

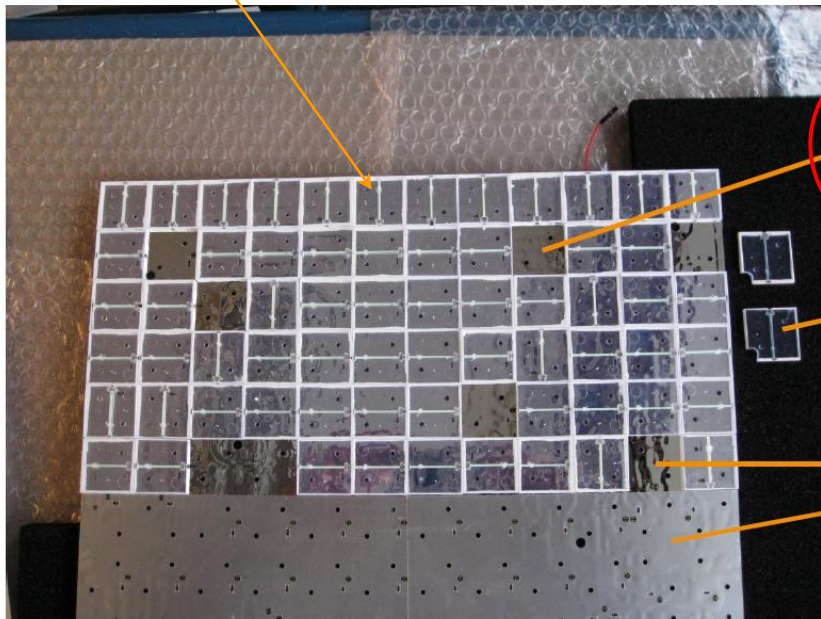
Studies of the AHCAL tile sizes

CALICE Main Meeting
@DESY 05.07.2010

Motivation

Tile Assembly – HBUII SPIROC2 area

Old tile version



Some positions
cannot be
assembled
(tiles do not fit in)

“mechanics tiles”
(cassette construction)

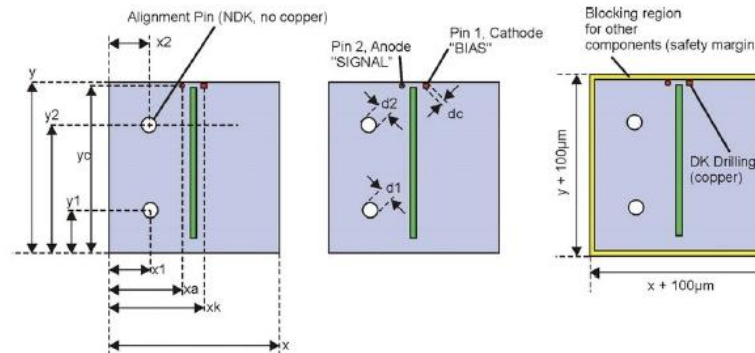
Reflector foil:
without cover (blank)
still with cover

Tile definition

Mathias Reinecke

Tile Definition for HBU Redesign (EUNET Layer module)

Dimensions taken from: email from Vladimir Rusinov, 31.3.2010:

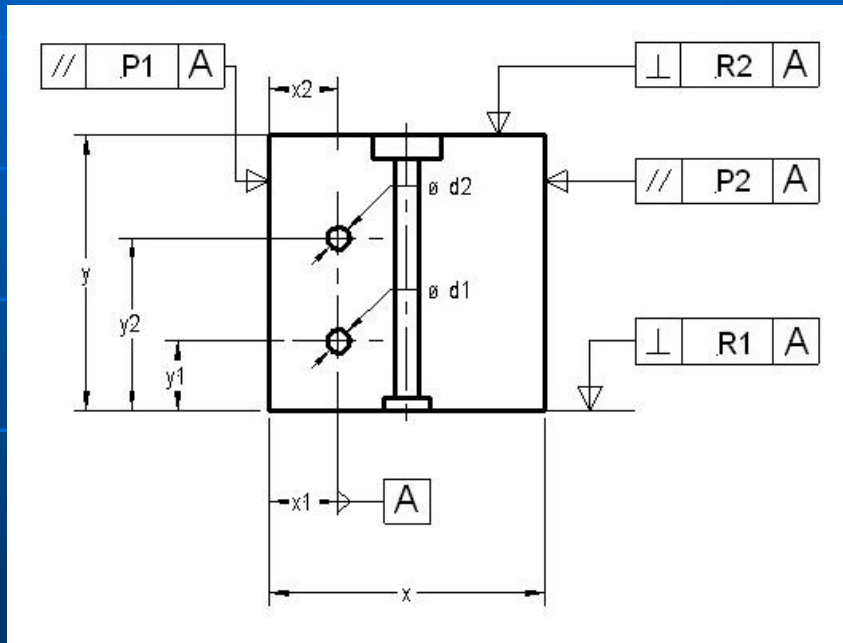


Tile will be plugged to the PCB's bottom side.
View here: Looking from top 'through' the PCB to the tile's top side.

These are the dimensions for the HBU PCB (drillings, outer dimensions, etc.):

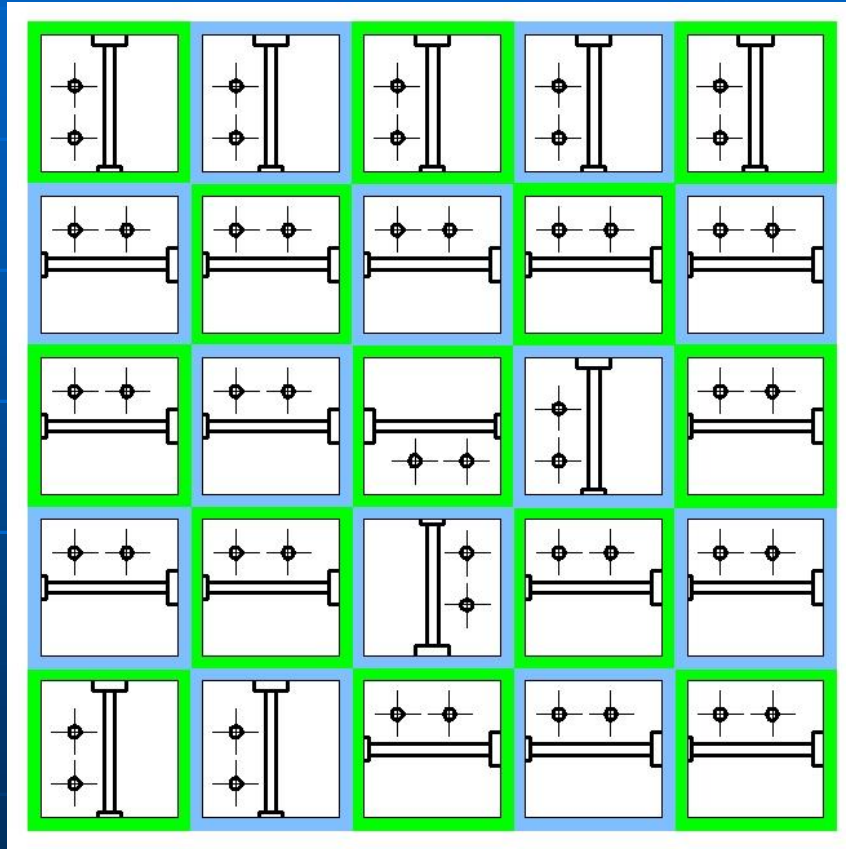
dimension	value (mm)	remark
x	30.02	including passivation (white border)
y	30.05	including passivation (white border)
x1	7.58	average value from 50-tiles-measurement
x2	7.61	average value from 50-tiles-measurement
y1	7.59	average value from 50-tiles-measurement
y2	18.59	average value from 50-tiles-measurement
xk	16.22	$xpd = xa - xk = 2.49mm$
xa	13.73	$xpd = xa - xk = 2.49mm$
yc	29.925	y minus half SiPM pin width. SiPM pin width = 0.25mm
d1	2.55	Loose Fit. Alignment Pin Width = 2.5mm
d2	2.55	Loose Fit. Alignment Pin Width = 2.5mm
dc	0.75	Compensates all mechanical tolerances. SiPM Pin Width: 0.25mm
green fiber	width: 1mm	only for clarity (not needed for HBU design)

Tile tolerances new version



	nominal Value	nominal dmin	nominal dmax	
y	30	-0,05	+0,05	mm
x	30	-0,05	+0,05	mm
t	3	-0,05	+0,05	mm
P1	0	-0,05	+0,05	mm
P2	0	-0,05	+0,05	mm
R1	0	-0,05	+0,05	mm
R2	0	-0,05	+0,05	
d1	2,5	-0,05	+0,05	mm
d2	2,5	-0,05	+0,05	mm
x1	7,5	-0,05	+0,05	mm
y1	7,5	-0,05	+0,05	mm
x2	7,5	-0,05	+0,05	mm
y2	18,5	-0,05	+0,05	mm

Tile tolerances in the group



- The gaps between the tiles will be
 - with x/y nominal
gap nominal = +0,1 mm
 - with dmax = +0,1 mm
gap min = ~0 mm
 - with dmin = -0,1 mm
gap max = ~0,2 mm
 - and everything in-between

Tile measurement setup

camera

video
measurement

microscope

motor controller

tile

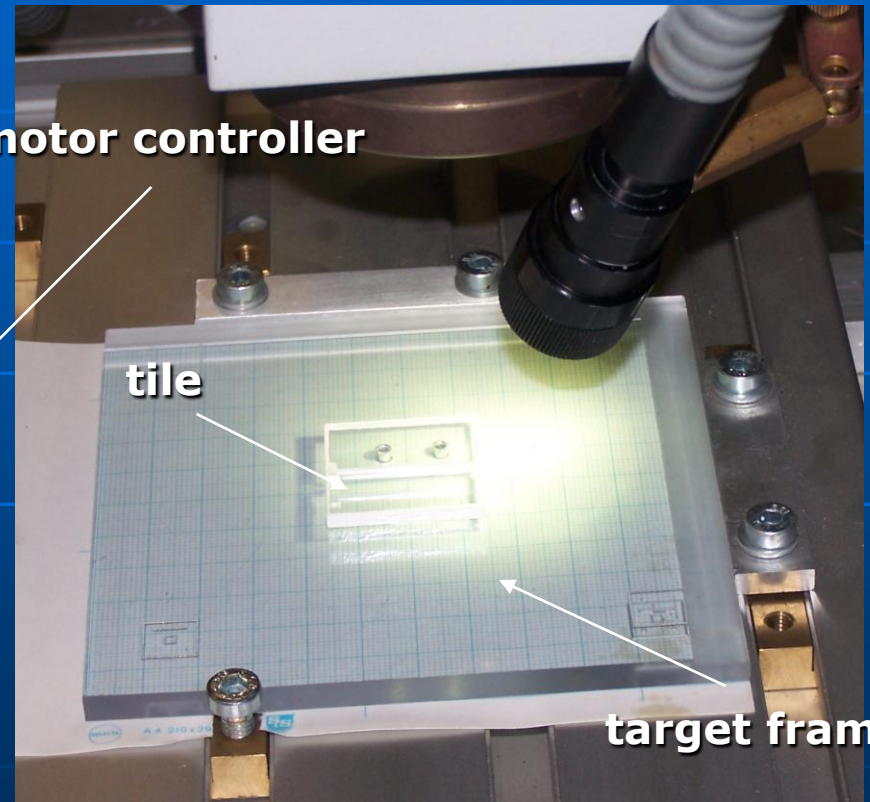
target frame

x/y table

05.07.2010

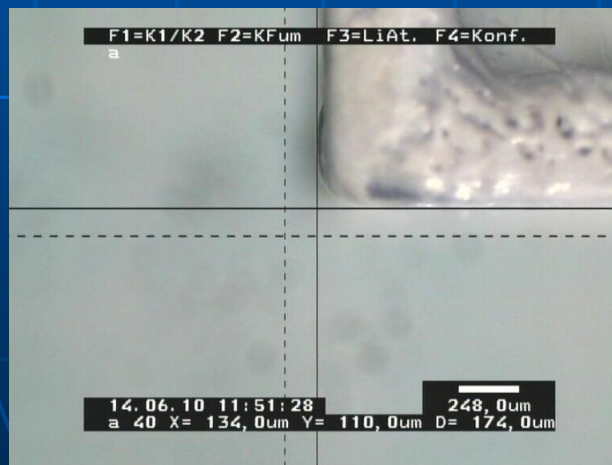
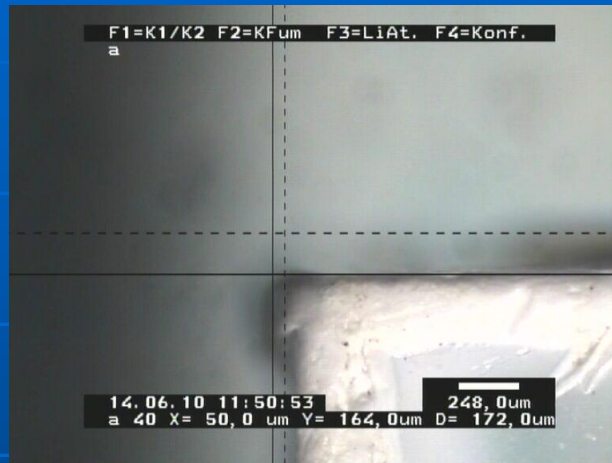
K.Gadow - DESY-FLC

6

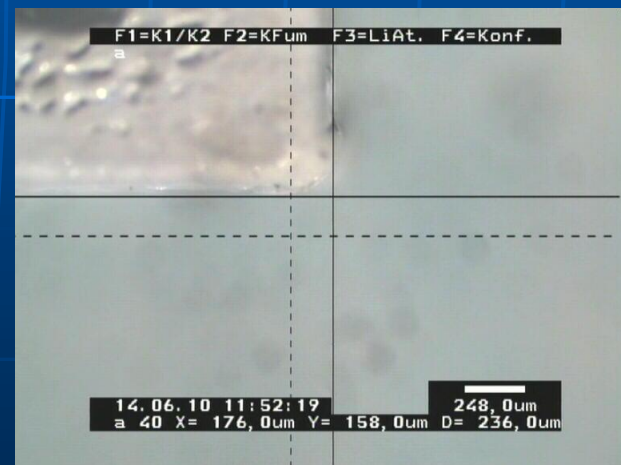
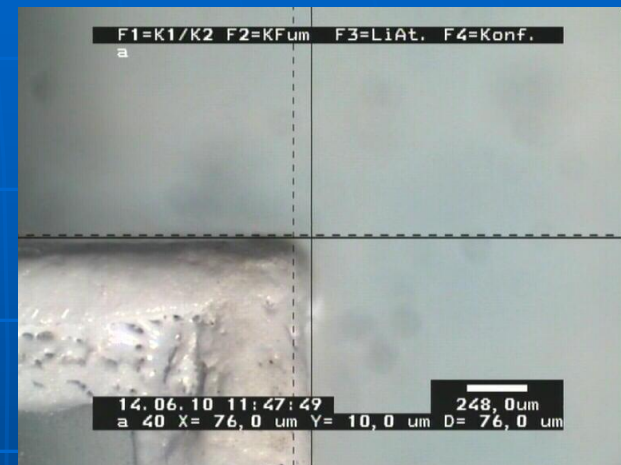


Measurement of tile no. 50

doted lines nominal



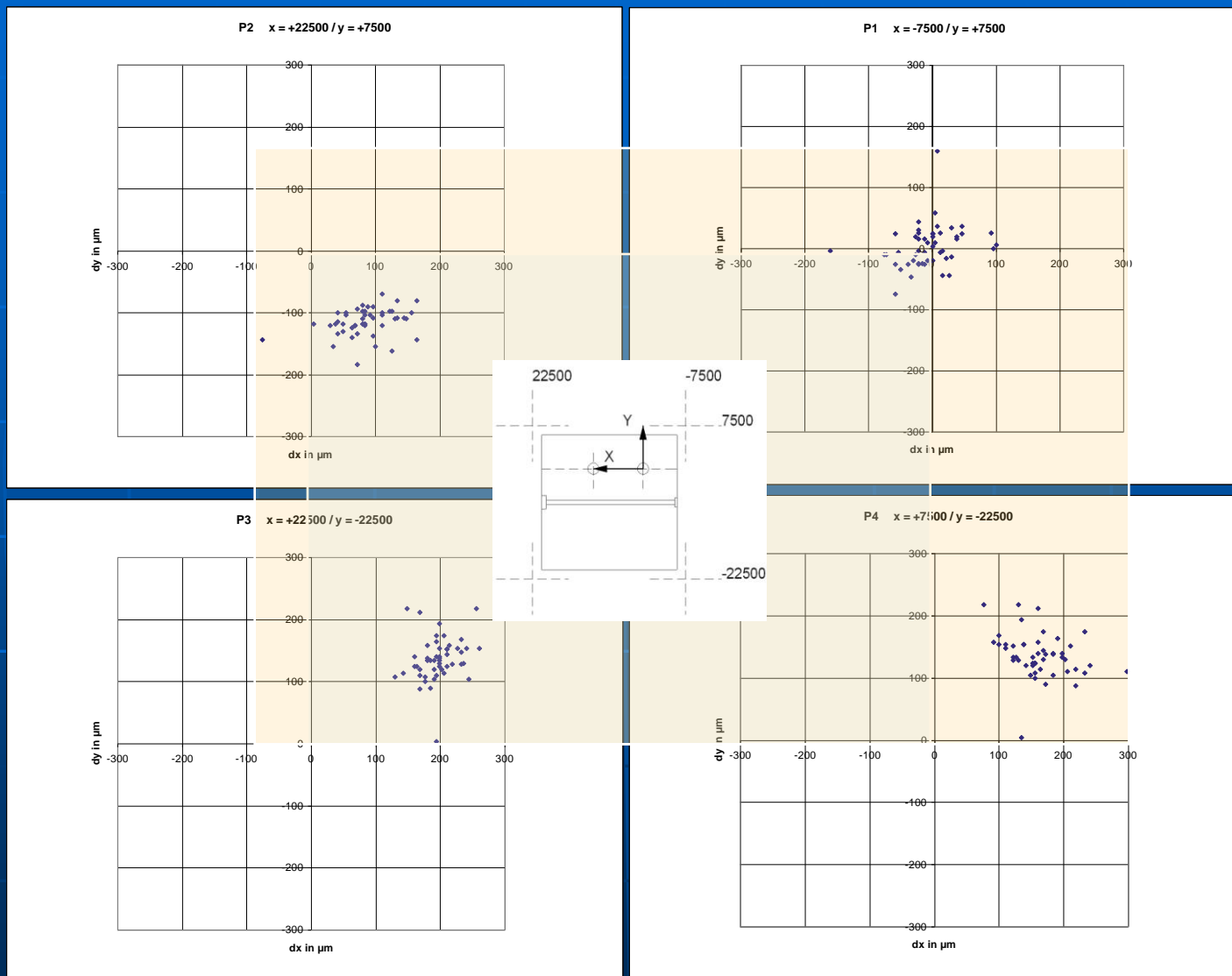
black lines offset



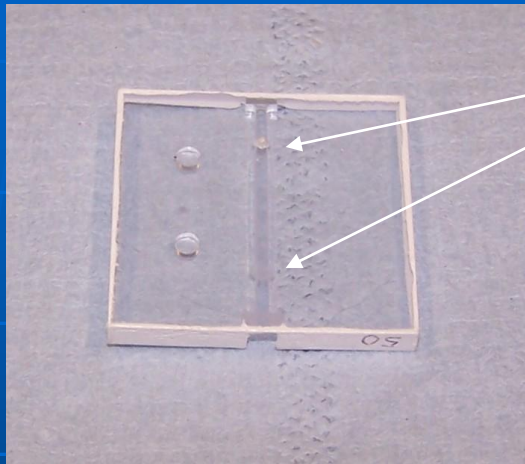
Measurement movie



Measurement results of 50 tiles

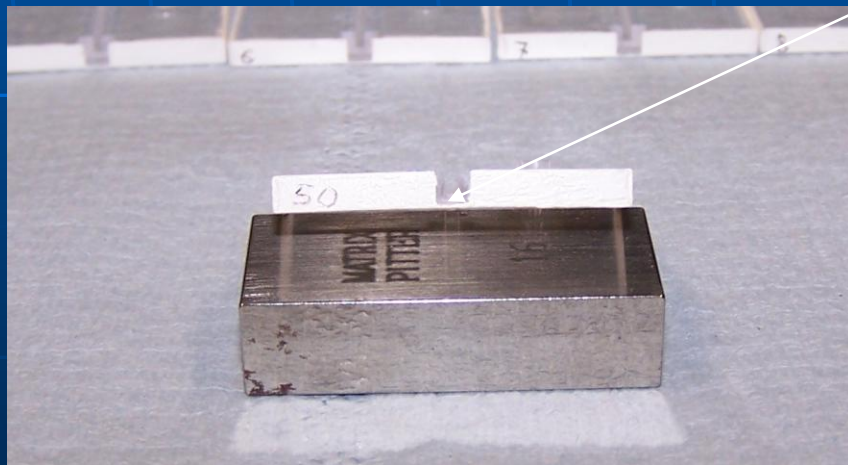


Tile thickness and flatness



- Injection points are out sticking

- Tile thickness increased between 3,1 mm up to 3,4 mm



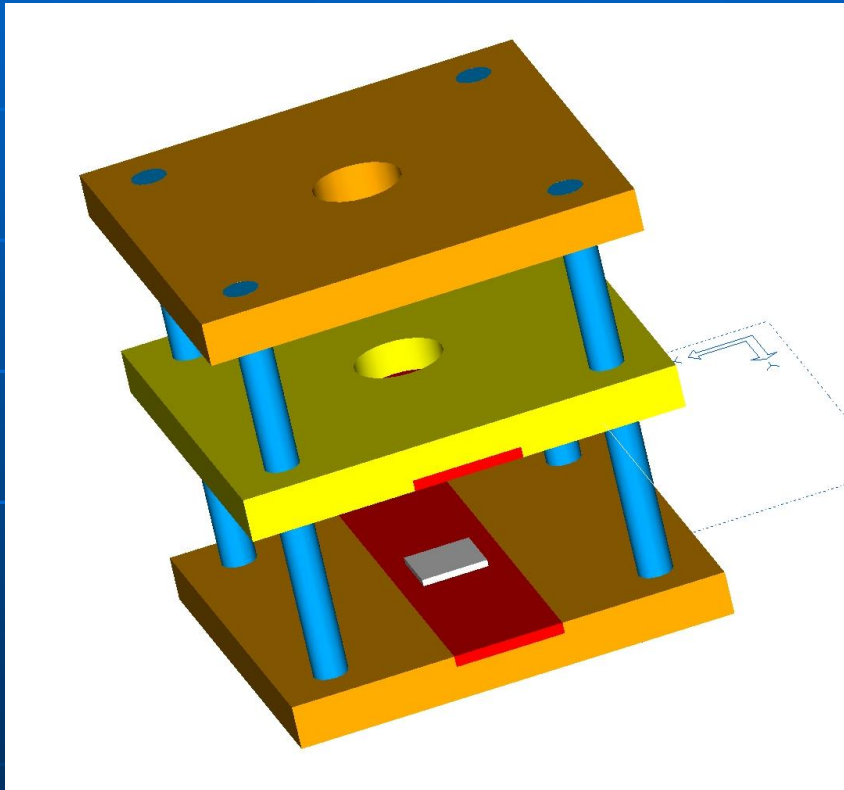
- Tiles are not flat

- this is not a serious problem, because this will go hopefully away, if the cassette will be assembled

Summary

- Standard measurements by hand are not useful, because tiles are not rectangular
- Position pins must be reference points
- Measuring tile dimensions like this, are time consuming
- Sorting to given tolerances are not practical due to high losses
- Increase of tolerances is not convenient due too large gaps
- The mould must be improved in reference to the position pins and parallelism
- The tile boundary with the existing mould, without sorting, must be $x / y = 30 + 600 \mu\text{m}$
- Gap can be up to 1 mm
- Injection points must be removed

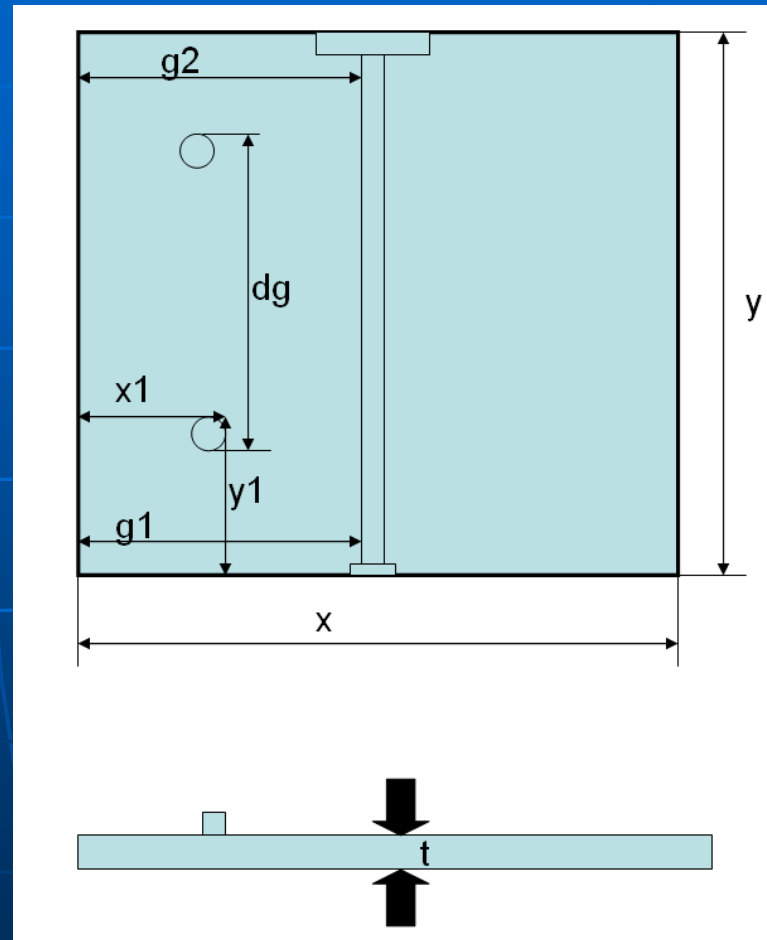
Outlook



- Tile gauge
 - check dimensions
 - sortingor
 - calibration
 - automatisisation

Backup

Vladimir Rusinov



Backup

Vladimir Rusinov

