The fast growth of the mobile transportation in Indonesia, especially automobile which in year 2008 increase up to more than 600,000 unit and motorcycle go up to more than 6 million unit, accelerate the supporting technology mainly for its maintenance and repair. The technology of dynamic balancing also must be developed to increase the local content and the domestic market share in industry. For this purpose, it is important to do a experimentally research to learn and to understand the principle of the dynamic balancing process, not only theoretical but also practically experimental. Because of that this research split of by two themes, there are a developing learning model and a prototype of wheel balancing machine for its application.

Developing a learning model is used to trace experimentally the fundamental principle of the dynamic balancing process both with phase method and four run method for a single rotating disc according to a miniature of car wheel. The result shows that the four run method has a high balance performance up to 92%, but it needs more time to measure four times the vibration amplitude, after the trial weight on the disc is applied. On the contrary, the phase method can be done fast and easy, however the balance performance is even lower. The reason is that the phase angle depends also on the rotating speed to determine the location of its balance mass.

The prototype of the wheel balancing machine uses a swing arm technology, which is developed in the machine tool and vibration laboratory, while the old technology with a sliding mechanism give a vibration signal not a pure sinusoidal, therefore it is difficult to determine the position of the balance mass to be added. This research investigates many tire size with its rim diameter of 12 in., 13 in., 14 in. and 15 in. with three variation of rotating speed of 457 rpm, 510 rpm and 661 rpm for the accommodated balancing process below the natural frequency, on the natural frequency zone and the above natural frequency.

The result of the measuring of characteristic of the wheel balancing machine prototype is decreasing amplitude from the initial unbalanced condition to the balance condition or defined as a balance performance of 89.84% for wheel with 13 in. rim, which is performed by rotating speed on the natural frequency zone. By using rotating speed below the natural frequency, the balance performance of 73.9% and 75% is reached by the wheel with 12 in. rim and 14 in. diameter respectively. For the wheel with 15 in. rim diameter gives a balance performance of 89.23%, which is done by the number of rotating above the natural frequency. The balancing process below the natural frequency comes about a phase shift of 180° and the above natural frequency give a phase shift of approximately of 90°.

Keyword: dynamic balancing, four run method, phase method, wheel balancing.