



## HELP



### 1. GENERAL

The program TRACTOR PT is designed to serve the calculation of traction prediction of agricultural tractors. It can be used for the design of basic geometric parameters of a tractor, but also to determine the optimal requirements of gross weight and their distribution by axles of a certain tractor. TRACTOR PT also helps in the election of the suitable tires. Any user must have in consideration that the program is only valid in the hypothesis of a horizontal ground in which the tractor is also making an horizontal pulling operation.

### 2. INPUT DATAS

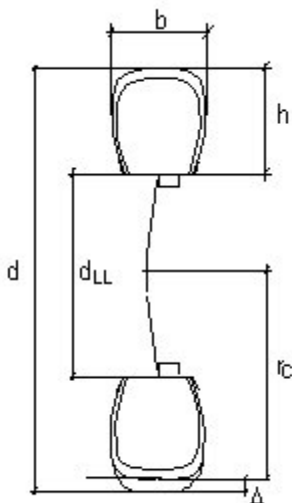
Before making a prediction, it is necessary to generate charts (of tractor, rear and front tires and sorking conditions) necessary to make the prediction.

- **Tractor**

The design parameters that affect the program are the static rear and front axle weights, drawbar height and wheelbase. Another fundamental parameter for the prediction in MFWD/4WD tractor types is the inter axle ratio. Optionally the registers on mark, model and power can be filled up.

- **Tires (front and rear tires)**

The data that must be provided to the program are values included in commercial catalogues of tire manufacturers. The fields that must be filled up are:



Section width (b, meters): width of the tire between flanks.

Rim diameter ( $d_{LL}$  in inches): marking value that appears in the pneumatic

Overall tire diameter (d in meters)

Tire rolling radius (r in meters): radius which correspond to the rolling circumference of the tire.

Static loaded ( $r_c$  in meters)

Maximum vertical tuyre load (Pmax in kp)



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- **Working conditions**

The working conditions only refer to the bearing capacity, characterized, exclusively, by their Cone Index to 6 inches (kPa) and to the horizontal drawbar pull (kp) developed by the tractor in the prediction that is going to take place.

### **3. OUTPUT DATAS**

The program follows a series of calculations guided by the corresponding algorithms for each theory. The presentation, in Excel spreadsheet, shows a wide summary of the results obtained. Nevertheless the flap "calculation" only shows a brief summary of the more important results.

- **Dynamic axle weight (Ry)**

They are the resultant forces, in both tires, perpendicular to the ground. These forces are the reaction that occurs when the tractor is working on a drawbar pull. Then the acting forces are the total weight, located at the center of gravity, the drawbar pull, and the rolling resistance in both wheels.

- **Rolling resistance (Rk)**

The tractor rolling resistance that is also the sum of the rolling resistance of the front and rear tires.

- **Gross thrust (Ft)**

The tangential force developed by the vehicle corresponds to the sum of the rolling resistance of the own vehicle plus the developed drawbar pull.

- **Traction coefficients**

In two wheel drive, 2 traction coefficients can be calculated ( $\mu_t$ ,  $\mu_n$ ). They correspond to the respective formulas:

$$\mu_t = \frac{F_t}{R_{1y}} \quad \text{Ratio between gross thrust and the dynamic rear weight}$$

$\mu_n = \mu_t - k_1$  Difference between the gross thrust coefficient  $\mu_t$  and the rolling resistance coefficient in the rear wheels.

In MFWD/4WD prediction, the values of these coefficients will not appear because, in fact, they are not defined (it would be necessary to determine the portion of gross thrust in each wheel)

- **Slip ( $\delta$ )**

It refers to the reduction in travel speed of the tractor when it is pulling a drawbar force in relation with a reference condition. The program shows the slip produced in the driving wheels (rear in 2WD and both wheels in MFWD/4WD)