

**DEVELOPING AN EFFECTIVE SPECIFIC GRAVITY  
MEASURING SYSTEM FOR SOLID TYRE  
MANUFACTURING PROCESS**

A dissertation submitted to the

Faculty of Animal Science and Export Agriculture

Uva Wellassa University

In partial fulfillment of the requirements for the award of  
Bachelor of Science in Palm & Latex Technology and Value Addition

**By**

**RUWANIKA PRATHIBHANI PALLIYAGE**

**Palm & Latex Technology and Value Addition Degree**

**Programme**

**Faculty of Animal Science and Export Agriculture**

**Uva Wellassa University of Sri Lanka**

**2019**

## ABSTRACT

Solid tyres are non-pneumatic tyers which are not filled with air. Tyres consist of major three layers such as, heel, cushion and tread. The main steps of solid tyre manufacturing process are compound warming, compound feeding, tyre rolling, curing and final inspection. During compound warming, specific gravity of warmed compound is tested. According to that value, the required mass of compound for tyre is measured. Then it is transferred to feeding mill and after that it is transferred to tyre rolling. Current production process takes total 7 min for measuring specific gravity. In the solid tyre manufacturing process, specific gravity of the warmed compound should be measured before the tyre rolling. If there is not enough time to measure the specific gravity of compound before the tyre rolling, required mass of the compound can't be identified. If the mass will be less than required amount, tyre can be scraped due to less mass, leading to economic losses to the company. Therefore, minimizing the total time for specific gravity measuring is important to increase the productivity. In this research, eight types of experiments were designed to find the optimum time for 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 these experiments, three different curing temperatures (180°C, 190°C, 200°C), two different curing times (2 min, 3 min), two different cooling water temperatures (30°C, <10°C) and five different cooling times (0 min, 1 min, 2 min, 3 min, 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 cooling water temperature is <10°C. By applying these conditions, the total time taken for specific gravity measuring could be minimized to 4 min and it would be profitable to the company in many ways, compared to the currents 7 min operation.

**Keywords:** Cooling time, Cooling water temperature, Curing temperature, Curing time, Specific gravity, Total time for specific gravity measuring