Statistical Control of the Quality of Decanters Used for the Continuous Virgin Olive Oil Extraction

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**Abstract.** The most immediate solution to improve the productivity of a decanter for continuous virgin olive oil extraction is to increase the rotation speed of the bowl. Indeed, by increasing the rotation speed, the separation force increases, thus allowing to improve the flow rate of treated pasta keeping constant all other parameters.

The aim of this research was to study the operation of a two-phase decanter focusing on its vibrations, by appropriately varying the rotation regime. It was set up a study of a diagnostic program by means of specific Quality Control Charts. The quality control was carried out on fourteen AMENDUNI REX-250 two-phase decanters; the operating capacity is in the range 30.0-80.0 q/h with an installed power of 45 kW, according to ISO 20816-1: 2016 standards. The machines were studied at rotational speeds of 3000 rpm, 2900 rpm, and 2800 rpm. The tested decanters provided the best performance at 3000 rpm.The machines showing significant anomalies (spurious vibrations) at the maximum rotation speed were those balanced on lower rotation speeds. This practice is usual in the extraction of virgin oil to avoid the risk of paste overheating. It was possible to identify the most stressed sections of the machines at all speeds. These were the closest to the engine and on the left side of the basin (the side where the machine is set in rotation by the duct branch of the belt transmission). The possible causes of the anomalies are: unbalanced bowl due to errors during the assembly phase, incorrect assembly of the bearings and, more rarely, defects and damages in the raceways, balls or rollers. The process carried out by the manufacturing company was adequately monitored, in accordance with current technical standards. However, the control chart tool seems particularly suitable to the production process. Indeed, it showed that through Root Mean Square (RMS) trend, that was easy to track by cyclically and preventively monitoring these values, it would be predicted the behavior of the machine over time and, possibly, increased its "expected useful life". This tool, properly managed, could be a solution to any breakdowns which, during the olive oil season, generate critical deficiency costs and can affect revenues of an oil mill for a whole year.