Claims

What is claimed is:

1. A laser cladding tool head of a hybrid computer numerical control (CNC) machining center, comprising:

a shell body;

a shank portion disposed on a top of the shell body, and detachably combined with a tool holder chuck of the hybrid CNC machining center; and

a laser module including a laser input portion, a laser output portion, and a spectroscopic assembly, wherein the laser input portion is horizontally disposed on a side surface of the spectroscopic assembly, and the laser output portion is perpendicularly disposed on a bottom surface of the spectroscopic assembly; the spectroscopic assembly has a spectroscope; an exterior laser source horizontally inputs a laser beam through the laser input portion; and the laser beam is reflected downward by the spectroscope, and is outputted to a work-piece through the laser output portion;

wherein the laser cladding tool head further comprises:

a first sensing module including a first optical assembly and a first sensing element, wherein the first optical assembly has a half reflecting mirror disposed with a 45 degree inclination and above the spectroscopic assembly of the laser module; and the first sensing element is disposed beside the first optical assembly, and configured to detect a machined surface of a work-piece through the half reflecting mirror and the spectroscope; and

a second sensing module including a second optical assembly and a second sensing element, wherein the second optical assembly has a total reflecting mirror disposed with a 45 degree inclination and above the first optical assembly of the first sensing module; and the second sensing element is disposed beside the second optical assembly and above the first sensing element of the first sensing module, and configured to detect the machined surface of the work-piece through the total reflecting mirror, the half reflecting mirror and the spectroscope.

2. The laser cladding tool head according to Claim 1, wherein the first sensing element of the first sensing module is a temperature sensor; and the second sensing element of the second sensing module is a camera.

3. The laser cladding tool head according to Claim 1, wherein the first sensing element of the first sensing module is a camera; and the second sensing element of the second sensing module is a temperature sensor.

4. The laser cladding tool head according to Claim 1, wherein one end of the laser input portion is connected to the side surface of the spectroscopic assembly, and the other end thereof is disposed on a side surface of the shell body to form a laser entrance; and one end of the laser output portion is connected to the bottom surface of the spectroscopic assembly, and the other end thereof is disposed on a bottom surface of the shell body to form a laser exit.

~~5. The laser cladding tool head according to Claim 1, wherein the half reflecting mirror of the first optical assembly is disposed with a 45 degree inclination; and the total reflecting mirror of the second optical assembly is disposed with a 45 degree inclination.~~

~~6.~~5. A machined surface sensing method of a laser cladding tool head, comprising steps of:

providing a laser cladding tool head, which comprises: a laser module, a first sensing module, and a second sensing module; wherein the laser module includes a spectroscopic assembly having a spectroscope, an exterior laser source horizontally inputs a laser beam, and then the laser beam is reflected downward by the spectroscope to a work-piece; the first sensing module includes a first optical assembly, which has a half reflecting mirror disposed with a 45 degree inclination and above the spectroscopic assembly of the laser module, and a first sensing element, which is disposed beside the first optical assembly; and the second sensing module includes a second optical assembly, which has a total

reflecting mirror disposed with a 45 degree inclination and above the first optical assembly of the first sensing module, and a second sensing element, which is disposed beside the second optical assembly and above the first sensing element of the first sensing module;

operating the first sensing module, which is configured to detect a machined surface of a work-piece through the half reflecting mirror and the spectroscope; and

operating the second sensing module, which is configured to detect the machined surface of the work-piece through the total reflecting mirror, the half reflecting mirror and the spectroscope.

~~7.~~6. The machined surface sensing method of the laser cladding tool head according to Claim ~~6~~5, wherein the first sensing element of the first sensing module is a temperature sensor, and the second sensing element of the second sensing module is a camera; or the first sensing element of the first sensing module is a camera, and the second sensing element of the second sensing module is a temperature sensor.

~~8.~~7. The machined surface sensing method of the laser cladding tool head according to Claim ~~7~~6, wherein during processing a cladding operation on the machined surface of the work-piece, detecting a temperature of a molten pool of the machined surface by the temperature sensor, and providing the detected temperature of the molten pool to a computer numerical control unit, wherein if the temperature of the molten pool is under a default temperature, a power of the laser cladding tool head is increased; and if the temperature of the molten pool is over the default temperature, the power of the laser cladding tool head is decreased.

~~9.~~8. The machined surface sensing method of the laser cladding tool head according to Claim ~~7~~6, wherein during processing a cladding operation on the machined surface of the work-piece, detecting a lightness and profile of the molten pool of the machined surface by the camera, and providing the detected lightness and profile of the molten pool to a computer numerical control unit, wherein if the lightness and profile of the molten

pool is under a default condition, the power of the laser cladding tool head is increased; and if the lightness and profile of the molten pool is over the default condition, the power of the laser cladding tool head is decreased.

~~10.~~9. The machined surface sensing method of the laser cladding tool head according to Claim ~~7~~6, wherein during processing a cladding operation on the machined surface of the work-piece, firstly detecting a temperature of a molten pool of the machined surface by the temperature sensor, and providing the detected temperature of the molten pool to a computer numerical control unit, wherein if the temperature of the molten pool is under a default temperature, a power of the laser cladding tool head is increased; and if the temperature of the molten pool is over the default temperature, the power of the laser cladding tool head is decreased; and then detecting a lightness and profile of the molten pool of the machined surface by the camera, and providing the detected lightness and profile of the molten pool to the computer numerical control unit, wherein if the lightness and profile of the molten pool is under a default condition, the power of the laser cladding tool head is increased; and if the lightness and profile of the molten pool is over the default condition, the power of the laser cladding tool head is decreased.