta = \begin{bmatrix} 321.47 & -23.47 & 0.67 \\ 149.84 & -1.4 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

16JUL12-0012.tr

• gain - multimeter: 17JUL12-0003.mt

$$\begin{array}{l} \text{• powder} \rightarrow \begin{bmatrix} 50 & 12 & 7 \\ 3 & -7 & 0 \end{bmatrix} \rightarrow \text{too much large error: 50} \\ \text{• powder again: } \begin{bmatrix} 31.99 & 14.72 & 2.71 \\ -20.93 & -6.33 & 0 \end{bmatrix} \rightarrow 12JUL12-0005.tr \end{array}$$

#48 $\Delta RAM = -3.521913$

CLAMP:

- ~~broken~~ fractured.

$$\begin{array}{l} \text{• powder again: } \begin{bmatrix} 44.68 & 16.60 & 3.90 \\ -6.49 & -5.36 & 0 \end{bmatrix} \\ \text{• using this gain: } \end{array}$$

$$\begin{array}{l} \text{• new gain } 17JUL12-0006.M \\ \begin{bmatrix} 39.86 & 15.88 & 3.51 \\ -11.51 & -5.71 & 0 \end{bmatrix} \end{array}$$

• powder again: 17JUL12-0007 → mistake: not focused.

17JUL12-0008

$$\begin{bmatrix} 23.83 & -6.16 & 3.83 \\ 9.01 & -6.38 & 0 \end{bmatrix}$$

• new gain 17JUL12-0009.mt

$$\begin{bmatrix} 20.13 & -6.49 & 3.77 \\ 3.98 & -6.31 & 0 \end{bmatrix}$$

By t
emar

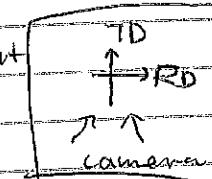
102

another powder 0010.tr

$$\begin{bmatrix} 30.21 & 2.34 & 4.61 \\ -1.20 & -4.40 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 32.22 & 0.94 & 2.51 \\ -2.13 & -5.10 & 0 \end{bmatrix}$$

#0 - time synced.

#1 - aligned such that
~~RD is~~

#1 - aligned.

#2 - flat

#3 - clamped - clamp: 2.302mm - 320 kN.

#4 - flat again.

#5 - clamped clamp: 6.313mm - 340kN.

#6 - ram touch

clamp: 6.313 mm - 345kN

Ram: 58.89mm - 0.13 kN

#7 - clamped at -45kN : clamp: 6.112mm,
ram: 58.89 - 0.01 kN

X-Ray

17JUL12_0012.tr linear method

$$\Delta = \begin{bmatrix} 181.08 & -12.33 & 13.13 \\ -7.30 & -19.36 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 26 & 25 & 7 \\ 26 & 7 & 12 \end{bmatrix}$$

x-ray for n2c
position

$$\phi_i = -95 \\ z = -122$$

#8 ~ #12 GRAM -5.861

CLAMP: 6.036mm

RAM: 53.03mm - 18.5 kN

17JUL12_0013.tr

$$\Delta = \begin{bmatrix} 272.78 & -13.81 & 12.49 \\ 49.84 & -8.80 & 0.00 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 18.5 & 19.3 & 4.55 \\ 18.7 & 4.55 & 8.28 \end{bmatrix}$$

#73 ~ #95 $\Delta RAM = -1.375049$
CLAMP: 6.015mm
RAM: 51.66mm - 26 kN

17JUL12_0014.tr

$$\Delta = \begin{bmatrix} 265 & -17 & 14 \\ 70 & -11 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 15 & 14 & 4 \\ 15 & 4 & 7 \end{bmatrix}$$

#96 ~ #112 $\Delta RAM = -1.135628$
CLAMP: 5.992 mm
RAM: 50.92mm - 32 kN

17JUL12_0015.tr

$$\Delta = \begin{bmatrix} 265.64 & -18.69 & 17.21 \\ 65.86 & -10.44 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 14 & 13 & 3 \\ 14 & 3 & 6 \end{bmatrix}$$

#113 ~ #127

CLAMP: 9.967
RAM: 49.55 - 38 kN

17JUL12_0016.tr

$$\Delta = \begin{bmatrix} 273.16 & -27 & 16 \\ 76 & -13 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 17 & 16 & 4 \\ 17 & 4 & 6 \end{bmatrix}$$

#128 ~ #141

CLAMP: 5.947
RAM: 48.70 - 45 kN

17JUL12_0017.tr

$$\Delta = \begin{bmatrix} 275.20 & -19 & 16 \\ 69 & -11 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 24 & 22 & 6 \\ 24 & 6 & 11 \end{bmatrix}$$

#142 ~ #156

CLAMP: 5.924
RAM: 47.94 - 50 kN

17JUL12_0018.tr

$$\Delta = \begin{bmatrix} 281.55 & -14 & 16 \\ 71 & -19 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 25 & 23 & 6 \\ 25 & 6 & 11.3 \end{bmatrix}$$

24.00

By the
email.

104

#197 ~ #168 GRAM -0.711463
CLAMP 5.903mm RAM 47.23mm -56.3 kN

17JUL12-0019.tr

$$\Delta = \begin{bmatrix} 283.63 & -9 & 16 \\ n_1 & -16 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 23 & 22 & 6 \\ 23 & 6 & 10 \end{bmatrix}$$

#169 ~ #179 GRAM -0.673523
clamp 5.884mm ram 46.96mm

17JUL12-0020.tr

$$\Delta = \begin{bmatrix} 201.93 & -9.93 & 19.91 \\ 6449 & -1430 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 24.02 & 22.51 & 1.90 \\ 24.02 & 5.90 & 10.15 \end{bmatrix}$$

#180 ~ #190 GRAM -0.604343
clamp: 5.866mm ram: 45.95 mm -67 kN

17JUL12-0021.tr

$$\Delta = \begin{bmatrix} 296.00 & -16.17 & 14.20 \\ 69.32 & -16.38 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 24.75 & 23.19 & 6.08 \\ 24.75 & 6.08 & 11.08 \end{bmatrix}$$

#191 ~ #201 GRAM -0.584674
ram 45.37mm -72 kN

clamp 5.846

17JUL12-0022.tr

$$\Delta = \begin{bmatrix} 295.5 & -17 & 13 \\ n_4 & -12.5 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 23 & 21 & 6 \\ 23 & 6 & 10 \end{bmatrix}$$

#202 ~ #211 GRAM -0.591959
clamp: 5.829mm ram 44.82mm -77 kN

17JUL12-0023.tr

$$\Delta = \begin{bmatrix} -285.7 & -19 & 10 \\ 77 & -12.4 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 14.13 & 13.8 & 3.62 \\ 14.13 & 3.62 & 6.6 \end{bmatrix}$$

#212 ~ #221 GRAM -0.52042
clamp: 5.812 ram 44.20mm -82 kN

17JUL12-0024.tr

$$\Delta = \begin{bmatrix} 309 & -16 & 11 \\ 69 & 13 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 15 & 14 & 4 \\ 15 & 4 & 7 \end{bmatrix}$$

#222 ~ #231

clamp: 5.711 5.797

17JUL12-0025.tr

$$\Delta = \begin{bmatrix} 308.98 & -19 & 2.92 \\ 66.90 & -11.98 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 14 & 13 & 3 \\ 14 & 3 & 6 \end{bmatrix}$$

GRAM -506280
RAM: 43.76mm -86.5 kN

#232 ~ #240

clamp: 5.780

17JUL12-0026.tr

$$\Delta = \begin{bmatrix} 293 & -19 & 10 \\ 80 & -11 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 16 & 15 & 4 \\ 16 & 4 & 7 \end{bmatrix}$$

#241 ~ #290

clamp 5.766

17JUL12-0027.tr

$$\Delta = \begin{bmatrix} 294 & -27 & 12 \\ 82 & -9 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 13 & 13 & 3 \\ 14 & 3 & 6 \end{bmatrix}$$

#251 ~ #305

clamp: 5.611

17JUL12-0028.tr

$$\Delta = \begin{bmatrix} 317.97 & -5.17 & 14.11 \\ 71.39 & -5.68 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 18 & 16.9 & 4.42 \\ 18.0 & 4.42 & 8.06 \end{bmatrix}$$

#306 ~ #351

clamp 5.521

17JUL12-0029.tr

$$\Delta = \begin{bmatrix} 282 & 4 & 13 \\ 1 & 75 & -4 \\ 0 & 0 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 12.6 & 12 & 3 \\ 13 & 3 & 6 \end{bmatrix}$$

#252 ~ #396

clamp: 5.462

12JUL12-0030.tr

$$\Delta = \begin{bmatrix} 296 & -21 & 7 \\ 67 & -2 & 0 \end{bmatrix} \quad \Delta r = \begin{bmatrix} 1.4 & 1.3 & 0.3 \\ 1.4 & 0.3 & 0.62 \end{bmatrix}$$

CP →

24.00

106

By the
email.

391 ~

SRAM - 3.92

stamp : 442 ram : 27.02 mm

Young

clamp

ram

fractured!

2012 JULY 18 18_A12_PS_TD.b

- DIC computer didn't respond a couple of time when rebooted.

- multi-gain again

$$\begin{bmatrix} 29.15 & 2.56 & 7.24 \\ 4.05 & -4.72 & 0 \end{bmatrix}$$

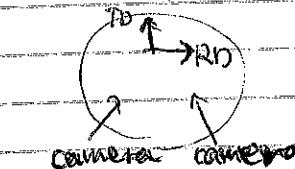
18JUL12_0005.mt with 0304.tr

107

$$\sigma_{err} = \begin{bmatrix} 3.10 & 3.9 & 1. \\ 3.7 & 1. & 1.7 \end{bmatrix}$$

sample: A steel 1-2

PS-TD



• DIC calibration

2012 JULY 18 / calibration

1 in #99 time-synced.

Int#99 calibration images.

0.093

6, 7, 8, 9, 11, 13, 21, 16, 20, 22, 33, 34, 35, 38, 39, 46, 56, 60
57, 59, 60, 67, 68, 69, 83, 84, 85, 86, 90, 95, 96, 97, 98, 99

20.039

$$\bar{\sigma} = 34.12 \quad 4.62 \quad 2.48$$

$$-16.23 \quad -4.17$$

0

✓ - powder again!

18JUL12_0007.tr.

$$\begin{bmatrix} 1d.46 & 6.02 & 1.48 \\ 5.64 & -7.58 & 0. \end{bmatrix}$$

• X-Ray calibration

- single exposure 18JUL12_0001.st

- triaxial (powder) 18JUL12_0002.tr

$$\bar{\sigma} = \begin{bmatrix} 10.26 & 8.30 & 0.92 \\ 4.56 & -3.24 & 0 \end{bmatrix} \sigma_{err} = \begin{bmatrix} 5.11 & 8.35 & 1.40 \\ 5.11 & 1.40 & 2.56 \end{bmatrix}$$

- gaw: 18JUL12_0003.mt

$$\bar{\sigma} = \begin{bmatrix} 11.91 & 10.69 & 2.56 \\ 4.98 & -2.78 & 0 \end{bmatrix} \sigma_{err} = \begin{bmatrix} 4.20 & 3.94 & 1. \\ 4.20 & 1. & 1.9 \end{bmatrix}$$

- triaxial (powder) 18JUL12_wolter again

$$\bar{\sigma} = \begin{bmatrix} 29.54 & 1.20 & 8.89 \\ -9.88 & -4.14 & 0 \end{bmatrix} \sigma_{err} = \begin{bmatrix} 4.46 & 4.35 & 1.14 \\ 4.64 & 1.14 & 2.98 \end{bmatrix}$$

0 - time synced

1 ~ 3 RBM

4 align

5 flat

6 clamp = 5.119mm - 34.8 KN

7 RBM touch : Ram: 57.49 - 0.19 KN

8 clamp at -400KN

clamp: 4.909mm
ram: 57.49mm, -0.01 kN

initial X-ray.

$$\bar{\sigma} = \begin{bmatrix} & & \end{bmatrix} \sigma_{err} = \begin{bmatrix} & & \end{bmatrix}$$

SRAM - 27.917292

24.00

By the
email108 (DIC position) $\phi_{\text{ini}} = -45^\circ$, $R = +122$
(for X-ray device)#19 ~ #195 $\Delta \text{RAM} = -27.917 \pm 2$ -168.146 kN
ram clamp: 4.221 mm ram 39.35 mm -166 kN

Young

18 JUL 12 - 009.tr

$$\Delta = \begin{bmatrix} 496.81 & -9.94 & 1.59 \\ 18.25 & -1.43 & 0.0 \end{bmatrix} \quad \Delta^{\text{err}} = \begin{bmatrix} 3.00 & 2.81 & 0.74 \\ 3.00 & 0.74 & 1.34 \end{bmatrix}$$

#196 ~ #215

clamp: 4.168 mm ram: 37.9 mm -162 kN

18 JUL 12 - 0010.tr

$$\Delta = \begin{bmatrix} 495.95 & 1.11 & 5.61 \\ 184.13 & -4.80 & 0.0 \end{bmatrix} \quad \Delta^{\text{err}} = \begin{bmatrix} 1.94 & 1.82 & 0.48 \\ 1.94 & 0.48 & 0.61 \end{bmatrix}$$

#216 ~ #233

clamp: 4.122 mm ram: 36.14 mm -195 kN

18 JUL 12 - 0011.tr

$$\Delta = \begin{bmatrix} 513.59 & -20.43 & -0.23 \\ 115.80 & -5.36 & 0 \end{bmatrix} \quad \Delta^{\text{err}} = \begin{bmatrix} 6.56 & 6.15 & 1.61 \\ 6.56 & 1.61 & 2.94 \end{bmatrix}$$

#234 ~ #248

clamp: 4.088 mm ram: 35.14 mm -204 kN

18 JUL 12 - 0012.tr

$$\Delta = \begin{bmatrix} 498.61 & -0.95 & 2.46 \\ 169.23 & 0.95 & 0 \end{bmatrix} \quad \Delta^{\text{err}} = \begin{bmatrix} 5.81 & 5.5 & 1.44 \\ 5.81 & 1.44 & 2.63 \end{bmatrix}$$

#249 ~ #262

clamp 4.065 mm ram: 34.86 mm -200 kN

18 JUL 12 - 0013.tr

$$\Delta = \begin{bmatrix} 498.65 & -5.11 & 3.41 \\ 139.90 & -7.04 & 0 \end{bmatrix} \quad \Delta^{\text{err}} = \begin{bmatrix} 6.44 & 6.03 & 1.58 \\ 6.44 & 1.58 & 2.85 \end{bmatrix}$$

#263 ~ #

clamp ram:

18 JUL 12 - 0014.tr

$$\Delta = \begin{bmatrix} \square & \square & \square \end{bmatrix} \quad \Delta^{\text{err}} = \begin{bmatrix} \square & \square & \square \end{bmatrix}$$

H ~ # clamp ΔRAM : ram
18 JUL 12 - 0015.tr $\times 6$
(b)

109

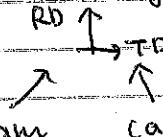
→ fractured.

found that the RAM POSITION - strain relation was wrong.

Using obtained images, recalculated "RAM pos - ε relation"

2012 July 18th
A12 - PS - RD

- DIC, X-ray calibrations are used as based on what was done in the morning.



X-ray folder 2012 July 18 - A12 PS RD.

#0: aligned, time-synched

#1: flat

#2: clamp; 708.2 mm, -360 kN RAM: 70.08 mm

#3: RAM touch ram: 59.35 mm -0.1 kN

#4: clamp at -460 kN

clamp: 6.914 mm ram: 59.35 mm 0 kN.

#5: initial X-ray.

polarization correction

→ 18 JUL 12 - 0017.tr in the "TD folder"

18 JUL 12 - 0015.tr.

$$\Delta = \begin{bmatrix} 221.9 & 4.08 & 0.03 \\ -342.7 & -2.11 & 0 \end{bmatrix}$$

$$\Delta^{\text{err}} = \begin{bmatrix} 0.97 & 0.91 & 0.24 \\ 0.97 & 0.24 & 0.43 \end{bmatrix}$$

24.00-

By the
email

110

$$\begin{bmatrix} z = -100 \\ \phi\theta = -95 \end{bmatrix}$$

#5 ~#61

clamp: 6.81 mm

SRAM: -5.226575

ram: 94.12 mm -23.72 kN

12-0016-tr

#126 ~#137

SRAM: -0.765301

clamp: 6.61 mm

ram: 48.98 mm -74 kN

111

Young

X-ray
14:05:00 ~

14:

14:18:00

14:21:00

14:24:00

14:27:00

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14:42:00

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24.00

2012 July 19 DR.

MOVING X-ray data off computer

By the
email

Young

- open desired file
- open gear
- apply powder correction file
- ① linear psi C.t
- right clk data sheet
- copy to text

② triaxial

- right clk on data sheet
- copy to text.

Powder correction
19JUL12_0004.tr

61 ~# 79

clamp: 6.081mm

GRAM: -1.505871

ram: 52.03mm -3.6 kN

115

19JUL12_0008.tr

$$\alpha = \begin{bmatrix} 442.83 & -22.71 & 9.42 \\ 17236 & 8.20 \\ 0 & 0 \end{bmatrix}$$

$$\sigma_m = \begin{bmatrix} 450 & 4.30 & 1.13 \\ 4.50 & 1.13 \\ 2.05 \end{bmatrix}$$

80 ~# 95

clamp: 6.016.034mm

GRAM: -1.194564

ram: 50.83mm -47.93 kN

19JUL12_0009.tr

$$\alpha = \begin{bmatrix} 444.77 & -27.94 & 8.62 \\ 173.03 & -2.52 \\ 0 & 0 \end{bmatrix}$$

$$\sigma_m = \begin{bmatrix} 5.17 & 4.84 & 1.27 \\ 5.17 & 1.27 \\ 2.31 \end{bmatrix}$$

96 ~# 109

clamp: 5.993

GRAM: -0.999700

ram: 49.83mm -58.49 kN

19JUL12_0010.tr

$$\alpha = \begin{bmatrix} 443.96 & -23.61 & 9.85 \\ 174.99 & -7.58 \\ 0.00 \end{bmatrix}$$

$$\sigma_m = \begin{bmatrix} 3.40 & 3.18 & 0.83 \\ 3.40 & 0.83 \\ 1.52 \end{bmatrix}$$

10 ~# 122

clamp: 5.954mm

GRAM: -0.871701

ram: 48.96mm -6kN

19JUL12_0011.tr

$$\alpha = \begin{bmatrix} 449.80 & -20.98 & 9.96 \\ 182.94 & -9.39 \\ 0 \end{bmatrix}$$

$$\sigma_m = \begin{bmatrix} 0.73 & 0.68 & 0.18 \\ 0.73 & 0.18 \\ 0.33 \end{bmatrix}$$

0 : aligned.

1 : flat

2 : clamp ~360 kN, 6.401mm

3 : ram touch 58.76mm, -0.17 kN

4 : clamp at -40kN

clamp: 6.240mm ram: 58.76mm -0.04 kN

+ X-ray powder correction: 19JUL12_0004.tr

- 19JUL12_0006.tr

$$\alpha = \begin{bmatrix} 229.53 & -1.15 & 8.80 \\ -92.21 & -5.03 \\ 0 \end{bmatrix}$$

$$\sigma_m = \begin{bmatrix} 5.78 & 5.42 & 1.42 \\ 5.78 & 1.42 \\ 2.59 \end{bmatrix}$$

4 ~# 60

clamp: 6.136

GRAM: -5.226575

ram: 53.93mm -24.20 kN

19JUL12_0007.tr

$$\alpha = \begin{bmatrix} 410.41 & -18.24 & 10.60 \\ 114.90 & -7.50 \\ 0 \end{bmatrix}$$

$$\sigma_m = \begin{bmatrix} 10.76 & 10.08 & 2.14 \\ 10.76 & 2.14 \\ 4.82 \end{bmatrix}$$

123 ~# 134

clamp: 5.920mm

GRAM: -0.765301

ram: 48.19mm -76 kN

19JUL12_0012.tr

$$\alpha = \begin{bmatrix} 452.88 & -16.34 & 8.20 \\ 181.50 & -8.39 \\ 0 \end{bmatrix}$$

$$\sigma_m = \begin{bmatrix} 1.39 & 1.30 & 0.34 \\ 1.39 & 0.34 \\ 0.62 \end{bmatrix}$$

135 ~# 145

clamp: 5.887

GRAM: -0.704018

ram: 47.49mm -84 kN

19JUL12_0013.tr

$$\alpha = \begin{bmatrix} 455.30 & -9.94 & 7.46 \\ 182.22 & -6.21 \\ 0 \end{bmatrix}$$

$$\sigma_m = \begin{bmatrix} 0.58 & 0.54 & 0.14 \\ 0.58 & 0.14 \\ 0.26 \end{bmatrix}$$

146 ~# 159

clamp: 5.851mm

GRAM: -0.624054

ram: 46.37mm -91 kN

19JUL12_0014.tr

$$\alpha = \begin{bmatrix} 456.81 & -13.04 & 10.54 \\ 183.65 & -2.85 \\ 0 \end{bmatrix}$$

$$\sigma_m = \begin{bmatrix} 3.22 & 2.70 & 2.02 \\ 3.22 & 2.02 \\ 3.68 \end{bmatrix}$$

24.00

By the
email

Young

116 # 156 ~# 165 $\Delta \text{RAM} = -0.581077$
 clamp: 5.82mm ram: 46.28mm -99.5 kN
 $\alpha = \begin{bmatrix} 456.42 & -31.54 & 9.11 \\ 193.80 & -3.87 \\ 0 & 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 3.19 & 2.99 & 0.99 \\ 1.19 & 0.99 \\ 1.43 \end{bmatrix}$

19JUL12_0015.tr $\Delta = \begin{bmatrix} 468.89 & -7.99 & 1.98 \\ 196.09 & -4.12 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 4.21 & 3.95 & 1.04 \\ 4.21 & 1.04 \\ 1.89 \end{bmatrix}$

166 ~# 174 $\Delta \text{RAM} = -0.542692$
 clamp: 5.801mm ram: 45.14mm -106.1 kN
 $\alpha = \begin{bmatrix} 474.92 & -10.82 & 6.86 \\ 192.68 & -4.92 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 7.85 & 7.36 & 1.93 \\ 7.85 & 1.93 \\ 3.51 \end{bmatrix}$

19JUL12_0016.tr $\alpha = \begin{bmatrix} 474.92 & -10.82 & 6.86 \\ 192.68 & -4.92 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 7.85 & 7.36 & 1.93 \\ 7.85 & 1.93 \\ 3.51 \end{bmatrix}$

175 ~# 183 $\Delta \text{RAM} = -0.491787$
 clamp: 5.776mm ram: 45.24 mm -112 kN
 $\alpha = \begin{bmatrix} 474.92 & -10.82 & 6.86 \\ 192.68 & -4.92 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 7.85 & 7.36 & 1.93 \\ 7.85 & 1.93 \\ 3.51 \end{bmatrix}$

19JUL12_0017.tr $\alpha = \begin{bmatrix} 474.92 & -10.82 & 6.86 \\ 192.68 & -4.92 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 7.85 & 7.36 & 1.93 \\ 7.85 & 1.93 \\ 3.51 \end{bmatrix}$

194 ~# 193 $\Delta \text{RAM} = -0.478924$
 clamp: 5.751mm ram: 44.77 mm -117.5 kN
 $\alpha = \begin{bmatrix} 462.42 & -23 & 9.94 \\ 187.04 & -6.81 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 3.46 & 3.24 & 0.85 \\ 3.46 & 0.85 \\ 1.95 \end{bmatrix}$

19JUL12_0018.tr $\alpha = \begin{bmatrix} 462.42 & -23 & 9.94 \\ 187.04 & -6.81 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 3.46 & 3.24 & 0.85 \\ 3.46 & 0.85 \\ 1.95 \end{bmatrix}$

194 ~# 201 $\Delta \text{RAM} = -0.451525$
 clamp: 5.727mm ram: 44.31 mm -124 kN
 $\alpha = \begin{bmatrix} 479.61 & -13.53 & 9.24 \\ 188.31 & -1.84 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 6.74 & 6.31 & 1.66 \\ 6.74 & 1.66 \\ 3.02 \end{bmatrix}$

19JUL12_0019.tr $\alpha = \begin{bmatrix} 479.61 & -13.53 & 9.24 \\ 188.31 & -1.84 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 6.74 & 6.31 & 1.66 \\ 6.74 & 1.66 \\ 3.02 \end{bmatrix}$

202 ~# 209 $\Delta \text{RAM} = -0.429382$
 clamp: 5.701mm ram: 43.83mm -120 kN
 $\alpha = \begin{bmatrix} 484.54 & -19.21 & 6.13 \\ 206.89 & -5.55 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 4.39 & 4.12 & 1.08 \\ 4.39 & 1.08 \\ 1.97 \end{bmatrix}$

19JUL12_0020.tr $\alpha = \begin{bmatrix} 484.54 & -19.21 & 6.13 \\ 206.89 & -5.55 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 4.39 & 4.12 & 1.08 \\ 4.39 & 1.08 \\ 1.97 \end{bmatrix}$

210 ~# 219 $\Delta \text{RAM} = -0.401963$
 clamp: 5.684mm ram: 43.48mm -135 kN
 $\alpha = \begin{bmatrix} 474.33 & -19.11 & 7.40 \\ 188.43 & -6.06 \\ 0.00 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 8.63 & 8.09 & 2.12 \\ 8.63 & 2.12 \\ 3.86 \end{bmatrix}$

19JUL12_0021.tr $\alpha = \begin{bmatrix} 474.33 & -19.11 & 7.40 \\ 188.43 & -6.06 \\ 0.00 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 8.63 & 8.09 & 2.12 \\ 8.63 & 2.12 \\ 3.86 \end{bmatrix}$

216 ~# 244 $\Delta \text{RAM} = -2.338895$
 clamp: 5.578mm ram: 41.14mm -163 kN
 $\alpha = \begin{bmatrix} 479.80 & -10.81 & 5.53 \\ 203.06 & 8.91 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 5.52 & 5.19 & 1.36 \\ 5.52 & 1.36 \\ 2.47 \end{bmatrix}$

19JUL12_0022.tr $\alpha = \begin{bmatrix} 479.80 & -10.81 & 5.53 \\ 203.06 & 8.91 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 5.52 & 5.19 & 1.36 \\ 5.52 & 1.36 \\ 2.47 \end{bmatrix}$

245 ~# 267 $\Delta \text{RAM} = -1.925104$
 clamp: 5.485mm ram: 39.22 mm -186 kN
 $\alpha = \begin{bmatrix} 489.67 & -27.97 & 6.97 \\ 218.03 & -9.20 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 11.81 & 11.06 & 2.90 \\ 11.81 & 2.90 \\ 5.28 \end{bmatrix}$

19JUL12_0023.tr $\alpha = \begin{bmatrix} 489.67 & -27.97 & 6.97 \\ 218.03 & -9.20 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 11.81 & 11.06 & 2.90 \\ 11.81 & 2.90 \\ 5.28 \end{bmatrix}$

268 ~# 287 $\Delta \text{RAM} = -1.608521$
 clamp: 5.414mm ram: 37.61mm -205 kN
 $\alpha = \begin{bmatrix} 496.86 & -27.03 & 8.027 \\ 183.91 & -5.61 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 10.08 & 9.44 & 2.48 \\ 10.08 & 2.48 \\ 4.51 \end{bmatrix}$

19JUL12_0024.tr $\alpha = \begin{bmatrix} 496.86 & -27.03 & 8.027 \\ 183.91 & -5.61 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 10.08 & 9.44 & 2.48 \\ 10.08 & 2.48 \\ 4.51 \end{bmatrix}$

288 ~# 304 $\Delta \text{RAM} = -1.336871$
 clamp: 5.366 ram: 36.27mm -218 kN
 $\alpha = \begin{bmatrix} 486.09 & -9.68 & 0.517 \\ 200.90 & -5.13 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 3.25 & 2.24 & 0.60 \\ 3.25 & 0.60 \\ 1.45 \end{bmatrix}$

19JUL12_0025.tr $\alpha = \begin{bmatrix} 486.09 & -9.68 & 0.517 \\ 200.90 & -5.13 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 3.25 & 2.24 & 0.60 \\ 3.25 & 0.60 \\ 1.45 \end{bmatrix}$

309 ~# 320 $\Delta \text{RAM} = -1.10$
 clamp: 5.334 ram: 37.17 mm -228 kN
 $\alpha = \begin{bmatrix} 507.25 & -21.46 & 13.42 \\ 185.48 & -1.51 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 6.18 & 5.79 & 1.52 \\ 6.18 & 1.52 \\ 2.76 \end{bmatrix}$

19JUL12_0026.tr $\alpha = \begin{bmatrix} 507.25 & -21.46 & 13.42 \\ 185.48 & -1.51 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 6.18 & 5.79 & 1.52 \\ 6.18 & 1.52 \\ 2.76 \end{bmatrix}$

321 ~# 348 $\Delta \text{RAM} = -1.0$
 clamp: ram: → fractured.

19JUL12_0027.tr $\alpha = \begin{bmatrix} 507.25 & -21.46 & 13.42 \\ 185.48 & -1.51 \\ 0 \end{bmatrix}$ $\text{err} = \begin{bmatrix} 6.18 & 5.79 & 1.52 \\ 6.18 & 1.52 \\ 2.76 \end{bmatrix}$

117

24.00

118

By the email
2012 July 20th - B+3 steel, Balanced Braxial

- DIC calibration
Young

#2~106 0.06

2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27,
29, 32, 33, 34, 43, 44, 45, 53, 55, 56, 57, 58, 59,

0.045

#26, 35, 52, 66, 71, 92, 86,

-0.044

- X-ray

warmed up

calibration with powder.

- 20JUL12-0002.tr - powder

$$\alpha = \begin{bmatrix} 26.56 & -0.95 & 4.38 \\ 6.40 & -2.19 & 0 \end{bmatrix} \quad \alpha^{\text{err}} = \begin{bmatrix} 5.4 & 5.06 & 1.33 \\ 5.40 & 1.33 & 2.42 \end{bmatrix}$$

- 20JUL12-0003.mt - gain.

$$\alpha = \begin{bmatrix} 17 & & \\ & \ddots & \\ & & . \end{bmatrix}$$

- 20JUL12-0004.tr - failed - not focused.

$$\alpha = \begin{bmatrix} 7.75 & -2.83 & 5.49 \\ 6.25 & -7.73 & 0 \end{bmatrix} \quad \alpha^{\text{err}} = \begin{bmatrix} 1.91 & 1.79 & 0.49 \\ 1.91 & 0.49 & 0.85 \end{bmatrix}$$

0005.tr

24.00

119

#0 ~ time-synched.

#1 align

#2. clamp : 11.14 mm

#3. ram touch : 59.80 mm, -0.16 kN

#4. clamp at -400 kN

9 wrong! did without
350 kN clamping.

#4. clamp at -390 kN, 6.580 mm

#5. ram touch ram: 58.28 mm -0.19 kN.

#6. clamp at -400 kN clamp: 6.433 mm

ram: 58.28 -0.07 kN.

~~#7~~ #7 $\Delta \text{RAM} = 6.323 \pm 8 \text{ mm}$ $\theta = -112^\circ$, $\phi = -55^\circ$

$$\text{20JUL12-0006.tr} \quad \alpha = \begin{bmatrix} 51.20 & 19.70 & 14.24 \\ -16.22 & -9.81 & 0 \end{bmatrix} \quad \alpha^{\text{err}} = \begin{bmatrix} 72.81 & 30.74 & 8.06 \\ 32.81 & 8.06 & 14.69 \end{bmatrix}$$

#11 ~ #14 $\Delta \text{RAM} = -6.323 \pm 8 \text{ mm}$

clamp: 6.328 mm ram: 51.95 mm -28.46 kN

$$\text{0007.tr} \quad \alpha = \begin{bmatrix} 178.30 & -294 & 17.51 \\ 136.34 & 3.01 & 0 \end{bmatrix} \quad \alpha^{\text{err}} = \begin{bmatrix} 26.69 & 25.00 & 6.56 \\ 26.69 & 6.56 & 16.94 \end{bmatrix}$$

#75 #96 $\Delta \text{RAM} = -1.809382 \text{ mm}$

clamp: 6.279 mm ram: 50.15 mm -42 kN

$$\text{0008.tr} \quad \alpha = \begin{bmatrix} 202.18 & -3.56 & 14.24 \\ 149.88 & 2.21 & 0 \end{bmatrix} \quad \alpha^{\text{err}} = \begin{bmatrix} 24.75 & 23.13 & 6.08 \\ 24.75 & 6.08 & 11.00 \end{bmatrix}$$

#91 #115 $\Delta \text{RAM} = -1.467587 \text{ mm}$

clamp: 6.274 mm ram: 48.68 mm -56 kN

$$\text{0009.tr} \quad \alpha = \begin{bmatrix} 223.79 & -9.60 & 11.11 \\ 161.51 & 2.41 & 0 \end{bmatrix} \quad \alpha^{\text{err}} = \begin{bmatrix} 19.49 & 18.20 & 4.79 \\ 19.49 & 4.79 & 9.72 \end{bmatrix}$$

ref fracture

24.00	120	$\rightarrow 0010. tr \rightarrow$ failed focus on a wrong region.	# 212 ~ # 222	$\Delta RAM: -0.663773 mm$	121
By the email	# 116 ~ # 133	$\Delta RAM: -1.24 mm$ clamp: 6.190 mm ram: 47.44 mm -69.3 kN	0018. tr	$\alpha = \begin{bmatrix} 237.82 & -6.67 & 8.44 \\ 164.59 & -1.00 & 0 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 15.28 & 14.32 & 3.75 \\ 15.28 & 3.75 & 6.84 \end{bmatrix}$
Young	0018. tr	$\alpha = \begin{bmatrix} 237.61 & -9.28 & 6.60 \\ 157.13 & 2.24 & 0 \end{bmatrix}$	0019. tr	$\alpha = \begin{bmatrix} 235.15 & -2.15 & 8.56 \\ 181.50 & -1.20 & 0 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 14.90 & 13.96 & 3.66 \\ 14.90 & 3.66 & 6.67 \end{bmatrix}$
# 134 ~ # 148		$\Delta RAM: -1.094506 mm$ clamp: 6.149 mm ram: 46.36 mm -80. kN	# 223 ~ # 232	$\Delta RAM: -0.626048 mm$ clamp: 5.947 mm ram: 40.96 mm -141 kN	
0012. tr	$\alpha = \begin{bmatrix} 250.43 & -9.68 & 6.93 \\ 147.05 & 3.93 & 0 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 15.76 & 14.76 & 3.89 \\ 15.76 & 3.87 & 7.05 \end{bmatrix}$	0020. tr	$\alpha = \begin{bmatrix} 248.39 & -4.81 & 13.65 \\ 183.78 & -0.52 & 0 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 17.56 & 16.45 & 4.32 \\ 17.56 & 4.32 & 7.86 \end{bmatrix}$
# 149 ~ # 163		$\Delta RAM: -0.970173 mm$ clamp: 6.113 mm ram: 49.38 mm -91. kN	# 243 ~ # 252	$\Delta RAM: -0.552145 mm$ clamp: 5.907 mm ram: 39.82 mm -(92 kN)	
0013. tr	$\alpha = \begin{bmatrix} 236.33 & 8.54 & 2.96 \\ 156.30 & 3.21 & 0 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 8.37 & 2.06 & 2.06 \\ 8.37 & 2.06 & 3.75 \end{bmatrix}$	0021. tr	$\alpha = \begin{bmatrix} 237.41 & 1.55 & 13.55 \\ 158.16 & -2.23 & 0 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 16.75 & 15.69 & 4.12 \\ 16.75 & 4.12 & 7.50 \end{bmatrix}$
# 164 ~ # 176		$\Delta RAM: -0.875985 mm$ clamp: 6.081 mm ram: 44.50 mm -101 kN	# 253 ~ # 261	$\Delta RAM: -0.530768 mm$ clamp: 5.891 mm ram: 39.29 -158 kN	
0014. tr	$\alpha = \begin{bmatrix} 236.86 & -4.01 & 5.31 \\ 175.00 & 1.18 & 0 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 6.35 & 9.95 & 1.96 \\ 6.35 & 1.96 & 2.84 \end{bmatrix}$	0022. tr	$\alpha = \begin{bmatrix} 2.256 & 1.34 & 17.17 \\ 162.91 & -2.30 & 0 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 16.54 & 15.50 & 4.07 \\ 16.54 & 4.07 & 7.40 \end{bmatrix}$
# 177 ~ # 188		$\Delta RAM: 0.802355 mm$ clamp: 6.049 mm ram: 43.10 mm -111 kN	# 262 ~ # 336	$\Delta RAM: -6.9965444 mm$ clamp: 5.723 mm ram: 32.29 mm -210 kN	
0015. tr	$\alpha = \begin{bmatrix} 253.89 & 8.86 & 7.33 \\ 167.56 & 1.78 & 0.00 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 13.81 & 12.94 & 7.39 \\ 13.81 & 3.39 & 6.18 \end{bmatrix}$	0023. tr	$\alpha = \begin{bmatrix} 193.22 & 17.15 & 13.11 \\ 145.91 & -2.99 & 0 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 14.19 & 13.30 & 3.49 \\ 14.19 & 3.49 & 6.35 \end{bmatrix}$
# 189 ~ # 200		$\Delta RAM: 0.755446 mm$ clamp: 6.021 mm ram: 42.94 mm -118 kN	# 327 ~ # 389	$\Delta RAM: -4.898968 mm$ clamp: 5.688 mm ram: 27.40 mm -217 kN	
0016. tr	$\alpha = \begin{bmatrix} 249.59 & 1.79 & 7.06 \\ 162.79 & -0.46 & 0.00 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 9.31 & 8.72 & 2.29 \\ 9.31 & 2.29 & 4.17 \end{bmatrix}$	0024. tr	$\alpha = \begin{bmatrix} 180.38 & 16.91 & 8.41 \\ 154.08 & 1.35 & 0 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 5 & 4.68 & 1.23 \\ 5.00 & 1.23 & 2.24 \end{bmatrix}$
# 201 ~ # 211		$\Delta RAM: 0.692796 mm$ clamp: 5.995 mm ram: 42.25 mm -127 kN	# 390 ~ # 432	$\Delta RAM: -3.894255 mm$ -fractured.	
0017. tr	$\alpha = \begin{bmatrix} 246.87 & 9.95 & 5.81 \\ 163.95 & 2.20 & 0 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 13.20 & 12.37 & 7.24 \\ 13.20 & 3.24 & 5.91 \end{bmatrix}$	0025. tr	$\alpha = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$	$\alpha_{err} = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$

24.00

122

By the
email s#
clamp:SRAM ~2.544941mm
ram:

Youngi

0026.tr

$$\alpha = \begin{bmatrix} & \\ & \end{bmatrix} \quad \delta_{\text{er}} = \begin{bmatrix} & \\ & \end{bmatrix}$$

(P1) July 11/12

(P2) July 18

(P3) July 23

(P4) July 24

(P5) July 26

B steel

A steel

B steel

A steel

BD 1.9

BD 1.0

PS RD 0.9

PS RD 4.0

PS TD 1.0

PS TD 1.5

July 23

- DIC calibration

On # On

0.09

21, 5, 16, 26, 29, 30, 31, 32, 54, 55, 56, 63, 64, 66, 67, 69, 72, 73, 74, 75,
81, 48, 2, 83, 84, 85, 86, 87, 88, 91, 92, 93, 103 ~ 109

R9

B steel

Balanced
biaxial.

On 62

0, 17, 26, 32, 40, 41, 48, 49, 50, 51, 53, 55, 56, 57, 58, 59, 60,

cav1 cav2

0.029

23 JUL 12 - 001.tr powder

$$\alpha = \begin{bmatrix} 9.41 & 4.16 & 5.51 \\ 3.18 & -5.06 & 0 \end{bmatrix} \quad \delta_{\text{er}} = \begin{bmatrix} 6.21 & 5.82 & 1.53 \\ 6.21 & 1.53 & 2.78 \end{bmatrix}$$

0002.gain

$$\alpha = \begin{bmatrix} 19.68 & 9.19 & 4.73 \\ 17.03 & -4.85 & 0 \end{bmatrix} \quad \delta_{\text{er}} = \begin{bmatrix} 7.43 & 6.96 & 1.83 \\ 7.43 & 1.83 & 3.33 \end{bmatrix}$$

0003.tr powder

$$\alpha = \begin{bmatrix} 41.45 & 3.13 & 5.61 \\ -24.77 & -7.21 & 0 \end{bmatrix} \quad \delta_{\text{er}} = \begin{bmatrix} 2.14 & 2.01 & 0.53 \\ 2.14 & 0.53 & 0.96 \end{bmatrix}$$

0004.gain

$$\alpha = \begin{bmatrix} 36.29 & 4.10 & 4.06 \\ -27.96 & -7.91 & 0.0 \end{bmatrix} \quad \delta_{\text{er}} = \begin{bmatrix} 4.41 & 4.19 & 1.10 \\ 4.41 & 1.10 & 2.0 \end{bmatrix}$$

0005.tr

$$\alpha = \begin{bmatrix} -2.06 & 14.44 & 4.32 \\ -2.91 & -3.27 & 0 \end{bmatrix} \quad \delta_{\text{er}} = \begin{bmatrix} 1.52 & 1.42 & 0.37 \\ 1.52 & 0.37 & 0.68 \end{bmatrix}$$

#0 - align.

#1 - clamp

#2 - ram touch 10.98mm 4kN

#3 - clamp at -380kN

#4 - ram touch 6.362 -141kN 58.17mm -0.156N

#5 - clamp at -460kN 6.253mm -400kN "

#6 - ram touch 6.362 -141kN 58.17mm -0.156N

#7 - clamp at -460kN 6.253mm -400kN "

#8 - ram touch 6.362 -141kN 58.17mm -0.156N

#9 - clamp at -460kN 6.253mm -400kN "

#10 - ram touch 6.362 -141kN 58.17mm -0.156N

24.00-12

128

161.83 27.36 26.17
41.63 19.908.86 8.40
8.96 2.20
4.01

#113 #114

-0.802355
SRAM: -0.8759185 mmBy the v
email se
X-ray on them as-received surface

0006.tr

$$\begin{aligned} \text{phi} &= -55 \\ \theta &= -102 \end{aligned}$$

#6 ~#73

SRAM: -6.323818

clamp: 6.133 mm ram: 51.80mm -28. kN

$$\alpha = \begin{bmatrix} 217.23 & 18.99 & 16.18 \\ 176.76 & 18.76 & 0 \end{bmatrix} \quad e = \begin{bmatrix} 11.02 & 10.32 & 0.71 \\ 11.02 & 0.71 & 4.93 \end{bmatrix}$$

Youngur

#14 ~#15

SRAM: -1.805382

clamp: 6.084 mm ram: 50. mm -43.19 kN

$$0008.6 \quad \alpha = \begin{bmatrix} 181.33 & 6.15 & 13.45 \\ 185.68 & 18.33 & 0 \end{bmatrix} \quad e = \begin{bmatrix} 16.06 & 13.05 & 3.95 \\ 16.06 & 3.95 & 7.19 \end{bmatrix}$$

#96 ~#114

SRAM: -1.467587 mm

clamp: 6.030 mm ram: 48.53 mm -56 kN

$$0009.tr \quad \alpha = \begin{bmatrix} 197.89 & 0.55 & 9.76 \\ 191.60 & 18.65 & 0.0 \end{bmatrix} \quad e = \begin{bmatrix} 22.32 & 20.92 & 5.49 \\ 22.32 & 5.49 & 9.99 \end{bmatrix}$$

#115 ~#130

SRAM: -1.24 mm

clamp: 7.997 mm ram: 41.29 mm -70. kN

$$0010.tr \quad \alpha = \begin{bmatrix} 184.51 & 5.04 & 9.74 \\ 197.98 & 12.83 & 0.0 \end{bmatrix} \quad e = \begin{bmatrix} 16.79 & 15.73 & 4.13 \\ 16.79 & 4.13 & 7.52 \end{bmatrix}$$

#131 ~#145

SRAM: -1.094506 mm

clamp: 5.956 mm ram: 46.19 mm -82 kN

$$0011.tr \quad \alpha = \begin{bmatrix} 201.51 & -4.18 & 9.74 \\ 209.99 & 9.11 & 0.0 \end{bmatrix} \quad e = \begin{bmatrix} 12.11 & 11.35 & 2.98 \\ 12.11 & 2.98 & 5.42 \end{bmatrix}$$

#146 ~#159

SRAM: -0.970173 mm

clamp: 5.917 mm ram: 49.22 mm -94.44 mm

$$0012.tr \quad \alpha = \begin{bmatrix} 217.37 & 5.37 & 12.92 \\ 208.04 & 10.04 & 0.0 \end{bmatrix} \quad e = \begin{bmatrix} 10.83 & 10.15 & 2.66 \\ 10.83 & 2.66 & 4.85 \end{bmatrix}$$

#160 ~#172

SRAM: -0.8759185

clamp: 5.882 mm ram: 44.35 mm

$$0013.tr \quad \alpha = \begin{bmatrix} 219.80 & 4.92 & 6.85 \\ 209.99 & 12.86 & 0 \end{bmatrix} \quad e = \begin{bmatrix} -104.8 & 8.23 & 2.16 \\ 8.79 & 2.16 & 3.03 \end{bmatrix}$$

#113 ~#114

-0.802355

SRAM: -0.8759185 mm clamp: 5.849 mm ram: 43.99mm -114. kN

0014.tr

$$\alpha = \begin{bmatrix} 223.47 & 18.20 & 4.61 \\ 209.21 & 3.54 & 0.0 \end{bmatrix}$$

$$\alpha^e = \begin{bmatrix} 2.40 & 6.93 & 1.82 \\ 7.40 & 1.82 & 3.31 \end{bmatrix}$$

#115 ~#116

SRAM: -0.802355 mm

clamp: 5.818 mm ram: 42.70mm -123 kN

0015.tr

$$\alpha = \begin{bmatrix} 227.08 & 4.76 & 4.97 \\ 207.11 & 1.68 & 0.0 \end{bmatrix}$$

$$\alpha^e = \begin{bmatrix} 2.56 & 2.40 & 0.63 \\ 2.56 & 0.63 & 1.14 \end{bmatrix}$$

#117 ~#207

SRAM: -0.692796 mm

clamp: 9.190 mm ram: 42.10mm -132 kN

0016.tr

$$\alpha = \begin{bmatrix} 231.05 & 13.86 & 7.48 \\ 205.45 & 1.12 & 0 \end{bmatrix}$$

$$\alpha^e = \begin{bmatrix} 3.02 & 2.83 & 0.94 \\ 3.02 & 0.94 & 1.35 \end{bmatrix}$$

#208 ~#217

SRAM: -0.663773 mm

clamp: 5.764 mm ram: 41.43 mm -140 kN

0017.tr

$$\alpha = \begin{bmatrix} 236.4 & 1.35 & 4.5 \\ 202.78 & -1.65 & 0 \end{bmatrix}$$

$$\alpha^e = \begin{bmatrix} 5.21 & 4.88 & 1.28 \\ 5.21 & 1.28 & 2.33 \end{bmatrix}$$

#218 ~#227

SRAM: -0.626048 mm

clamp: 5.738 mm ram: 40.81mm -147 kN

0018.tr

$$\alpha = \begin{bmatrix} 235.89 & -6.78 & 5.42 \\ 193.35 & -0.41 & 0.0 \end{bmatrix}$$

$$\alpha^e = \begin{bmatrix} 3.65 & 3.42 & 0.90 \\ 3.65 & 0.90 & 1.63 \end{bmatrix}$$

#228 ~#238

SRAM: -0.587199 mm

clamp: 5.718 mm ram: 40.22mm -154 kN

0019.tr

$$\alpha = \begin{bmatrix} 237.9 & 11.07 & 9.37 \\ 189.68 & -2.52 & 0.0 \end{bmatrix}$$

$$\alpha^e = \begin{bmatrix} 4.48 & 4.19 & 1.10 \\ 4.48 & 1.10 & 2.00 \end{bmatrix}$$

#239 ~#249

SRAM: -0.552145 mm

clamp: 5.694 mm ram: 39.67 mm -161 kN

0020.tr

$$\alpha = \begin{bmatrix} 238.9 & 9.37 & 7.27 \\ 194.85 & -2.36 & 0.0 \end{bmatrix}$$

$$\alpha^e = \begin{bmatrix} 2.89 & 2.11 & 0.71 \\ 2.89 & 0.71 & 1.29 \end{bmatrix}$$

24.00-12

126 #246 ~#257 $\Delta RAM = -0.530768$
 clamp: 9.613mm ram: 39.14mm ~166 kN

By the w.
email sej
0021.tr

Youngur

#258

#

clamp:

ram:

 $\Delta RAM = -6.096544 \text{ mm}$ / fractured.

0022.tr

#

clamp:

 $\Delta RAM = -4.898968 \text{ mm}$

ram:

0023.tr

#

clamp:

 $\Delta RAM = -3.894255 \text{ mm}$

ram:

0024.tr

clamp:

 $\Delta RAM = -2.94491 \text{ mm}$

ram:

0025.tr

#

clamp:

 $\Delta RAM = -1.94491 \text{ mm}$

ram:

2012 July 24

→ DZL calibration

, 0.046

5, 6, 7, 8, 19, 16, 38, 41, 43, 48, 49, 56, 60
10, 035

- X-ray.

• triaxial 24JUL12_001.tr

 $\begin{bmatrix} 18.03 & 6.16 & 9.36 \\ 9.30 & -4.86 \\ -0.20 \end{bmatrix}$
 $\begin{bmatrix} 1.85 & 1.73 & 0.46 \\ 1.65 & 0.46 \\ 0.83 \end{bmatrix}$
• gain 24JUL12_002.gain
23.93 7.76 6.41
12.90 4.94
0.0

• triaxial 24 Jul 12 - 004.tr

 $\begin{bmatrix} 7.92 & 10.92 & 3.33 \\ -0.12 & 3.27 \\ 0 \end{bmatrix}$
 $\begin{bmatrix} 4.44 & 4.16 & 1.09 \\ 4.44 & 1.09 \\ 1.92 \end{bmatrix}$
 $\begin{bmatrix} 22.0 & 9.84 & 3.59 \\ 9.56 & -2.26 \\ 0 \end{bmatrix}$
 $\begin{bmatrix} 1.40 & 1.31 & 0.34 \\ 1.40 & 0.34 \\ 0.63 \end{bmatrix}$

• 0 gain: 0005.gain

 $\begin{bmatrix} 17.65 & 10.41 & 7.56 \\ -0.80 & -2.83 \\ 0 \end{bmatrix}, \begin{bmatrix} 3.95 & 3.70 & 0.97 \\ 3.95 & 0.91 \\ 1.11 \end{bmatrix}$

clamp: \rightarrow TD
 axes orientation \uparrow
 can can

#0

: align

#1

: flat

#2

: clamp = 350kN, 7.015mm ram: 77.46mm

#3

: ram touch

ram: 58.88 ~0.22kN

#4

: clamp at ~400kN

clamp: 6.186mm ram: " ~0.01 kN

#

24 JUL 12 - 006.tr

 $\alpha = \begin{bmatrix} 91.12 & 21.22 & 6.54 \\ 102.25 & -9.56 \\ 0 \end{bmatrix}$
 $\alpha \cdot \alpha^{-1} = \begin{bmatrix} 0.39 & 7.86 & 2.06 \\ 8.39 & 2.06 \\ 3.18 \end{bmatrix}$

fracture

4.00±12

2-103.

128

#52 #73 $\Delta RAM = -6.323818 \text{ mm}$
 clamp: 6.622 ram: 52.55mm -60.1kN

$$\text{av27.tr } \alpha = \begin{bmatrix} 310.29 & -7.80 & 3.90 \\ 334.53 & -1.87 & 0.0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 1.61 & 1.51 & 0.40 \\ 1.61 & 0.40 & 0.72 \end{bmatrix}$$

#14 ~#95 $\Delta RAM = -1.805382 \text{ mm}$
 clamp: 6.544 ram: 50.15mm -61.24kN

$$\text{av8.tr } \alpha = \begin{bmatrix} 290.83 & -6.11 & 4.23 \\ 334.23 & -8.39 & 0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 2.24 & 2.10 & 0.55 \\ 2.24 & 0.55 & 1.00 \end{bmatrix}$$

#96 ~#115 $\Delta RAM = -1.469587 \text{ mm}$
 clamp: 6.412 ram: 49.28mm -71kN

$$\text{av9.tr } \alpha = \begin{bmatrix} 304.74 & -11.22 & 2.33 \\ 330.14 & -6.25 & 0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 5.68 & 5.32 & 1.40 \\ 5.68 & 1.40 & 2.54 \end{bmatrix}$$

#116 ~#131 $\Delta RAM = -1.240020 \text{ mm}$
 clamp: 6.412mm ram: 48.04mm -98 kN

$$\text{av10.tr } \alpha = \begin{bmatrix} 343.03 & -8.89 & 3.12 \\ 371.09 & -4.33 & 0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 9.15 & 8.57 & 2.25 \\ 9.15 & 2.25 & 4.10 \end{bmatrix}$$

#132 ~#146 $\Delta RAM = -1.094506 \text{ mm}$
 clamp: 6.356mm ram: 46.95mm -114 kN

$$\text{av11.tr } \alpha = \begin{bmatrix} 319.50 & -15.41 & 2.95 \\ 343.71 & -9.66 & 0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 5.05 & 4.73 & 1.24 \\ 5.05 & 1.24 & 2.26 \end{bmatrix}$$

#147 ~#160 $\Delta RAM = -0.930143 \text{ mm}$
 clamp: 6.306mm ram: 45.98mm -129 kN

$$\text{av12.tr } \alpha = \begin{bmatrix} 235.83 & -12.55 & 3.64 \\ 331.66 & -7.61 & 0.0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 1.08 & 1.02 & 0.21 \\ 1.08 & 0.21 & 0.49 \end{bmatrix}$$

#161 ~#173 $\Delta RAM = -0.875985 \text{ mm}$
 clamp: 6.260 ram: 45.10mm -142 kN

$$\text{av13.tr } \alpha = \begin{bmatrix} 329.03 & -9.41 & 7.13 \\ 340.62 & -1.37 & 0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 8.23 & 7.71 & 2.02 \\ 8.23 & 2.02 & 3.68 \end{bmatrix}$$

#147 #185 $\Delta RAM = -0.802355 \text{ mm}$
 clamp: 6.217mm ram: 44.30mm -155.6kN

$$\text{av14.tr } \alpha = \begin{bmatrix} 359.33 & -8.94 & 2.90 \\ 333.07 & -1.94 & 0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 9.19 & 8.61 & 2.26 \\ 9.19 & 2.26 & 4.11 \end{bmatrix}$$

#186 ~#196 $\Delta RAM = -0.755448 \text{ mm}$
 clamp: 6.179 mm ram: 43.54mm -166 kN

$$\text{av15.tr } \alpha = \begin{bmatrix} 339.94 & -11.34 & 1.01 \\ 346.13 & -5.36 & 0.00 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 8.30 & 7.76 & 2.04 \\ 8.30 & 2.04 & 1.72 \end{bmatrix}$$

#197 ~#207 $\Delta RAM = -0.692496 \text{ mm}$
 clamp: 6.142 mm ram: 42.85mm -177 kN

$$\text{av16.tr } \alpha = \begin{bmatrix} 333.07 & 8.39 & 2.48 \\ 341.18 & -3.16 & 0.00 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 3.40 & 3.18 & 0.84 \\ 3.40 & 0.84 & 1.52 \end{bmatrix}$$

#208 ~#217 $\Delta RAM = -0.663773 \text{ mm}$
 clamp: 6.109mm ram: 42.19mm -187 kN

$$\text{av17.tr } \alpha = \begin{bmatrix} 727.91 & -16.40 & 3.26 \\ 358.03 & -3.06 & 0.0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 7.69 & 7.20 & 1.89 \\ 7.69 & 1.89 & 3.44 \end{bmatrix}$$

#218 ~#227 $\Delta RAM = -0.626048 \text{ mm}$
 clamp: 6.076mm ram: 41.56mm -196 kN

$$\text{av18.tr } \alpha = \begin{bmatrix} 351.28 & -14.42 & 0.14 \\ 338.77 & -7.54 & 0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 2.84 & 2.66 & 0.90 \\ 2.84 & 0.90 & 1.27 \end{bmatrix}$$

#228 ~#236 $\Delta RAM = -0.587199 \text{ mm}$
 clamp: 6.049mm ram: 40.97mm -205 kN

$$\text{av19.tr } \alpha = \begin{bmatrix} 348.91 & -16.60 & 2.71 \\ 346.71 & -1.83 & 0.0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 11.30 & 10.59 & 2.48 \\ 11.30 & 2.48 & 9.06 \end{bmatrix}$$

#237 ~#245 $\Delta RAM = -0.572145 \text{ mm}$
 clamp: 6.023mm ram: 40.42mm -212 kN

$$\text{av20.tr } \alpha = \begin{bmatrix} 339.92 & -1.12 & 3.51 \\ 350.58 & -4.59 & 0.0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 3.94 & 3.69 & 0.97 \\ 3.94 & 0.97 & 1.76 \end{bmatrix}$$

243

24.01

130

By t
ema

#246 ~#255

ΔRAM: ~0.530768

clamp: 6.001 mm

ram: 39.89 mm

-216 kN

$$\alpha = \begin{bmatrix} 342.85 & -13.19 & 0.92 \\ 391.21 & 8.59 & -0.2 \end{bmatrix} \quad \alpha_{err} = \begin{bmatrix} 9.41 & 5.13 & 1.34 \\ 5.41 & 1.34 & 2.45 \end{bmatrix}$$

256 ~#282

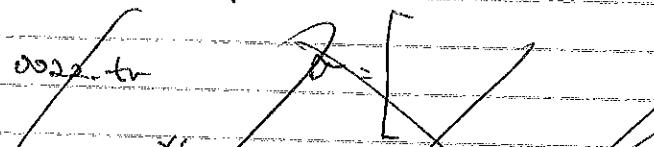
ΔRAM: ~6.996544

clamp:

ram: ~6.996544

Fractured.

0021.tr



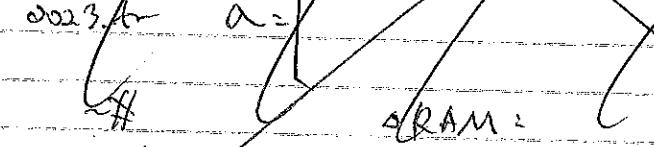
ΔRAM:

ram: ~4.898968

clamp:

ram: ~3.854255

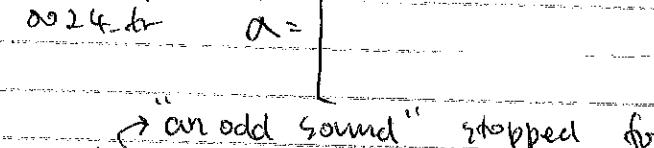
0023.mt



clamp:

ram: ~3.854255

0024.tr



clamp:

ram: ~3.854255

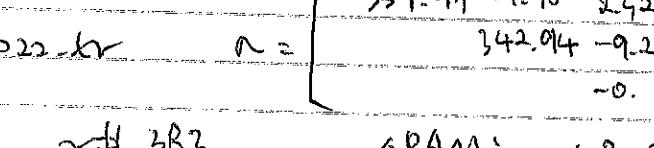
#256 ~#282 ~#327 "an odd sound" stopped for a while to inspect + resample. couldn't find fractured pt. Kept going on.

clamp: 5 mm

ram: 33.46

-282 kN

0022.tr



ΔRAM:

ram: ~4.898968 mm

clamp: 4.955 mm

ram: 28.96 mm -291 kN

0023.tr



ΔRAM:

ram: ~3.854255 mm

clamp: 5.190 mm

ram: 24.71 mm -276 kN

0024.tr



ΔRAM:

ram: ~3.854255 mm

clamp: 5.190 mm

ram: 24.71 mm -276 kN

430 ~#460

ΔRAM: ~2.544841 mm

clamp:

ram:

fractured.

131

July 25

B steel
PXRD

A steel BB

RP

TD

K

can can

Die calibration: 0.067

6, 7, 3, 9, 13, 18 ~ 22, 24 ~ 29, 34 ~ 35, 43 ~ 45

1

~0.034

X-ray powder check

1. 25 July 12 - 002.tr

$$\alpha = \begin{bmatrix} 19.16 & -11.69 & 1.56 \\ 1.65 & -10.48 & -0.03 \end{bmatrix}$$

$$\alpha_{err} = \begin{bmatrix} 0.59 & 0.56 & 0.15 \\ 0.59 & 0.15 & 0.21 \end{bmatrix}$$

$$2. 25 July 12 - 003.mt$$

$$\alpha = \begin{bmatrix} 19.91 & -13.21 & 2.58 \\ 3.49 & -10.98 & -0.0 \end{bmatrix}$$

$$\alpha_{err} = \begin{bmatrix} 0.16 & 0.15 & 0.04 \\ 0.16 & 0.04 & 0.01 \end{bmatrix}$$

$$3. 25 July 12 - 004.tr$$

$$\alpha = \begin{bmatrix} 31.54 & -5.40 & 7.80 \\ -8.71 & -4.69 & 0. \end{bmatrix}$$

$$\alpha_{err} = \begin{bmatrix} 6.54 & 6.13 & 1.61 \\ 6.54 & 1.61 & 2.93 \end{bmatrix}$$

$$4. 25 July 12 - 005.tr$$

$$\alpha = \begin{bmatrix} 21.60 & 8.24 & 6.43 \\ 0.95 & -7.25 & 0. \end{bmatrix}$$

$$\alpha_{err} = \begin{bmatrix} 7.32 & 6.85 & 1.80 \\ 7.32 & 1.80 & 3.21 \end{bmatrix}$$

$$5. \rightarrow failed..$$

$$6. 25 July 12 - 006.tr$$

powder check again

$$7. 25 JULY 12 - 007.mt$$

$$\alpha = \begin{bmatrix} 26.35 & 7.03 & 6.82 \\ 5.73 & -7.50 & 0. \end{bmatrix}$$

$$\alpha_{err} = \begin{bmatrix} 8.69 & 8.14 & 2.14 \\ 8.69 & 2.14 & 3.89 \end{bmatrix}$$

recheck

recheck

By
ema
You

132

#0 align time synced.

#1 flat

#2 clamp at $\sim -390\text{ kN}$ clamp: 6.965 mm $\sim 390\text{ kN}$
ram: 77.36 mm#3 ram touch. ram: 58.62 mm $\sim 0.8\text{ kN}$ #4 clamp at -400 kN clamp: 6.885 mm $\sim 400\text{ kN}$
ram: 78.82 mm $\sim 0\text{ kN}$

initial

25 JULY 2 - 009 br

$$\alpha = \begin{bmatrix} 180.3 & 0.96 & 4.15 \\ 111.44 & -6.30 & 0.00 \end{bmatrix}$$

powder
correction: 25JUL12-WOB.b

$$\alpha^e = \begin{bmatrix} 0.62 & 0.58 & 0.18 \\ 0.62 & 0.15 & 0.18 \end{bmatrix}$$

#61 ~ #78

ram: 52.23 mm $\sim 43\text{ kN}$ load dropped to: * ram: 52.49 mm $\sim 25\text{ kN}$ \rightarrow 0012.4

$$\#79 \quad (202.23 \ 6.09 \ 2.92) \begin{bmatrix} 441.414 & 1.08 \\ 304.62 & 4.12 \end{bmatrix} + \text{gain} \rightarrow \begin{bmatrix} 216.03 & 218.34 \\ 247.73 & 5.79 \end{bmatrix} \begin{bmatrix} 3.34 & 3/3 0.82 \\ 3.34 & 0.82 \end{bmatrix}$$

#80 Back to ram: 52.23 mm, 52.49

RAM: 0.26 $\frac{-52.23}{2.6}$ (ram: 52.23 mm, $\sim 42\text{ kN}$
clamp: 6.698 mm)

0013.tr

$$\alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

$$\alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

53.23
72.23

hit a wrong button... now ram is at

~~* 52.01 mm $\sim 46\text{ kN}$~~

#81 ~ #84 all same.

0014.tr

#5 ~ #60 SRAM: -5.218784 clamp: 6.163 mm ram: 53.0 mm $\sim 30.07\text{ kN}$

$$0010.tr \quad \alpha = \begin{bmatrix} 339.32 & -3.21 & 2.44 \\ 319.14 & 3.41 & 0 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 1.17 & 0.66 & 0.44 \\ 1.17 & 0.44 & 0.79 \end{bmatrix}$$

#61 ~ #78 SRAM: -1.374612 mm clamp: 6.107 mm ram: 52.23 mm $\sim 43\text{ kN}$

$$0011.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#79 ~ #85 SRAM: -1.108632 mm clamp: ram:

$$0012.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#85 ~ #87 SRAM: -0.979265 mm clamp: ram:

$$0013.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#87 ~ #89 SRAM: -0.810370 mm clamp: ram:

$$0014.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

failed... bump at

0015.tr \rightarrow checking psi is off.0016.tr \rightarrow forgot to increase the exposure time..

$$0017.tr \quad \alpha = \begin{bmatrix} 336.45 & 6.04 & 2.15 \\ 326.31 & -8.56 & 0.00 \end{bmatrix} \quad \alpha^e = \begin{bmatrix} 212.14 & 0.52 \\ 2.10 & 0.52 \\ 0.94 \end{bmatrix}$$

#85 ~ #87 SRAM: -1.108632 clamp: 6.636 mm ram: 50.90 mm $\sim 60.53\text{ kN}$

$$0018.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#89 ~ #91 SRAM: -0.979265 mm clamp: ram:

$$0019.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#91 ~ #93 SRAM: -0.810370 mm clamp: ram:

$$0020.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#93 ~ #95 SRAM: -0.641475 mm clamp: ram:

$$0021.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#95 ~ #97 SRAM: -0.472580 mm clamp: ram:

$$0022.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#97 ~ #99 SRAM: -0.303685 mm clamp: ram:

$$0023.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#99 ~ #101 SRAM: -0.134790 mm clamp: ram:

$$0024.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#101 ~ #103 SRAM: -0.005895 mm clamp: ram:

$$0025.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#103 ~ #105 SRAM: -0.005895 mm clamp: ram:

$$0026.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#105 ~ #107 SRAM: -0.005895 mm clamp: ram:

$$0027.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#107 ~ #109 SRAM: -0.005895 mm clamp: ram:

$$0028.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#109 ~ #111 SRAM: -0.005895 mm clamp: ram:

$$0029.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#111 ~ #113 SRAM: -0.005895 mm clamp: ram:

$$0030.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#113 ~ #115 SRAM: -0.005895 mm clamp: ram:

$$0031.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#115 ~ #117 SRAM: -0.005895 mm clamp: ram:

$$0032.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#117 ~ #119 SRAM: -0.005895 mm clamp: ram:

$$0033.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#119 ~ #121 SRAM: -0.005895 mm clamp: ram:

$$0034.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#121 ~ #123 SRAM: -0.005895 mm clamp: ram:

$$0035.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#123 ~ #125 SRAM: -0.005895 mm clamp: ram:

$$0036.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#125 ~ #127 SRAM: -0.005895 mm clamp: ram:

$$0037.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#127 ~ #129 SRAM: -0.005895 mm clamp: ram:

$$0038.tr \quad \alpha = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix} \quad \alpha^e = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

#129 ~ #131 SRAM: -0.005895 mm clamp: ram:

$$00$$

24.0

#108/35A

- By 1
ema
- #104 ~#182 $\Delta RAM = -0.580686$ clamp: 6.349 ram: 135 mm 89.66mm 135 KN
- 26JUL12_0009.tr $\alpha = \begin{bmatrix} 359.05 & -4.98 & 1.17 \\ 399.71 & -6.52 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 1.09 & 1.02 & 0.21 \\ 1.09 & 0.29 & 0.49 \\ 0.49 & 0 & 0 \end{bmatrix}$
- You #105 1 arm locate.
- #105 clamp at -46.61KN
- #106 ram to 90.9mm
- clamp: 6.511mm ram: 90.9mm -61.6KN
- 26JUL12_0002.tr $\alpha = \begin{bmatrix} 307.95 & 0.13 & 0.48 \\ 302.09 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$
- $\alpha = \begin{bmatrix} 320.62 & -2.60 & 1.36 \\ 318.91 & -6.97 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 6.39 & 5.99 & 1.57 \\ 6.39 & 1.57 & 2.86 \\ 0 & 0 & 0 \end{bmatrix}$
- #107 ~#191 $\Delta RAM = -0.748119$ clamp: 6.322 ram: 141.6KN
- 26JUL12_0010.tr $\alpha = \begin{bmatrix} 356.93 & -5.98 & 3.07 \\ 337.89 & -7.97 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 0.27 & 0.26 & 0.07 \\ 0.27 & 0.01 & 0.12 \\ 0.12 & 0 & 0 \end{bmatrix}$
- #108 ~#192 $\Delta RAM = -0.524722$ mm clamp: 6.3 ram: 44.39mm -149 KN
- 26JUL12_0011.tr $\alpha = \begin{bmatrix} 360.40 & -3.25 & 4.80 \\ 398.16 & -10.16 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 1.71 & 1.61 & 0.42 \\ 1.71 & 0.42 & 0.79 \\ 0.79 & 0 & 0 \end{bmatrix}$
- #109 ~#193 $\Delta RAM = -0.493620$ clamp: 6.279 mm ram: 44.10mm +56KN
- 26JUL12_0012.tr $\alpha = \begin{bmatrix} 355.16 & -21.79 & 0.43 \\ 354.34 & -7.91 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 10.44 & 9.98 & 2.56 \\ 10.44 & 2.56 & 4.67 \\ 4.67 & 0 & 0 \end{bmatrix}$
- #110 ~#194 $\Delta RAM = -0.466705$ clamp: 6.268 mm ram: 43.64mm +63.6KN
- 26JUL12_0013.tr $\alpha = \begin{bmatrix} 365.01 & -8.49 & 0 \\ 355.03 & 0.09 & 1.22 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 1.26 & 1.18 & 0.31 \\ 1.26 & 0.31 & 0.56 \\ 0.56 & 0 & 0 \end{bmatrix}$
- #111 ~#195 $\Delta RAM = -0.439469$ clamp: 6.240 ram: 43.18mm -170.6KN
- 26JUL12_0014.tr $\alpha = \begin{bmatrix} 338.11 & 0.57 & 1.72 \\ 360.64 & -1.08 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 3.97 & 3.72 & 0.98 \\ 3.97 & 0.98 & 1.76 \\ 1.76 & 0 & 0 \end{bmatrix}$
- #112 ~#196 $\Delta RAM = -0.407116$ clamp: 6.466 mm ram: 48.27mm -95 KN
- 26JUL12_0009.tr $\alpha = \begin{bmatrix} 311.01 & 6.48 & 0.62 \\ 343.95 & -6.34 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 1.25 & 1.17 & 0.31 \\ 1.25 & 0.31 & 0.56 \\ 0.56 & 0 & 0 \end{bmatrix}$
- #113 ~#197 $\Delta RAM = -0.378095$ clamp: 6.434 mm ram: 47.54mm -107 KN
- 26JUL12_0006.tr $\alpha = \begin{bmatrix} 324.3 & -9.03 & 0.18 \\ 343.07 & -4.3 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 1.47 & 1.78 & 0.36 \\ 0.47 & 0.36 & 0.66 \\ 0.66 & 0 & 0 \end{bmatrix}$
- #114 ~#198 $\Delta RAM = -0.346045$ clamp: 6.405mm ram: 46.89 -119 KN
- 26JUL12_0007.tr $\alpha = \begin{bmatrix} 348.01 & 0.98 & 2.67 \\ 334.72 & -6.71 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 2.14 & 2.0 & 0.53 \\ 2.14 & 0.53 & 0.96 \\ 0.96 & 0 & 0 \end{bmatrix}$
- #115 ~#199 $\Delta RAM = -0.313611$ clamp: 6.378mm ram: 46.24 +25 KN
- 26JUL12_0008.tr $\alpha = \begin{bmatrix} 341.24 & -3.89 & 4.17 \\ 350.59 & -8.37 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 2.10 & 1.97 & 0.52 \\ 2.10 & 0.52 & 0.94 \\ 0.94 & 0 & 0 \end{bmatrix}$
- #116 ~#200 $\Delta RAM = -0.284046$ clamp: 5.816 ram: 29.64mm -274 KN
- 26JUL12_0017.tr $\alpha = \begin{bmatrix} 326.85 & -3.23 & 11.92 \\ 327.79 & -6.21 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ $\alpha^e = \begin{bmatrix} 1.49 & 1.40 & 0.37 \\ 1.49 & 0.37 & 0.69 \\ 0.69 & 0 & 0 \end{bmatrix}$

By t
ema

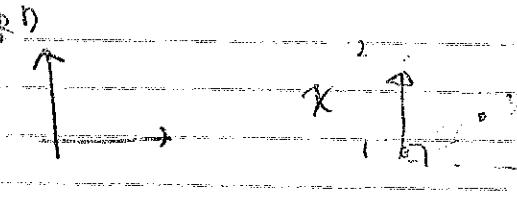
136 #361 z#609 4RAM clamp:

fractured

ram:

EVPS simulation.

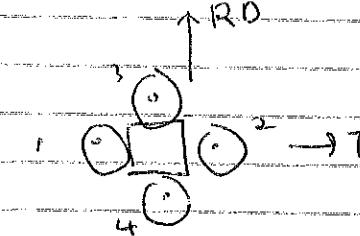
You

predict elastic constant
(intergranular strength)

137

try to see if separating - σ_{int} "possible?"

post-analysis of DIC



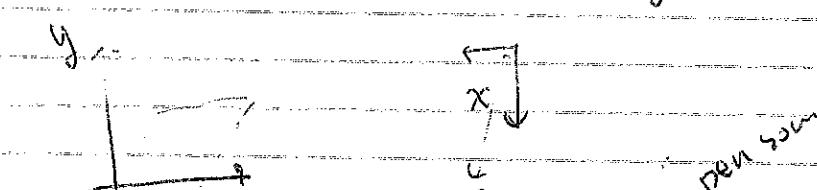
taking $\epsilon_{xx}, \epsilon_{yy}, \epsilon_{xy}$
from 1-4 points
for each sample

minute

xy

July 25 A_BB 'xy'

July 24 A_BB 'xy' x y 2 heads down.



open some
give a
temporary
license

match id: 25 25

fracture

fracture