

Study on Shifting Properties of CVT Rubber V-belt

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Abstract : The objective of this study is to investigate the effect of belt stiffness on the performance of the CVT unit, such as the required pulley thrust force and the ratio coverage. The CVT unit consists of the V-grooved pulleys and the rubber CVT belt. The width of the driving pulley groove was controlled by the stepper motor, while that of the driven pulley was controlled by the hydraulic pressure. The generated mechanical power on the motor was transmitted from the driving axis to the driven axis through the CVT unit. The rotational speed and the transmitting torque of both axes were measured by the tachometers and the torque meters attached with these axes, respectively. The transmitted, mechanical power was absorbed by the magnetic powder brake. The thrust force acting on both pulleys and the force between both shafts were measured by the load cell. The back face profile of the rubber CVT belt along with width direction was measured by the 2-dimensional laser displacement meter. This paper found that when the stiffness of the rubber CVT belt in the belt width direction was reduced, the thrust force required for shifting was reduced. Moreover, when the stiffness of the rubber CVT belt in the belt width direction was reduced, the ratio coverage of the CVT unit was reduced. Due to the decrement of stiffness in belt width direction, the excessive concave deformation of belt in pulley groove was confirmed. Because of this excessive concave deformation, apparent wrapping radius of belt would have been reduced. Proposed model could be effectively estimated the difference of ratio coverage due to concave deformation. The proposed model could also be utilized for designing the rubber CVT belt with optimal bending stiffness in width direction.

Keywords : CVT, continuously variable transmission, rubber, belt stiffness, transmission

Conference Title : ICSIDMC 2022 : International Conference on Structural Integrity and Design of Mechanical Components

Conference Location : Rome, Italy

Conference Dates : March 03-04, 2022