# ANALYSIS OF FUEL ECONOMY INDICATORS AT PARTIAL LOADS OF AGRICULTURAL TRACTORS

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When performing technological processes, the tractor's power load for individual agricultural operations can be 30-70%. Such a significant underload is accompanied by increased fuel consumption per unit of useful work performed. The features of the brake specific fuel consumption (BSFC) map of tractor diesel engines explain this. According to BSFC map, a decrease in the torque load causes an increase in specific fuel consumption. However, there is a possibility of improving fuel economy, which is realized by reducing the engine crankshaft speed at a constant tractor traction power and maintaining the technological speed of movement. This requires switching to a higher transmission gear and provides an increase in the engine's torque load. In this case, the engine switches to more economical operating modes in terms of specific fuel consumption. This method of switching to a higher gear while simultaneously reducing the speed is called "GUTD - gear-up and throttle-down" or "SUTB - shifted-up and throttled-back".

The effectiveness of this technique was studied based on the results of tractor test protocols at the Nebraska Tractor Test Laboratory (NTTL, USA) (see figure). Existing reserves for increasing the efficiency of wheeled agricultural machinery in the form of fuel savings were identified using the example of more than 30 tractors.

For example, the study and analysis of data from the test protocol of the John Deere 8R 490 tractor according to the OECD Code 2 procedure in NTTL showed that it is possible to obtain real fuel savings within 11.8-14.1% when using the GUTD method, ensuring a speed of 8.5-8.7 km/h and partial traction within 50...75%.

It was found that in general fuel savings can reach a maximum of 19.2% when loaded with 75% and 25.5% when loaded with 50% of the maximum traction. The average fuel savings are 10.7% for 75% and 14.9% for 50% of the maximum traction. On most tractors, fuel savings of 7.1-14.1% can be achieved when loaded with 75% traction and 11.1-18.5% when loaded with 50% of the maximum traction.

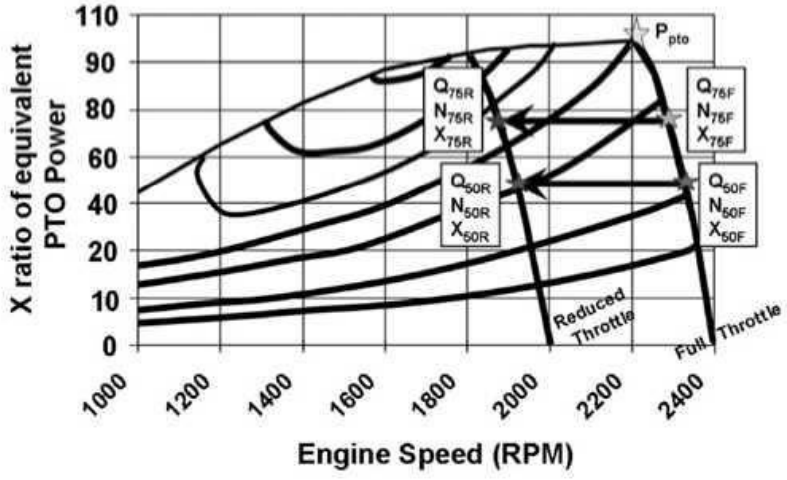


Figure – Brake specific fuel consumption map with test modes in NTTL