

CLAIMS

1. A laser processing system providing on-the-fly laser processing of a workpiece, said laser processing system comprising:
 - a positioning system configured to support the workpiece;
 - a positioning system controller configured to control movement of the workpiece on the positioning system;
 - a scanner system configured to scan a laser beam over the workpiece; and
 - a scanner controller configured to operate the scanner system and the positioning system controller, said scanner controller receiving vector input data for use in feed-forward position compensation.
2. The laser processing system as claimed in claim 1, wherein the vector input data is, in part, low pass filtered and provided at a reduced data rate.
3. The laser processing system as claimed in any of the preceding claims, wherein said scanner controller operates the scanner system at a positioning system delay compensated high data rate where scanner positioning is compensated by observation of the positioning system location and speed.
4. The laser processing system as claimed in any of the preceding claims, wherein the vector input data is provided along two different paths to provide the reduced data rate input to the positioning system controller and to provide the positioning system delay compensated high data rate input to the scanner controller.
5. The laser processing system as claimed in any of the preceding claims, wherein the system calculates a velocity and acceleration of the workpiece by integrating observed positional change over time.
6. The laser processing system as claimed in claim 5, wherein the system predicts future positions of the workpiece using the calculated velocity and acceleration of the workpiece.
7. The laser processing system as claimed in any of the preceding claims, wherein a higher bandwidth of the scanner system enables the positioning of galvanometer mirrors to be on a predicted path of the workpiece regardless of changes in velocity or position of the workpiece.

8. The laser processing system as claimed in any of the preceding claims, wherein upon job start, low-pass filtered reduced data rate input is provided to the positioning system controller at a rate that is not required to be synchronous with a positioning system delay compensated high data rate input to the scanner controller.
9. A laser processing system providing on-the-fly laser processing of a workpiece, said laser processing system comprising:
- a positioning system configured to support the workpiece;
 - a positioning system controller configured to control movement of the workpiece on the positioning system;
 - a scanner system configured to scan a laser beam over the workpiece; and
 - a scanner controller configured to operate the scanner system and the positioning system controller, said scanner controller determining an anticipated vector of the positioning system for use in feed-forward position compensation.
10. The laser processing system as claimed in claim 9, wherein the scanner controller operates the positioning system controller responsive to vector input data that is, in part, time-domain expanded and provided at a reduced data rate, said scanner controller operating the scanner system at a positioning system delay compensated high data rate.
11. The laser processing system as claimed in any of claims 9 - 10, wherein the reduced data rate and the stage delay compensated high data rate are synchronized.
12. The laser processing system as claimed in any of claims 9 - 11, wherein the vector input data is further low pass filtered to provide the reduced data rate.
13. The laser processing system as claimed in any of claims 9 - 12, wherein the vector input data is provided along two different paths to provide the reduced data rate input to the positioning system controller and to provide the positioning system delay compensated high data rate input to the scanner controller.
14. The laser processing system as claimed in any of claims 9 - 13, wherein the system calculates a velocity and acceleration of the workpiece by integrating positional change over time.

15. The laser processing system as claimed in any of claims 9 - 14, wherein the system predicts future positions of the workpiece.
16. The laser processing system as claimed in any of claims 9 - 15, wherein a higher bandwidth of the scanner system enables the positioning of galvanometer mirrors to be on a predicted path of the workpiece regardless of changes in velocity or position of the workpiece.
17. The laser processing system as claimed in any of claims 9 - 16, wherein upon job start, low-pass filtered reduced data rate input is provided to the positioning system controller at a rate that is not necessarily synchronous with the positioning system delay compensated high data rate input to the scanner controller.
18. A method of providing on-the-fly laser processing of a workpiece, said method comprising:
- providing a positioning system configured to support the workpiece;
 - providing a positioning system controller configured to control movement of the workpiece on the positioning system;
 - providing a scanner system configured to scan a laser beam over the workpiece;
 - providing a scanner controller configured to operate the scanner system and the positioning system controller;
 - operating the positioning system controller responsive to vector input data; and
 - operating the scanner system at a positioning system delay compensated high data rate.
19. The method as claimed in claim 18, wherein the vector input data is, in part, low pass filtered and provided at a reduced data rate.
20. The method as claimed in any of claims 18 - 19, wherein scanner positioning is compensated by observation of the positioning system location and speed.