

Developing an Effective Specific Gravity Measuring System for Solid Tyre Manufacturing Process

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Solid tyres are non-pneumatic tyres which are not filled with air. It consists of major three layers such as heel, cushion, and tread. The main steps of the solid tyre manufacturing process are compound warming, compound feeding, tyre rolling, curing, and final inspection. During compound warming, the specific gravity of the warmed compound is tested. According to that value, the required mass of compound for tyre is measured. Then It is transferred to the feeding mill and after that, it is transferred to tyre rolling. In the solid tyre manufacturing process, the specific gravity of the warmed compound should be measured before the tyre rolling. The current production process takes a total of 7 min for measuring specific gravity, which is higher than tyre rolling time. So, the current specific gravity measuring system is un-effective for the process. If the weight will be less than the required amount, tyre can be scrapped. It leads to economic losses to the company. Therefore, minimizing the total time for specific gravity measuring is important to increase productivity. In this research, eight types of experiments were designed to find the optimum time for a specific gravity measuring process. In each experiment major four parameters were considered, such as curing temperature, curing time, cooling water temperature, and cooling time. In this experiments three different curing temperatures (180 °C, 190 °C, 200 °C), two different curing times (2, 3 min), two different cooling water temperatures (30 °C, <10 °C) and five different cooling times (0, 1, 2, 3, 4 min) were used to test the specific gravity of the compound samples under 8 different experiments. The results revealed that the optimum curing temperature is 190 °C, curing time is 2 min., cooling time is 2 min., and the cooling water temperature is <10 °C. The total time takes by specific gravity measuring could be minimized to 4 min. It would be profitable for the company in many ways compared to the current 7 min operation.

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