RESEARCH ON REMOTE CONTROL OF DEDUSTING SYSTEM VIA SMART PHONE

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Abstract
The paper contains research on remote control, through smart phon, of dedusting machines, with a view to finding a solution to make them more efficient, as well as to modernize agriculture.
The modernisation of agriculture has well-defined causes, one of which is the explosive growth of the world's population, to which the food problem is closely linked.
The quality of the cereals is given by the proper drying, dedusting and storage of cereals, so it depends on the performance of the deduster.
The cyclone serves to pre-purify the air aspirated from pneumatic transport facilities and from the dedusting of the conditioning machines of the cereal or oil raw materials.

Key words: smart phone, dedusting system, pneumatic separator, cyclon, controller

INTRODUCTION

The pneumatic separator operates on the principle of separating particles into the air current, acting as a pre-cleaner and distributor in several fractions, based on aerodynamic properties. The principle of operation of pneumatic separators is the same, although in a constructive aspect there are machines with the supply of air flow and particles from the bottom or top. (Iancu C 2010, Iancu C 2010)

The cyclone serves to pre-purify the air aspirated from pneumatic transport facilities and from the dedusting of the conditioning machines of the cereal or oil raw materials. The effect of separating dust and mild impurities is 70 ... 90 %.
The principle of operation of cyclones is based on the deposition of air-driven particles through detente and the movement of turbines in a cylindroconical metal container (1), with tangential input at the top (5), (fig. 1). In order to prevent direct exit through the clean air outlet (6), located in the middle of the upper part, a central tube (3) is provided, which obliges the air flow to receive a turbonary downward route around the cyclone wall (2). The formed turbon creates, when hitting the bottom, another tip from the bottom up. (Iancu C 2010, Iancu C 2010) Due to the hitting of the walls and

the gradual loss of speed, dust particles tend to settle on the bottom, being removed with the help of the lock (4).
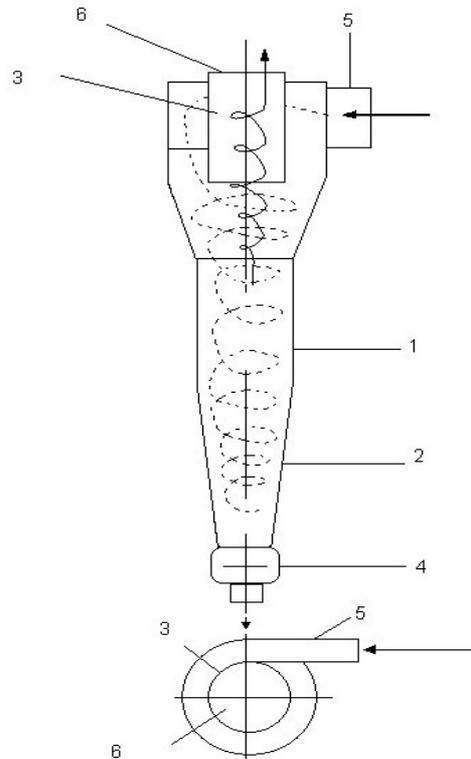
Figure 1. – *Cyclone:*

1 – cylindrical part; 2 – tapered part; 3 – central tube;
4 – lock; 5 – input mouth; 6 – outlet

MATERIAL AND METHOD

To carry out the remote control of a cyclone used in the preliminary dedusting of cereal or oil raw materials, modern, numerically implemented controllers were used with the block scheme shown in Figure 2, sensors and a smartphone. (Iancu C 2010, Iancu Carmen 2010)
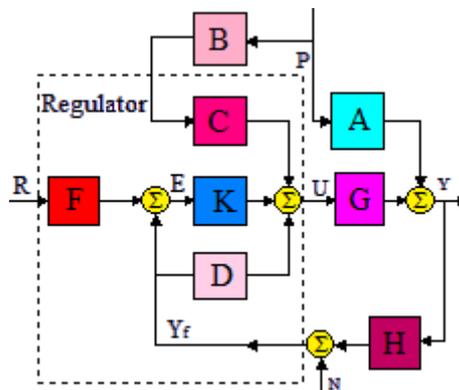
Figure 2. *Controller PID numeric* with two degrees of freedom

The controller used consists of a comparator and the offset K. Block G on the direct path shapes the execution element and the automated process. The translator is represented by block H. (Iancu C 2010, A. Bara Iancu C 2010, Astrom K. J. 2002, 1984, Borangiu Th et all, 1986, Dionissios P et all 2006, C. Popescu 2001, C. Volosencu 1997, E.F. Zanoelo et all 2008, F. S. Blaga 2009)

The shape of the algorithm, called the parallel PID algorithm, is linear in the parameters. In this case, proportional action (amplification), integral action (automatic recovery) and derivative action are clearly highlighted.

The actual algorithm, used by the controller at the helm of the process, is different, however, because the term, corresponding to the derivative action, that appears in the function of transferring the PID compensator is not physically feasible., for this reason, we choose the approximation. (Iancu C 2010, A. Bara Iancu C 2010, Astrom K. J. 2002, 1984, Borangiu Th et all, 1986, Dionissios P et all 2006, Crispin Allen 1990, H. Silaghi et all 2009, K. Leiviskä et all 2005)

The automation device is composed according to Figure 3 of an EP prescribing element that helps to fix the automatic system program; we also have a C comparison element that compares the reference work schedule r(t)) with the output size obtained through the Tr transducer; the EA amplification element; the EE execution element and the EC correction element, which ensure the proper functioning of the whole system. The technological installation (IT) is subject to pi disturbances. (Iancu C 2010, A. Bara Iancu C 2010, Astrom K. J. 2002, 1984, Borangiu Th et all, 1986, Dionissios P et all 2006, Carmen Jover et all 2006,)

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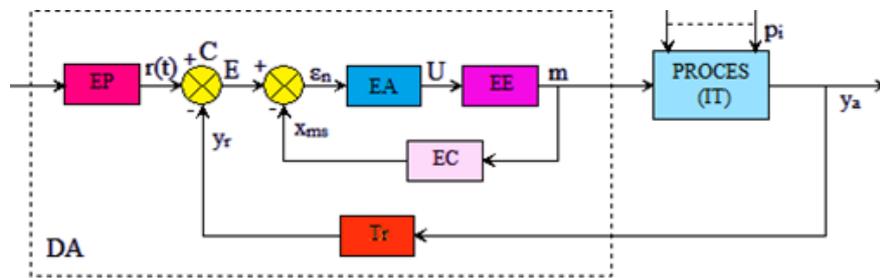
Figure 3. Technological installation

RESULTS AND DISCUSSION

The problem of leadership therefore has two problems, namely, the first, expressing the rejection of disturbances and the second, expressed by that of the exact follow-up. Both issues explain an external input-output desire.

Naturally this desiderat is supplemented with an internal one on the internal utility of the closed loop driving system.

Thus was implemented the remote driving system of a cyclone via mobile phone. A smart phone app has been created via a software.
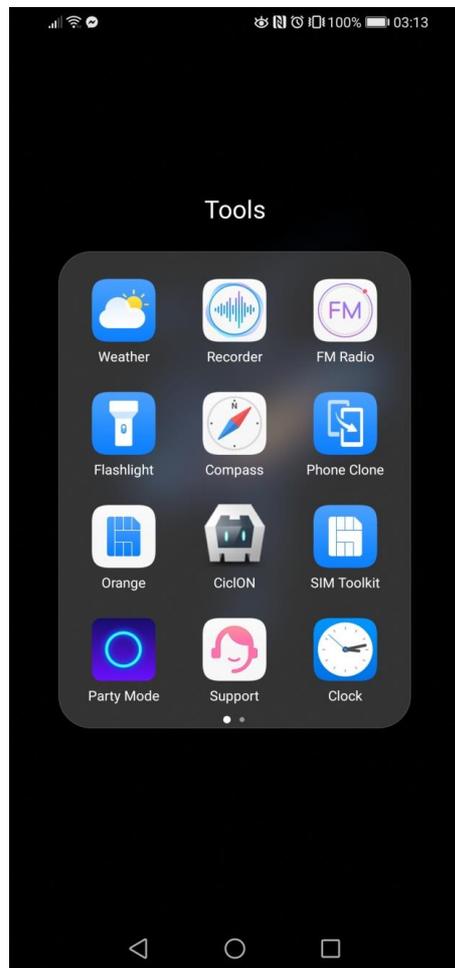
Figure 4. Smart phone app

A software has been created for the dedusting system:

Figure 5. Software for the dedusting system

And the operation of the system is as follows:
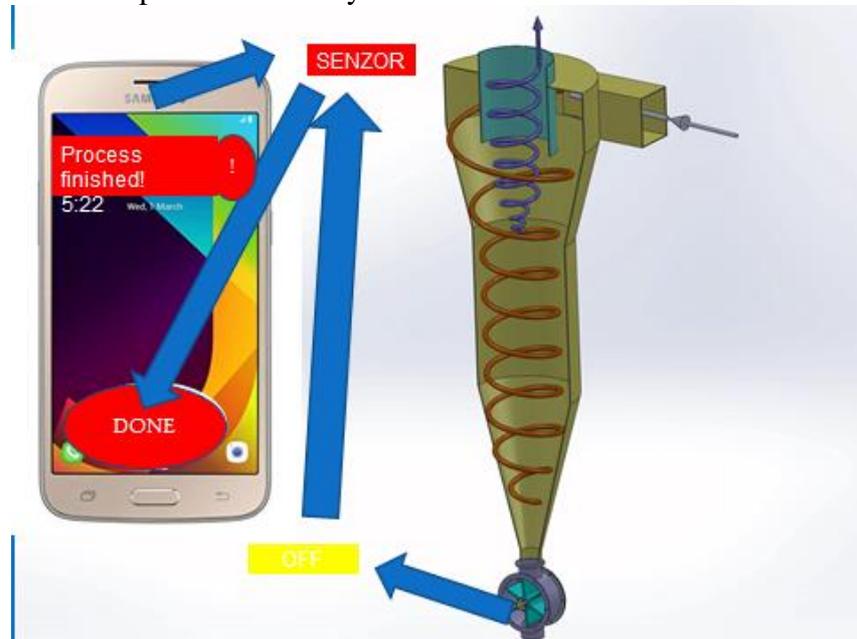
Figure 6. Remote driving of a cyclone via your smart phone

CONCLUSIONS

By accessing the remote control app in the smart phone and pressing the cyclone start key, it gives signal to the sensor at the cyclone's power mouth allowing it to be fed to the raw material.

When the raw material has completed the dedusting cycle, the sensor at the lock gives the end-of-life signal to the smart phone. Thus a dedusting cycle is closed.

The problem of the synthesis of management systems essentially pursues a driving purpose expressed by the requirement that the quality size pursue a specified aprior reference size in the context of the disturbance.

This is achieved by drawing up a decision on the appropriate evolution of the order size, elaboration resulting from the processing of the measured information and possibly, where possible, the disturbance.

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