WHAT IS CLAIMED IS:

1. A system for machining a surface, the system comprising:

a cart comprising a cart body movable over a surface to be machined, the cart comprising an end effector extending from the cart body for machining the surface and an actuator for adjusting the position of the end effector;

a laser tracking system that measures the position of the end effector; and

a computer system adapted to store, before and during machining, a multitude of surface measurements and a representation of a shape to be achieved by machining and adapted to receive the end effector position, the computer system further adapted to generate commands for the actuator based on the end effector position and the machining shape and analyze the surface measurements to determine if sufficient machining has occurred at a first surface location.

2. The system of claim 1, wherein the cart comprises a travel mechanism adapted to move the cart over the surface to be machined.

3. The system of claim 2, wherein the travel mechanism comprises:

rollers adapted to contact and move the cart over the surface to be machined; and

a motor to drive the rollers.

4. The system of claim 1, further comprising a central station and an arm rotatably coupled to the central station and extending to the cart.

5. The system of claim 4, wherein the arm is adapted to cause the cart to move around the central station.

6. The system of claim 1, further comprising:

a mechanical linkage between the actuator and the end effector; and

a laser target coupled to the mechanical linkage.

7. The system of claim 6, wherein the laser target is adapted to determine the location and orientation of the end effector.

8. The system of claim 1, wherein the cart comprises a plurality of actuators for adjusting the orientation of the end effector.

9. The system of claim 1, wherein the laser tracking system comprises a laser source located away from the surface to be machined.

10. The system of claim 9, wherein the laser tracking system comprises a sensor located with the laser source and adapted to measure the location of the end effector.

11. The system of claim 1, wherein the computer system is further adapted to determine if sufficient machining has occurred at a first surface location.

~~12. The system of claim 11, wherein the computer system is adapted to store a plurality of surface measurements and analyze the surface measurements to determine if sufficient machining has occurred at a first surface location.~~

~~13~~12. The system of claim 11, wherein the computer system is further adapted to adjust the cart location when sufficient machining has occurred at a first surface location and initiate machining at a second surface location.

~~14~~13. A method for machining a surface, the method comprising:

retrieving a stored representation of a shape to be achieved by machining and a multitude of stored surface measurements;

machining a first surface location with an end effector, the end effector extending from a cart body that is movable over the surface and comprises an actuator for adjusting the position of the end effector;

measuring the position of the end effector with a laser tracking system; ~~and~~

generating commands for the actuator that positions the end effector, the commands generated based on the position of the end effector and the machining shape.; and

analyzing the surface measurements to determine if sufficient machining has occurred at a first surface location.

~~15~~14. The method of claim ~~14~~13, further comprising moving the cart body over the surface to be machined.

~~16~~15. The method of claim ~~14~~13, wherein measuring the position of the end effector comprises measuring the location and orientation of the end effector.

~~17~~16. The method of claim ~~14~~13, wherein measuring the position of the end effector comprises:

illuminating a laser target coupled to the end effector with a laser source; and

detecting the reflected laser beam with a sensor co-located with the laser source.

~~18~~17. The method of claim ~~17~~16, wherein the laser target is located between the actuator and the end effector.

~~19~~18. The method of claim ~~17~~16, wherein:

illuminating the laser target coupled to the end effector provides the orientation of the end effector; and

detecting the reflected laser beam with the sensor co-located with the laser source provides the location of the end effector.

~~20~~19. The method of claim ~~14~~13, further comprising determining if sufficient machining has occurred at the first surface location.

~~21~~20. The method of claim ~~20~~19, further comprising adjusting the location of the cart body when sufficient machining has occurred at the first surface location and initiating machining at a second surface location.

~~22. The method of claim 20, further comprising retrieving a plurality of surface measurements and analyzing the surface measurements to determine if sufficient machining has occurred at the first surface location.~~

~~23~~21. A system for machining a surface, the system comprising:

means for storing a representation of a shape to be achieved by machining and a multitude of stored surface measurements;

means for machining a surface at a first surface location, the machining means extending from a cart body that is movable over the surface to be machined;

laser means for measuring the position of the machining means; and

means for generating commands for a positioning means for the machining means based on the position of the end effector and the machining shape and analyzing the surface measurements to determine if sufficient machining has occurred at a first surface location.

~~24~~22. The system of claim ~~23~~21, further comprising means for moving the cart body over the surface to be machined.

~~25~~23. The system of claim ~~23~~21, wherein the laser means measures the location and orientation of the machining means to measuring the position of the machining means.

~~26~~24. The system of claim ~~23~~21, wherein the laser means comprises:

a laser source means;

a laser target means coupled to the machining means; and

a laser sensor means co-located with the laser source means.

~~27~~25. The system of claim ~~26~~24, wherein illuminating the laser target means provides the orientation of the machining means and detecting the laser beam at the laser sensor means provides the location of the machining means.

~~28~~26. The system of claim ~~26~~24, wherein the laser target means is located between the machining means and the positioning means.

~~29~~27. The system of claim ~~23~~21, further comprising means for determining if sufficient machining has occurred at the first surface location.

~~30~~28. The system of claim ~~29~~27, further comprising means for adjusting the surface location of the machining means when sufficient machining has occurred at the first surface location and initiating machining at a second surface location.

~~31. The system of claim 29, wherein the storage means is further operable to store a plurality of surface measurements and the machining determination means is further operable to analyze the surface measurements to determine if sufficient machining has occurred at the first surface location.~~

~~32~~29. A system for machining a surface, the system comprising:

a cart comprising a cart body movable in an automated manner over a surface to be machined, the cart comprising:

an end effector extending from the cart body for machining the surface,

a plurality of actuators for adjusting the position of the end effector,

a mechanical linkage between the actuators and the end effector,

a laser target coupled to the mechanical linkage, the laser target adapted to determine the orientation of the end effector when illuminated by a laser source,

rollers adapted to contact and move the cart over the surface to be machined, and

a motor to drive the rollers;

a central station with an arm rotatably coupled thereto and extending from the station to the cart, the arm adapted to cause the cart body to move around the central station;

a laser tracking system that measures the location and orientation of the end effector, the laser tracking system comprising a laser source located away from the surface to be machined and a sensor to measure the location of the end effector, the laser source illuminating the laser target on the linkage and, by reflection, the sensor; and

a computer system adapted to store, before and during machining, a multitude of surface measurements and a representation of a shape to be achieved by machining and adapted to receive the end effector location and orientation, the computer system further adapted to generate commands for the actuators based on the end effector location and orientation and the machining shape and analyze the surface measurements to determine if sufficient machining has occurred at a first surface location.