Procedure for definition of nominal positions of optical marks

Revised version

In the following, a standard procedure is described to define the nominal position of optical marks to be recorded in the DB, starting from Run 2008. It is worth to recall that now both CS and brick scanning are performed in Local Coordinates.

Definitions:

a) Frontal X-Ray Spots: spots produced on plate 57 (most downstream one) by X-rays, and shared with the CS doublet. Their Local Coordinates are denoted as CS_MARK_X, CS_MARK_Y – **data available on the Central DBs in TB_TEMPLATEMARKSETS**.
b) CSMINX, CSMAXX, CSMINY, CSMAXY: extents of the bounding rectangle of the CS in Detector Coordinates – **data available on the Central DBs in TB_EVENTBRICKS**.
c) Optical Spots: spots produced on all plates by the gridding machine. Their Local Coordinates are denoted as SP_MARK_X, SP_MARK_Y – **data in TB_TEMPLATEMARKSETS**.
d) Lateral X-Ray Lines: lines produced by X-rays on all plates. Their Local Coordinates are denoted as LX_MARK_X, LX_MARK_Y – **data in TB_TEMPLATEMARKSETS**.
e) MINX, MAXX, MINY, MAXY: extents of the bounding rectangle of the brick in Detector Coordinates – **data in TB_EVENTBRICKS**
f) ZEROX, ZEROY, ZEROZ: Detector Coordinates of a reference point on the brick – **data in TB_EVENTBRICKS**.
g) LOCALMINX = MINX – ZEROX;
LOCALMAXX = MAXX – ZEROX;
LOCALMINY = MINY – ZEROY;
LOCALMAXY = MAXY – ZEROY;
LOCALMINZ = MINZ – ZEROZ;
LOCALMAXZ = MAXZ – ZEROZ;
h) Local coordinates are obtained from Detector Coordinates by subtraction of ZEROX, ZEROY, ZEROZ.

Procedure:

1) Get the CS information about CSMINX, CSMAXX, CSMINY, CSMAXY, and the associated CS_MARK_X, CS_MARK_Y for every CS mark.
2) Frontal X-Ray marks on brick have by definition the same Local Coordinates as on CS – this automatically implies also $ZEROX,ZEROY_{(brick)} = ZEROX,ZEROY_{(CS)}$.
3) Initialize a map in SySal2000 by acquiring CS marks.
4) Enter ManualChecks, and confirm the local CS position the Frontal X-Ray Mark acquired (this also initializes the map transformation).
5) Go to the Optical Spots / Lateral X-Ray Lines and take their positions by using the pointer on the alternate display. Pressing the "1" or "2" button on the keyboard retrieves the Local Coordinates of the Optical Spots / Lateral X-Ray Lines **already in the reference of the Frontal X-Ray Marks**. This makes the brick reference frame already consistent with the CS reference frame.
6) Go to the LOCALMINX, LOCALMINY corner of the brick (usually corresponds to the farther-right side of the plate, opposite in X to the notch and on the same Y side) and measure the position (again using "1" or "2"); do the same for LOCALMAXX, LOCALMAXY.
7) CHECK STEP (can be skipped): make a set of Lateral X-Ray marks/Optical Spots, using the coordinates acquired and step 5, then re-initialize SySal2000 with these marks, and verify that Frontal X-Ray marks are found exactly at their positions, within less than 20 micron – if not so, there is some mistake or some problem.
8) In the DB, for the brick, set:
$ZEROX_{(brick)} = ZEROX_{(CS)}$ (= CSMINX, by definition on CS);
$ZEROY_{(brick)} = ZEROY_{(CS)}$ (= CSMINY, by definition on CS);
MINX,Y = LOCALMINX,Y (measured coordinates at step 6) + ZEROX,Y;
MAXX,Y = LOCALMAXX,Y (measured coordinates at step 6) + ZEROX,Y;
9) In the DB, for TB_TEMPLATEMARKSETS, set mark positions to the Local Coordinates detected at step 5.