

## Prac 3: Alignment checks of the light and X-ray fields

**Location:** Room G24, Building 27 (dark room is Room G11 Building 27)

### Equipment required

- 18 x 24 cm cassette and film
- Collimator test tool
- Beam alignment test tool
- Tape measure

### Method

You will check whether the light beam coincides with the X-ray beam. There are two aspects; coincidence between the central rays, and coincidence around the edge of the rectangular field.

1. Place the loaded film cassette on a flat surface below the X-ray tube, and select a source-to-image distance (SID) of 100 cm.
2. Ensure that the X-ray tube anode-cathode (long) axis is parallel to the long axis of the film-screen cassette.
3. Place the beam alignment test tool (a plastic cylinder with a disc at the top and a ring near the bottom) in the centre of the illuminated area. Use the cross-hairs in the light field as guidance and make sure that the centre of the tool is in the middle of the light field.
4. Collimate the beam to cover a rectangular area inside the boundary of the cassette. Now mark the edges of the light field using radio-opaque objects (e.g., metal nails, paper clips, Pb strips, small coins etc).
5. Sketch the imaging geometry, paying special attention to note the SID, height of the collimator test tool, and the dimensions of the rectangular light field.
6. Set the following exposure parameters; 65 kVp, SID=100 cm, 10 mAs.
7. Expose the cassette to X-rays, then develop the film.

### Task

The tolerance for misalignment between the central rays is 1.5 degrees.

The edge tolerance is 1% of the SID.

Project these tolerances into lateral distances on the film (clue: draw a right-angled triangle, use  $\tan\theta = s/c$ , where c the height of the collimator test tool and s is the offset of the image of the disc).

What is the misalignment for the central ray (in mm at the SID, and in degrees)?

What is the misalignment for all 4 sides (top, right, left, base) along the edge of the light and X-ray fields (express this answer in cm and a percentage of the SID)?

Are these values within the required tolerance?