

# Vane Torque tester for forest biomass

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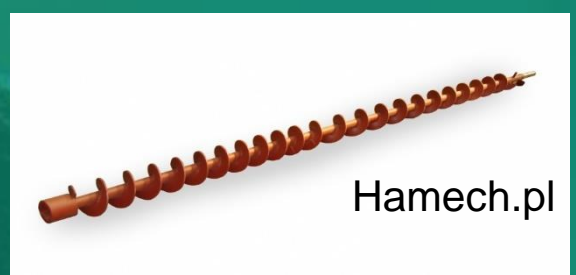
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## INTRODUCTION



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A need for quick determination of:  
- Moisture content  
- Density  
- Increase in strenght causing problems

Evaluation of biomass,

## PROJECT

□ Biomass fuels are unique materials composed of particles varying in size and shape.

□ The knowledge of mechanical properties of granular biomass is necessary for design and efficient operation of equipment for handling, storage and processing.

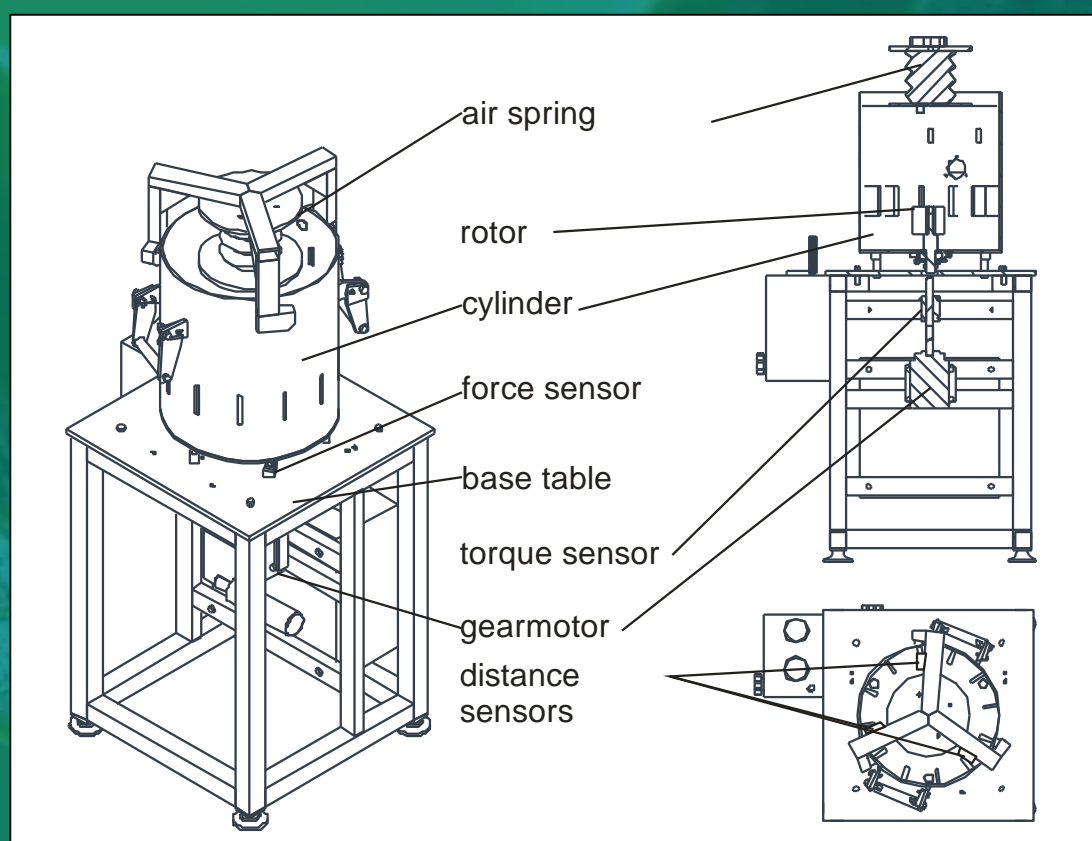
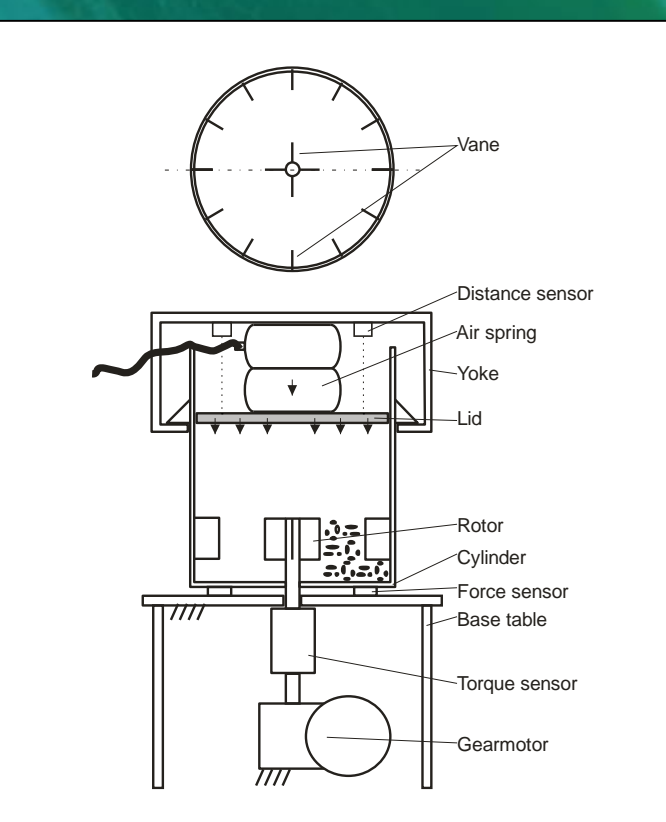
□ The prototype vane tester was constructed for determination of shear strength of consolidated sample of granular biomass. The device comprise cylindrical chamber 40 cm in diameter, 40 cm high. Axially, near the bottom of the chamber 8 cm high and 12 cm wide rotating vane tool having four blades is located. The normal pressure is exerted by pneumatic system with rubber air spring and the yoke. The rotating vane impeller is assumed to shear only the material placed in the immediate vicinity of the blades.

□ Normal consolidation pressures in a range from 5 to 30 kPa and rotation rate from 3 to 13 r/min was applied in experiments.

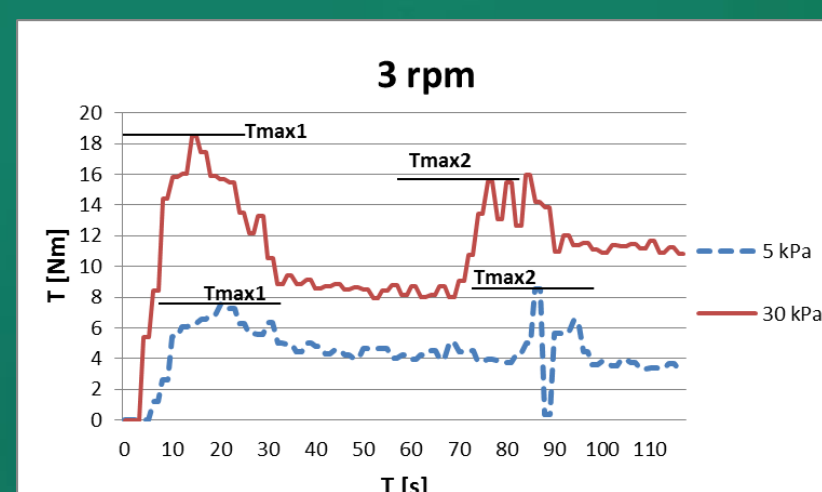
□ Valuable tool for determination of mechanical properties of granular biomass.

□ Quick measurement of density and moisture content of wide range of granular biomass possible.

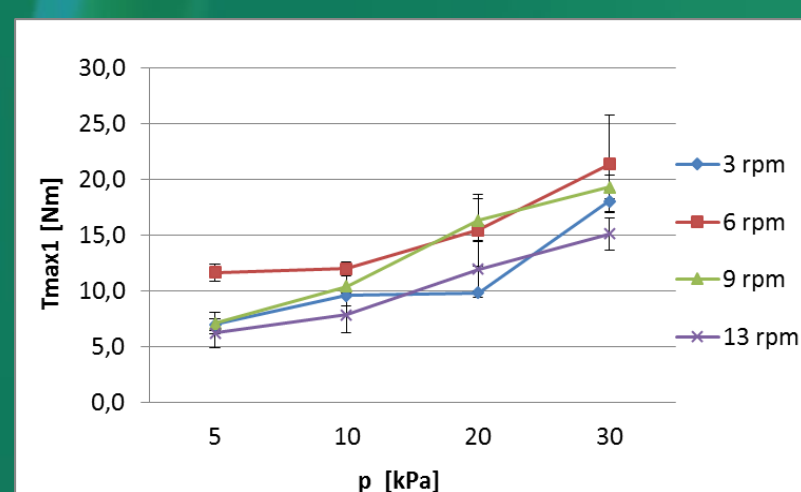
## VANE TESTER



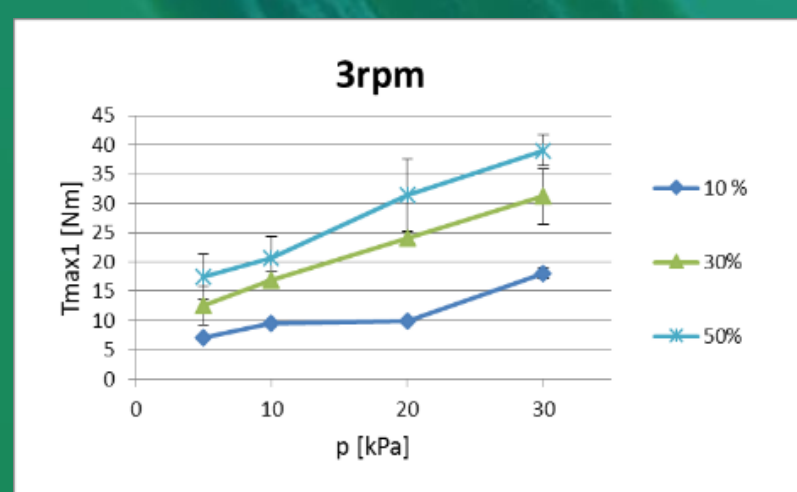
## TORQUE



Experimental curves obtained for forest woodchips

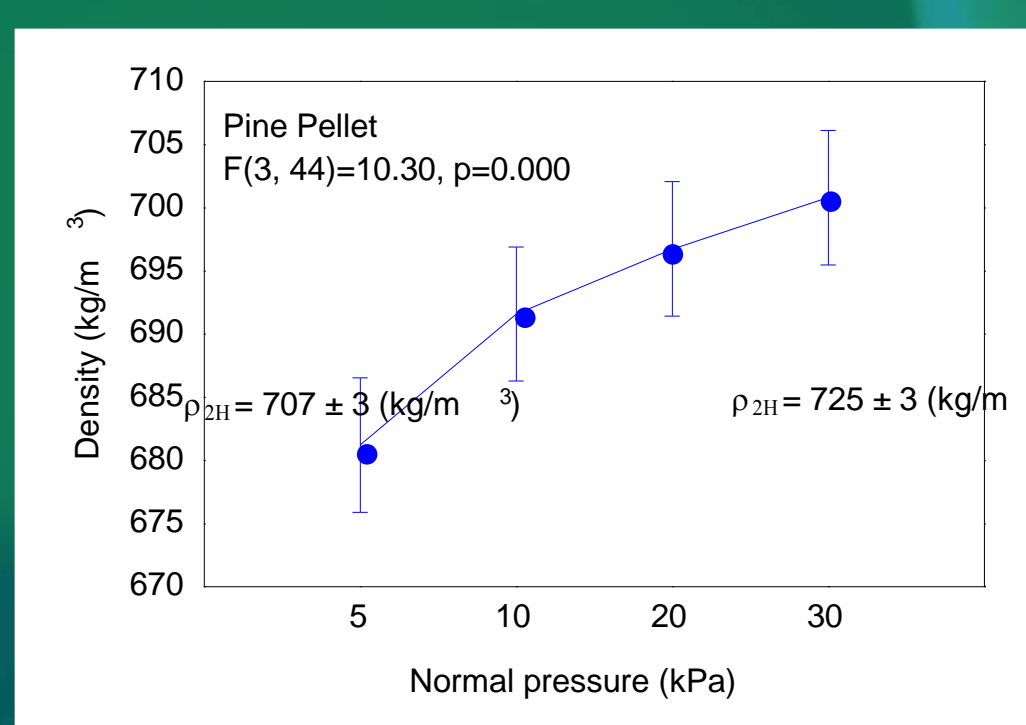


Influence of compaction pressure and rotation speed



An influence of moisture content

## DENSITY



## MOISTURE CONTENT

