CHAPTER 4

STRATEGY ADOPTED

This work presents a methodology that uses an image processing or computer vision system to quantify the nature of surface of carbon-carbon composites which can be used for online inspection. It has been already established that so far the image processing or computer vision is used for conventional metallic materials machined conventionally and no work has been reported on the quantification of the surface finish for composite materials. To do so the following strategy is adopted.

➢ To verify the correctness and accuracy of method, experiments are conducted on machined OHNS specimens. These specimens are machined on vertical machining center (VMC-850) with different speeds and different feeds.

➢ To establish the datum for surface finish measurement of the carbon - carbon composites, graphite specimens, representing the same class of materials, are used. Different textured machined surfaces are obtained by preparing the holes on graphite specimens by changing the speeds and feeds on vertical machining center (VMC-430).

➢ To establish the methodology for surface finish measurement of carbon – carbon composite class of materials, experiments are carried out on machined surface of high density graphite specimens. Machined surfaces of graphite specimens are obtained by controlling the cutting parameters (speed and feed) on vertical machining (VMC-850).

➢ Experiments are conducted on machined carbon – carbon composites. Different surface roughness values are obtained by controlling the values of different EDM process variables namely pulse current, gap voltage and pulse-on-time.

In all these experiments, the images of different surface roughness are grabbed by CCD camera and stored into computer. Preprocessing (filtering) is done to remove the noise with the help of image processing tool of Matlab software. Histogram analysis and Fourier
analysis are carried out to find out the nature of surface that whether the surface is relatively smooth or coarse. Then optical parameters, gray level average Ga (before applying filter to images) and gray level average Gaf (after applying filter to images) are found out. These optical parameters are compared with surface roughness parameter ‘Ra’ which can be measured with conventional stylus instrument and a correlation is found out for each of the two cases which are mentioned above. Evaluation of surface roughness ‘Ra’ for carbon-carbon composite is done by extending the analysis of graphite specimens.