

~~We claim:~~ Claims

1. A method of performing surface processing on a three dimensional object using a robotic manipulator, with a stationary or mobile base, in a work environment comprising the steps of:
 - obtaining a base model of said three dimensional object;
 - generating a surface model from said base model by performing a surface scan of said three dimensional object and augmenting said base model with range data and surface property data obtained from said scan;
 - planning a temporal sequence of states of said robotic manipulator to maximize processing of said surface of said three dimensional object;
 - placing said robotic manipulator in each state in said sequence of states, and, for each state:
 - scanning said surface of said three dimensional ~~model-object~~ before said surface is processed to control or modulate a processing tool connected to said robotic manipulator;
 - processing said surface with said processing tool ; and
 - scanning said surface of said three dimensional ~~model-as-object~~ after said surface is ~~being~~ has been processed and updating said surface model with new surface property data;
 - adjusting said ~~set of positions and poses~~ temporal sequence of states for said robotic manipulator based on said updated surface model; and
 - continuing processing of said surface and said updating of said surface model until said surface reaches a desired state.
2. The method of claim 1 further comprising the steps of:
 - refining the position of said surface model ~~within~~ with respect to said work environment; and
 - refining the position of said robotic manipulator ~~within~~ with respect to said work environment.
3. The method of claim ~~1~~ 2 wherein said ~~robotic~~ robotic manipulator is mounted on a mobile base which is capable of moving ~~on a surface~~ with respect to said work environment.

14. The method of claim 1 wherein said robotic manipulator includes one or more sensors, and further wherein said surface property data is generated by said one or more sensors.
15. The method of claim 14 wherein said one or more sensors is selected from a group comprising multi-spectral cameras, color cameras, monochrome cameras and cameras with specific wavelength sensitivities.
16. The method of claim 14 wherein said one or more sensors is selected from a group comprising inspection sensors, including non-destructive inspection sensors, ultrasonic sensors, and eddy current based crack detection sensors.
17. The method of claim 1 wherein said temporal sequence of states of said robotic manipulator comprises a set of positions with respect to said work environment and poses.
18. The method of claim 1 wherein said step of planning a temporal sequence of states of said robotic manipulator includes maximizing the processing of said surface while avoiding a collision between said ~~the~~ three-dimensional object and other objects in said work environment.
19. The method of claim 1 wherein said step of planning a temporal sequence of states of said robotic manipulator precludes processing the same area of said surface more than once within a predetermined minimum period of time.
20. The method of claim 1 wherein said surface model consists of a set of two dimensional manifolds, each of said manifolds composed of a plurality of cells, each of said cells representing a physical unit of surface area and each of said cells having a set of properties associated therewith.
21. The method of claim ~~28~~20 where said properties associated with each of said cells includes the type of material and coating properties.