The invention relates to a continuous casting mold comprising two narrow mold sides opposite each other and two longitudinal mold sides opposite each other, wherein at least one of the narrow mold sides can be moved towards or away from the opposite narrow mold side by hydraulic cylinders. The hydraulic cylinders can be actuated independently of each other and each comprises one cylinder and one piston rod moved therein. The piston rod is connected to the adjustable narrow mold side, wherein at least one hydraulic cylinder is provided with a device for detecting the position of the piston and thus is associated with the adjustment of the narrow mold side. In order to achieve a better determination of the position of the narrow mold side, the invention proposes that the device comprise a displacement sensor disposed parallel to the hydraulic cylinder that is designed such that the measuring path directly equals the displacement of the piston of the hydraulic cylinder.
Abstract

Continuous Casting Mold

The invention is directed to a continuous casting mold with two narrow mold sides opposite one another and two longitudinal mold sides opposite one another. At least one of the narrow mold sides is movable toward and away from the other by means of hydraulic cylinders on the opposite narrow mold side. The hydraulic cylinders can be actuated independently from one another and have, in each instance, a cylinder and a piston guided therein. The piston rod of the piston is connected to the narrow mold side that is to be displaced, and a device for acquiring the position of the piston and, therefore, the displacement of the narrow mold side, is associated with at least one of the hydraulic cylinders. In order to improve the determination of the position of the narrow mold side, it is proposed that the device comprises a displacement measuring system which is arranged parallel to the hydraulic cylinder and constructed in such a way that its measurement path directly corresponds to the displacement of the piston of the hydraulic cylinder.

Figure 3
CONTINUOUS CASTING MOLD

The invention is directed to a continuous casting mold with two narrow mold sides opposite one another and two longitudinal mold sides opposite one another, wherein at least one of the narrow mold sides is movable toward and away from the other by means of hydraulic cylinders on the opposite narrow mold side, and wherein the hydraulic cylinders can be actuated independently from one another and have, in each instance, a cylinder and a piston guided therein, the piston rod of the piston being connected to the narrow mold side that is to be displaced, and wherein a device for acquiring the position of the piston and, therefore, the displacement of the narrow mold side, is associated with at least one of the hydraulic cylinders.

Continuous casting molds with devices of the kind mentioned above for acquiring the displacement of the narrow mold side to be adjusted are known, for example, from DE 199 60 792 C2 or EP 914 888 B1.

In the first reference cited above, there is provided at the piston rod a device which transmits the position of the piston rod to a scale arranged in a stationary manner. In the second of the above-cited references, a linear displacement transducer is arranged parallel to cylinders.

Both devices have the disadvantage that only the relative position can be acquired thereby, i.e., a calibration must be carried out initially and the respective possible end positions of the narrow mold sides can be derived therefrom as reference quantities. Only then is it possible to deduce the actual position of the piston, and therefore of the narrow mold side, from the position of the displacement transducer.

Accordingly, this calibration must be carried out anew every time a basic adjustment of the mold is carried out. This is time-consuming and inconvenient.

Therefore, it is the object of the invention to provide a continuous casting mold which makes possible a simpler, faster adjustment which is also more flexible with respect to the device to be used for determining the position of the narrow mold side.

According to the invention, this object is met in that the device comprises a displacement measuring system which is arranged parallel to the hydraulic cylinder and
constructed in such a way that its measurement path directly corresponds to the displacement of the piston of the hydraulic cylinder.

The displacement measuring system preferably comprises telescoping elements, e.g., similar to a cylinder and piston rod. Accordingly, this system follows the displacement of the narrow mold side by means of the hydraulic cylinders in the same manner.

The compact design of this displacement measuring system also makes it possible to arrange a plurality of such systems around the respective hydraulic cylinder so that measurements can be made redundantly.

It is especially advantageous when the hydraulic cylinder and displacement measuring system form a module, that is, a cohesive arrangement. In this way, this module can be exchanged in its entirety. This in turn has the advantage that no calibration is required in the system; rather, this unit is calibrated prior to installation and is then immediately ready for use after being installed in the system.

The invention will be described in the following with reference to an embodiment example.

The drawings show:

Fig. 1 a schematic view of a hydraulic cylinder for adjusting a narrow mold side with a displacement measuring system, specifically, in the extended operating position;

Fig. 2 a schematic view of a hydraulic cylinder for adjusting a narrow mold side with a displacement measuring system, specifically, in the retracted operating position; and

Fig. 3 a modified articulation of the displacement measuring system at the hydraulic cylinder.

Figure 1 shows only hydraulic cylinder 1 with piston rod 2 and the indicated narrow mold side 3. The rest of a continuous casting mold is omitted from the drawing, especially because the person skilled in the art is already sufficiently familiar with these constructions from the prior art cited above.

The displacement measuring system 4 according to the invention is arranged parallel to the hydraulic cylinder 1, specifically, in a construction corresponding to that of a piston-cylinder system, i.e., with telescoping elements.
In Figure 1, this displacement measuring system is fastened to the hydraulic cylinder on one side and to the support of the piston rod 2 on the other side. The hydraulic cylinder itself is articulated at the narrow mold side 3.

It is fundamental that the relative displacement of the hydraulic cylinder 1 and piston rod 2 is transmitted directly to the telescopying displacement measuring system 4 by means of this arrangement and design of the displacement measuring system 4.

This also applies to the second variant for fastening which is shown in Figure 3, where the telescopying element of the displacement measuring system 4 is connected to the piston rod 2 and the associated cylinder is connected to the hydraulic cylinder 1. Therefore, the displacement of the telescopying element of the displacement measuring system corresponds exactly to the displacement of the piston rod 2 by means of which the narrow mold side is adjusted.

Figure 2 shows that the entire arrangement and design of the displacement measuring system and hydraulic cylinder is very compact so that a plurality of displacement measuring systems can also be provided around the hydraulic cylinder.

The invention has been claimed and described herein with a hydraulic cylinder arrangement for adjusting the narrow side of the mold. This hydraulic cylinder arrangement can also be called a linear displacement system, which would indicate another adjustment option such as a mechanical or electromechanical arrangement. It is fundamental that the linear adjusting movement for the narrow side of the mold is reproduced in parallel and directly by the displacement measuring system.
Claims

1. Continuous casting mold with two narrow mold sides opposite one another and two longitudinal mold sides opposite one another, wherein at least one of the narrow mold sides is movable toward and away from the other by means of hydraulic cylinders on the opposite narrow mold side, and wherein the hydraulic cylinders can be actuated independently from one another and have, in each instance, a cylinder and a piston guided therein, the piston rod of the piston being connected to the narrow mold side that is to be displaced, and wherein a device for acquiring the position of the piston and, therefore, the displacement of the narrow mold side, is associated with at least one of the hydraulic cylinders, characterized in that the device comprises a displacement measuring system which is arranged parallel to the hydraulic cylinder and constructed in such a way that its measurement path directly corresponds to the displacement of the piston of the hydraulic cylinder, and in that the displacement measuring system and the hydraulic cylinder form a module which can be exchanged in its entirety.

2. Continuous casting mold according to claim 1, characterized in that the displacement measuring system comprises telescoping elements.

3. Continuous casting mold according to one of the preceding claims, characterized in that a plurality of displacement measuring systems are associated with each hydraulic cylinder.