# Candidate Selection Exercises

## Introduction

Please find attached some images and exercises for testing which would be your proposals to solve some image analysis problems that we are currently facing in our system.

We are aware that the problems proposed are very general for giving you all the freedom for facing them.

We are not expecting a full VC++ code or to work a full week in it. We are expecting your ideas about it and to see some viability results using an image processing software tool (or your own code) for testing them. We would like to hear your proposal and to see some result images attached: both positives results (ideas that work and why) and negatives (ideas that don’t work and why).

## The images

We are using range imaging: the pixel’s value represents the depth value for this concrete position, not the color. The attached images are tiff 16bits x pixel files, where 0 represent the farthest depth from the camera. You can open and process them using for example ImageJ, Matlab, OpenCV or any other image processing software.

## Camera top

We would like to segment all the elements: we have 9 topboards (in vertical on the image) and 3 connection boards (in horizontal on the image).

* What strategies do you propose?
* Please note that some element could be missing. This should not affect to the element numbering (you could implement the numbering using different colors for each different board, for example).
* Note also that there are three possible types of Top Deck Configuration. Please check attached document 'B4840A Top Deck Configurations.pdf' for details.
* Please find attached Images from the three types of configurations.
* It’s important to show some results images.

## Camera bottom

1. Please find the attached images of baseboards with very thin and hardly visible cracks.

* We would like to emphasize them: what do you propose?
* Please note that first we need to emphasize them and then to detect that the element has a crack, binarizing the split.
* Images and cracks location in pixels:
  + B78 BB5, central horizontal element in the image, in its central part [approx. 800x920].
  + D82 BB3, left vertical element in the image [approx. 274x1300 and along its vertical axis].
  + D83 BB3, left vertical element in the image [approx. 318x697 and along its vertical axis].
  + E24 BB4, lower horizontal element in la image [approx., 665x1614].
  + E56 BB5, central horizontal element in the image, at its left part [approx. 540x1000].
  + E70 BB1, right vertical element in the image, in its lower part [approx. 1730x1440].

1. Please find now the attached images of baseboards with superficial scratches. They look like cracks but they are not.

* Detect them (binarize).
* How could we distinguish from the previous cracks? Note that a crack makes the element be defective and a scratch makes it not.
* Images and scratches location in pixels:
  + B58 BB1, right vertical element in the image, in its central part [approx. 1820x927].
  + D59 BB2, BB5 and BB4, horizontal elements in the image, in its central part [approx. 1078x440, 1037x1088, 1000x1622].