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# EXAMPLE OF PNEUMATIC COMMAND OF THE MANUFACTURING MACHINES

**Ionescu E, Cismaru, M, Braun B, Drugă C [1]**

[1] Universitatea „TRANSILVANIA" Braşov
Catedra de Mecanică Fină şi Mecatronică,
e-mail: eionescu@unitbv.ro

***Abstract:*** *The paper describes the way in which the adaptive mode adjustment can be made for a deep holes head, depending by the torsion moment who appears during the boring process. The adaptive command of the boring tool head is assured in pneumatic way, via a command scheme and machine ensemble ordering, depending by the torsion moment in boring tool, during the manufacturing.*

***Key words:*** *adaptive command, distributor, pneumatic device*

## 1. The role of the pneumatic command in the manufacturing functionning elements optimisation

As a following to the increased stress of the dynamic running manufacturing elements (cutters, reamers, taps), it exist a high risk of their breaking, during the functioning. For the reducing of this problems, nowadays there were found different methods to command the manufacturing heads functioning mode: the advance speed adjustment command, the rotation speed of a piercing tool command, or to command the retract of the manufacturing tool, due to a critical temperature as a follow to the high rubbing between the piercing tool and the manufactured probe.

A relative non expansive and very efficient method for the adaptive command of the manufacturing tools consists in the projecting of some pneumatic circuits, who command some execution elements. Frequently, at their turn, the execution elements are ordered via some switching elements, as valves or pneumatic distributors.

## 2. The adapting of the pneumatic command for the piercing machines

The solution of the pneumatic command obtaining for the manufacturing head optimization, was successfully applied at the TRANSILVANIA University of Brasov, to a gauge equipped with a deep hole piercing machine (Fig. 1).

**Fig. 1 –** ***The gauge equipped with the deep hole piercing machine***

As a following to the fact that a piercing cycle, usually is programmed to run until its end, in this case, for the deep holes boring, the danger of the piercing tool breaking appears, due to the following causes: the un-steeling of the tool as a following to the local extremely temperatures, but especially due to the torsion moment of the piercing tool increasement. The high torsion moment appears because of the presence of the splinter in the bored hole, who means to a high friction between the piercing tool and the internal probe's surface. This unwanted phenomena is the most frequently in case of the headed holes piercing.

By this reason, as a solution for this kind of disadvantages reducing, there was projected a pneumatic device for the limiting of the piercing couple force. In fact, the pneumatic command device permits the boring tool retract if the rotation couple becomes higher than a critical value, but under the breaking couple of the tool. The device for the command of the pneumatic retract is disposed along the system for the main rotation and second advance motion of the tool head (Fig. 2).

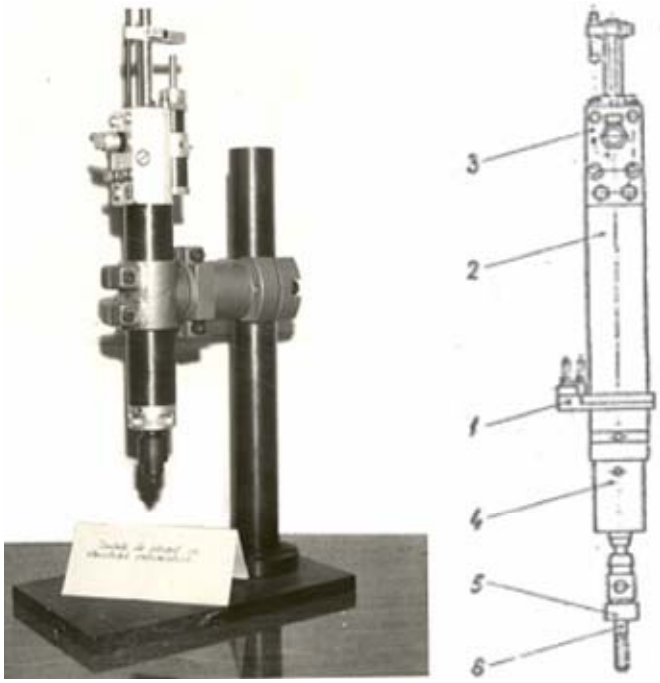


**Fig. 2 –** ***The disposing of the adaptive pneumatic command device to the piercing gauge***

The piercing ensemble is composed by the following sub-systems: 1 – the mechanic device for the limiting of the piercing couple, 2 – the main rotation and second advance motion system generation, 3 – the pneumatic block for the distribution, adjustment and control of the rotation and advance motion of the piercing tool, 4 – the sense inverter, 5 – the chuck, 6 – the piercing tool.

The pneumatic device for the limiting of the couple is presented in figure 3, and it is composed by a fix support (1), a superior mobile plate (2), with a small rotation angle around the bearing (3). In the fix support is mounted a spring (4), who create a resistant couple higher than the usual piercing couple. Through this spring the resistant couple adjustment is made, grace o the screw (5). The turning of the mobile plate (2) is limited by the screw (7), fixed into the support (1), playing a stopper role inside the oval cleft of the mobile plate. To the fix support (1) is disposed an other screw (8), in a support (9), and to the mobile plate (2) is disposed a pneumatic command valve (10), with mechanic action and spring retract.

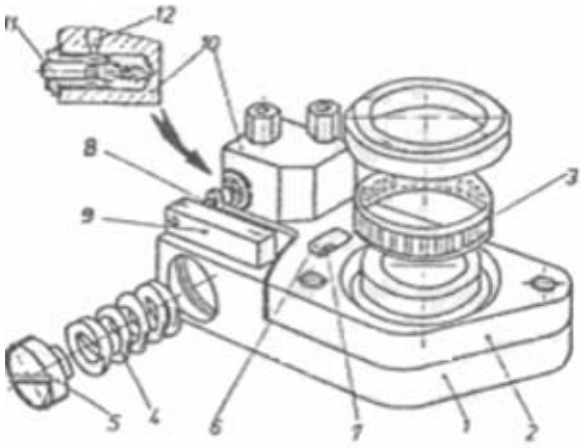


**Fig. 3 –** ***The device for the limiting of the couple of the piercing tool***

In this way, grace to its consistence, the spring (4) insures a reactive couple for the superior plate turning, in reverse sense to the piercing couple, so that, in turning, the pneumatic command valve (10), solidary with the mobile plate, touch the fix screw (8) disposed to the support (1). In this way it is determined the valve switching, through the rod (11) ordering. As a following a pneumatic pulse at the output of the orifice (12) is generated, who command the reversing of the tool rotation motion, for its retract, when the couple induced in the piercing tool is greater than the adjusted couple [1].

The pneumatic command and ordering scheme of the described device for the limiting of the couple of the piercing tool is presented in figure 4, being shown also the pneumatic binding between the distribution and control block (1) of the piercing tool head and the limiting couple device (2).

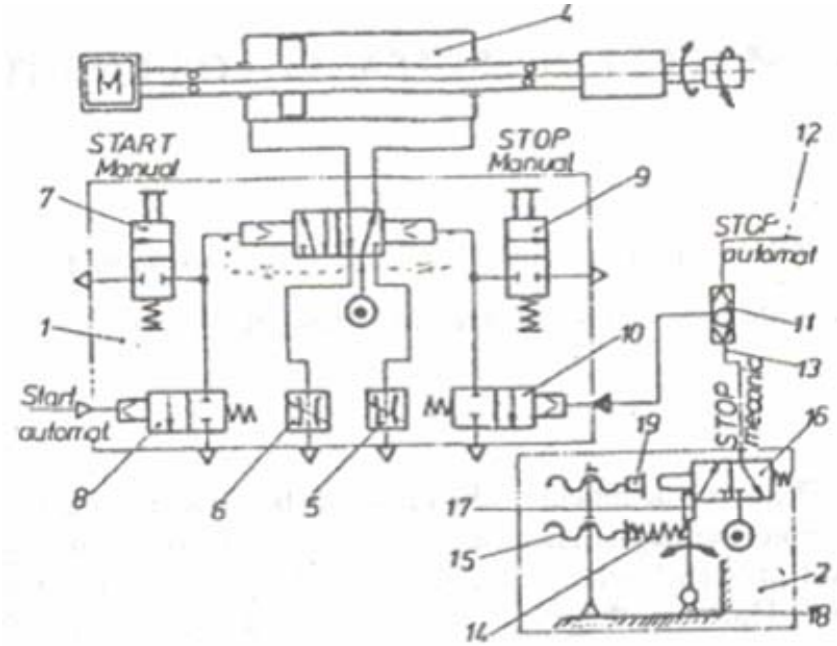


**Fig. 4 –** ***The pneumatic scheme of the ordering of the piercing tool head [2,3]***

To the switching of the distributor (3), it take place the force head retracting, the distributor switching being caused due to the switching of the valve (16), in case of exceeding of the established couple, who means to the rotation of the mobile plate (17),

solidary with the fix support. The valve switching (16) generate the mechanic STOP function on the pipe (13), so that through the selector (11) is commanded the switching of the valve (10). It commands the switching of the distributor 4/2 (3), for the retracting of the piston command, who is solidary with the piercing tool head.

The advance of the tool can be made also manually or automatically, by the manual ordering of the valve (7), respectively by the automatic ordering of the valve (8), and for the manual retract of the tool head is required to press manually the valve (9). The advance and retract speed of the piercing tool head is made by the air flow capacity limiters (5) and (6).

## 3. The advantages of the use of the pneumatic command systems for the manufacturing and processing machines

The use of the pneumatic command schemes for the manufacturing machines proves to be very advantageous, grace to the fact that it presents a high flexibility for different application in industry. In this way, even by using the same command and ordering pneumatic elements, but disposed differently, it is possible to obtain different pneumatic command schemes, for each of them existing the possibility to be adapted to a technological manufacturing or processing application.

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