machining belt 104, a tightening mechanism 106 and a contact mechanism 108. The contact mechanism 108 is used for a tool contact with an object 110 to be machined.

The machining belt 104 is a loop belt without a beginning and an end. A loop has a shape of a round or oval ring and it may be formed from a band of material by turning opposite ends of the band towards each other and fastening the ends together, for example.

The machining tool 100 may be meant for shaping and/or finishing the object 110, for example. The machining tool 100 may be a belt grinder or the like to be used in a robotic arm. Correspondingly, the machining belt 104 may be an abrasive belt, a sanding belt, a grinding belt, a deburring belt, a blending belt, a finishing belt, a polishing belt or the like for removing material from the surface of an object 110. A width of the machining belt 104 may be 1 mm to 50 mm, for example. A length of the machining belt 104 may be 10 mm to 1000 mm (depending on contact arm), for example.

The power transmission mechanism 102 of the machining tool 100 can be mechanically coupled with a rotational power source 112 which may be realized on the basis of a connection part 132. An arrow shows an example of the rotation direction of the connection part 132 which corresponds to that of the rotational power source 112. The direction of rotation may also be altered. The connection part 132 has a shape and structure which fits with ~~the~~ a ~~connecting~~ connection part of the rotational power source 112. The rotational power source 112 may comprise an electric motor or an air motor, for example. The power transmission mechanism 102 may turn the direction of the rotation axis by a desired amount inside the machining tool 100. The turn of the direction of the rotation axis may be 90°, for example.

The contact mechanism 108 and the power transmission mechanism 102 have a structural design capable of receiving and holding the circular machining belt 104 for performing machining with the machining tool 100. The circular machining belt 104 is thus looped between the contact mechanism 108 and the power transmission mechanism 102. The contact mechanism 108 and the power transmission mechanism 102 have a desired distance shorter than about a half of the length of the circular machining belt 104 therebetween in order to enable the use of the circular machining belt 104 for machining. In an embodiment, the contact roller shaft 124 and the power transmission shaft 202

mission roller 200. With the parallel rotational axes the use of the machining belt 104 is easy.

In an embodiment, the contact mechanism 108 may comprise a contact roller shaft 124 and a contact roller 126 such that the contact roller 126 rolls round the contact roller shaft 124. During operation of the machining tool 100, the movement of the machining belt 104 causes the contact roller 126 to roll.

Figure 3 presents a direct side view of the machining tool 100 from a different angle of view with respect to Figure 1A. In an embodiment, the power transmission mechanism 102 may comprise a power transmission roller 200 and a power transmission shaft 202. In an embodiment, the power transmission roller 200 is connected with the power transmission shaft 202 for enabling rotation of the power transmission roller 200 with the power transmission shaft 202.

The power transmission shaft 202 has a mechanical connection 320 with the ~~connecting~~ connection part 132 for rotating the power transmission shaft 202. The mechanical connection 320 between the transmission shaft 202 and the ~~connecting~~ connection part 132 may be realized with a gear. The gear may comprise toothed wheels at least two of them being engaged with one another. The gear may be used for changing or varying the rotational velocity between the toothed wheels and thus also between the ~~connecting~~ connection part 132 and the transmission shaft 202. The change in velocity finally has effect also on the velocity of the transmission roller 200 and the machining belt 104. Alternatively or additionally the direction of the rotation may be changed. An example of the gear is a bevel gear or the like, which turns the rotational axis by 90°. The ~~connecting~~ connection part 132 may rotate 1 rpm to 5000 rpm (rpm = rotations per minute), for example. The transmission roller 200 may rotate 1 rpm to 15000 rpm, for example. A possible rotation for the ~~connecting~~ connection part 132 and the transmission roller 200 may be 3000 rpm. In an embodiment, the gear ratio may be 1:1, for example, but the ratio may also be different. The machining belt 104 may then move 1 m/min to 2000 m/min, for example.

In an embodiment, the ~~connecting~~ connection part 132 may have a connection with the rotational power source 112 using a spindle connection. The spindle connection may be based on an industrial standard tool taper interface such as HSK63-F or ISO30. The spindle connection may also be called a gear connec-

tion. The spindle connection may be used also during storage of the machine tool 100.

In an embodiment, the machining tool 100 may be repeatedly and releasably connectable with the rotational power source 112 such that the ~~connecting~~ connection part 132 is mechanically connected to and released from a counterpart of the rotational power source 112. The spindle connection is suitable for repeatable connection and disconnection. With the mechanical connection such as spindle connection there is no need to connect and disconnect electrical wires or air pipes to the machining tool 100.

In an embodiment, the machining tool 100 may comprise a casing 250 which may also be a supporting structure. One end of the spring structure 210, 274 may directly or indirectly be fixed to the casing 250 for applying the spring force to the machining belt 104 in order to tighten it. The fixing to the casing 250 may be performed by a screw 276 or the like, for example.

In an embodiment shown in Figure 4, the machining tool 100 may have a set of contact arm pieces 400, 402. One contact arm piece 400, 402 may be selected for use between the contact roller shaft 126 and the power transmission shaft 200. The length of the contact arm 220 with each contact arm piece 400, 402 may be set when a tightening screw 404 is loosened. After a proper length is set the screw 404 may be tightened such that the length remains unchanged. The contact arms 400, 402 may include straight arms, angled arms, shoe-shine style arms, for example.

As Figure 2 shows the direction of the arm 220, 400 may be turned in an embodiment. The arm which is turned by 180° with respect to the rotational axis 350 of the ~~connecting~~ connection part 132 is shown with a dashed line. The arm 220, 400 may be turned from an angle α of 90° to an angle of 180° or even to an angle of -90°, for example. The turning may be performed continuously or discretely. The discrete turning may be performed with 15° steps, for example.

It will be obvious to a person skilled in the art that, as technology advances, the inventive concept can be implemented in various ways. The invention and its embodiments are not limited to the examples described above but may vary within the scope of the claims.

Claims

1. A machining tool, wherein the robotic machining tool comprises a power transmission mechanism, a circular machining belt, a tightening mechanism and a contact mechanism for tool contact with an object to be machined;

the power transmission mechanism of the machining tool is configured to have a mechanical connection through a connection part with a rotational power source;

the contact mechanism and the power transmission mechanism have a desired distance therebetween such that a contact roller of the contact mechanism and a power transmission roller of the power transmission mechanism have a contact arm of a desired length therebetween, a length of the contact arm needing no change for tightening;

the circular machining belt is looped between the contact roller and the power transmission roller for causing the circular machining belt to move between the contact roller and the power transmission roller in response to the rotation of the power transmission mechanism for machining the object; and

the tightening mechanism comprises at least one spring structure and at least one spring roller for pressing sections of the circular machining belt between the contact mechanism and power transmission mechanism towards each other for tensioning the machining belt.

2. The machining tool as claimed in claim 1, wherein

the contact mechanism comprises a contact roller and a contact roller shaft;

the power transmission shaft is configured to have a mechanical ~~gear~~ connection with a rotational power source for rotating the power transmission shaft;

the contact roller is connected to the contact roller shaft for enabling rotation of the contact roller round the contact roller shaft;

the power transmission roller is connected with the power transmission shaft for enabling rotation of the power transmission roller with the power transmission shaft;

the circular machining belt is looped over the contact roller and the power transmission roller for causing the circular machining belt to move over

10. The machining tool as claimed in claim 2, wherein the machining tool comprises a mechanical connection which connects the power transmission roller and the connection part.

11. The machining tool as claimed in claim 10, wherein the connection part comprises a gear for changing or varying the velocity of the machining belt with respect to the rotation speed of the connection part.