IMPROVING THRESHING EFFICIENCY FOR RICE HARVESTING COMBINE

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ABSTRACT

The experimental study was carried out at a private farm at, Delegate, Bohira Governorate during two agricultural seasons of 2017 and 2018. The threshing device in combine model CA385 was developed and manufactured from local material to be suitable for the harvesting operation under Egyptian conditions. The threshing device for the combine harvester was evaluated before and after development under different operating conditions(forward speed, grain moisture content and operating time,). un-threshing losses percentage, threshing efficiency, threshing capacity, fuel consumption, power requirements, energy requirements, device mass losses percent, specific wear, wearing rate, wearing resistance, critical wear, and device expected life. Were measured The results obtained showed that using modified secondary threshing drum at forward speed 3.5 km/h and grain moisture content 23%, led to an increase in threshing efficiency, wearing resistance, device expected life, and the critical wearing value from 99.6 to 99.7 % by an increase of .1%, from 3.33 to 4.54 hg^{-1} By an increase of 30%, from 57.7 to 105.9 h by an increase of 45%, and from 0.637 to 0.647 by an increase of 65%, before and after development, respectively As well as to a decrease in wearing rates, fuel consumption, energy consumed, and specific wear from 0.3 to 0.22 gh^{-1} by 26%, 4.7 to 4.4 L fed^{-1} by 6%, 3.73 to 3.28 kW.h/ton by12%, and 0.06 to 0.04 g/m^3 by 33%, before and after development respectively. The results also showed that the increase in operating time from 50 to 500 h led to a decrease in threshing efficiency, wearing resistance, and device expected life from 99.7 to 99.5 %, from 4.54 to 0.25 hg^{-1}, and from 105.9 to 5.8 h, as well as increasing wearing rate, fuel consumption, and energy consumption from 0.22 to 4 gh^{-1}, 4.4 to 7.0 L fed^{-1} and 3.28 to 8.37 kW.h/ton respectively,

Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS AND ABBREVIATIONS

Fc	Fuel consumption per feddan, L fed-1
Ci	Full tank capacity
Cc	Amount of remaining fuel in the tank after a specific period
Pr	Engine power, kW
P	The density of fuel in kg/l(for gas oil = 0.85)
L.C.V	The lower calorific value of fuel in 11 k.cal/kg
η_{thb}	The thermal efficiency of the engine (35 % for diesel)
η_m	Mechanical efficiency of the engine (80% for diesel and 85% for Otto)
Er	Energy requirements ,kW.h/ton
Ap	Actual system productivity
W0	mass of the device before using and
W	mass of device after using
Wr	Wearing rate, gh-1
\ St	divided by the hardness of abrasion
At	1060 quarts hardness,
EL	Device expected life
W new	the weight of the new device, g.
Ww	the weight of the worm device after the expected wear, g.
TFC	Tangential flow threshing cylinder unit
VHN	Vickers hardness number
HI	Heavy Industry (18)
c	hourly cost, L.E
p	price of machine, L.E,
y	yearly working hours, h,
a	life expecting of the machine, year,
i	interest rate /year ratio,
T	taxes, overheads ratio,