INTRODUCTION

- Mechanization of cassava processing operations will play a pivotal role in removing the negative attributes of the traditional processing techniques and promote timely large scale processing of the tubers in hygienic environment.
- It has been well documented that cassava peeling is the major challenge of cassava processing in Nigeria (Nwokedi 1983; Olukunle *et al*., 2006; Olajide and Jekayinfa, 2007; Egbeocha *et al*., 2016).
- Several attempts have been made at solving these problems which resulted in the development of various types of cassava peeling machines (Olukunle and Ademosun, 2006; Akintunde *et al*., 2005)

AIM OF THE STUDY

The aim of this study was to design and construct an innovative cassava peeling machine using locally sourced engineering materials.

To evaluate the performance efficiency of an innovative cassava peeling machine using two improved cassava cultivars namely:

(i) TMS 30572

(ii) TME 419

MATERIALS AND METHODS

Components of the machine are:

- The Hopper
- The Peeling Unit
- The Outlet Unit
- The Diesel Engine
- The Peeler Seat
- Power Transmission system
- The fruit water tank
- The driving and driven pulley
- The Shaft

MATERIALS OF CONSTRUCTION

The materials needed in fabricating the cassava peeler are:

- Mild Steel Plate
- Stainless Shaft
- Angle Iron
- Bolts and Nuts
- Iron Rod and Welding Electrodes
- Stainless Steel Plate

DESIGN CALCULATIONS

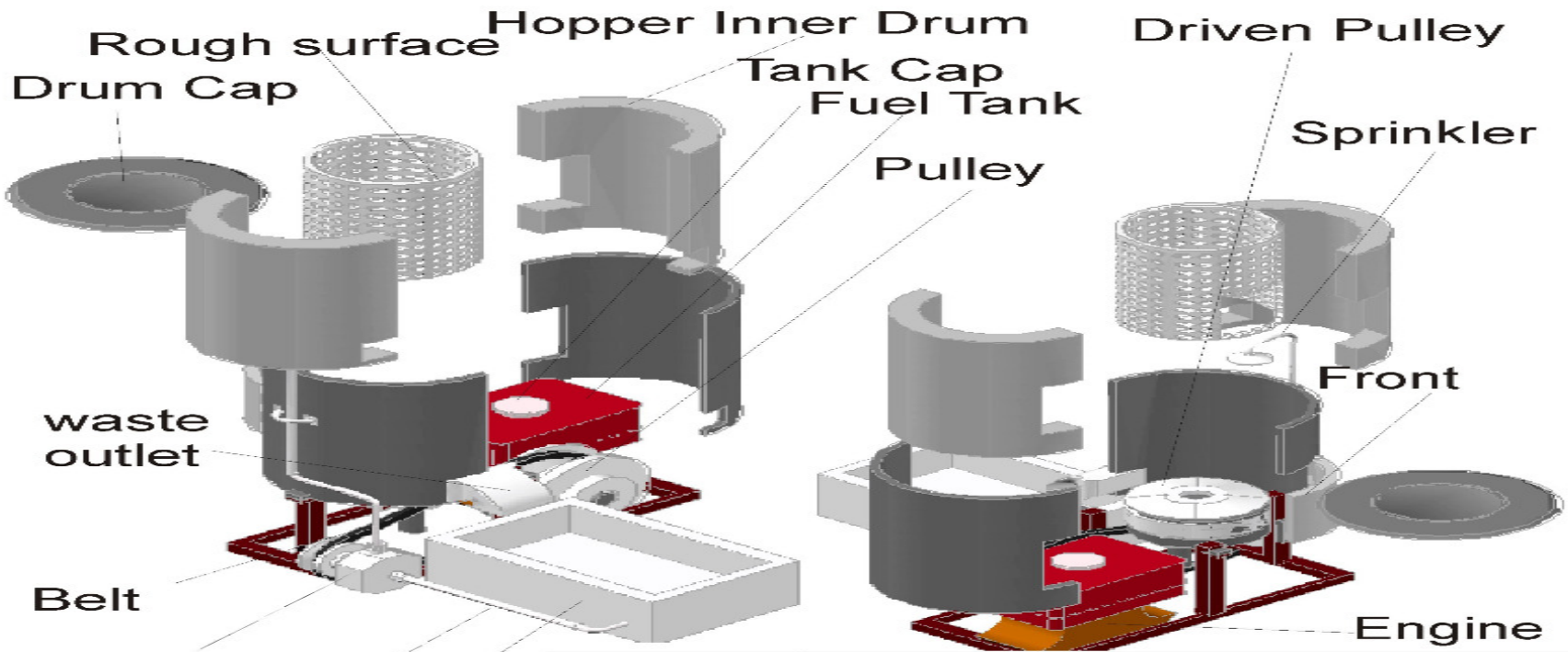
The following parameters were calculated using standard formulae:

- Power Requirement Design
- Belt Analysis Design
- Analysis of driven pulley and driving pulley
- Determination of wrap angles
- Determination of Belt Tensions
- Shaft Design
- Determination of twisting moment (τ)
- Determination of Polar moment of inertia of the shaft about the axis of rotation (J)
- Determination of shaft torque and permissible angle of twist

(Khurmi and Gupta, 2005).

3D DESIGN OF THE MACHINE

EXPLODE



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TITLE	DESIGN, CONSTRUCTION AND EVALUATION OF A CASSAVA PEELING MACHINE
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RESULTS

Table 1: Result of peeling by the Cassava Peeler

Variety	Speed (rev/ min)	Duration of Peeling (min)	Weight of Tuber (kg)	Weight of Peeled Tuber (kg)	Weight of Peels (kg)	% Weight of Peels	Mean Peeling Efficiency (%)
TME 419	1600.00	4.56	30.00	24.00	5.50	18.3	75.5
TME 419	1600.00	6.01	50.00	42.50	7.50	15.00	84.0
TME 419	2600.00	3.81	30.00	21.20	8.80	29.30	61.5
TME 419	2600.00	5.19	50.00	40.30	9.70	19.40	71.5
TMS 30572	1600.00	4.52	30.00	24.18	5.82	19.40	71.5
TMS 30572	1600.00	6.04	50.00	42.61	7.39	14.78	85.75
TMS 30572	2600.00	3.92	30.00	20.91	9.09	30.30	58.6
TMS 30572	2600.00	5.17	50.00	41.10	8.90	17.80	61.2

RESULTS

DISCUSSION

- The fabricated cassava peeling machine at the speed of 1600 revolution per minute had an average peeling efficiency of 79.18% and an average flesh loss of 5.09% for the 2 varieties.

- However, when the speed was raised to 2600 rev/min there was an average peeling efficiency of 63.22% and an average flesh loss of 5.95 percent for the 2 varieties.

- Hence, low speed of rotation of the peeling machine will increase the peeling efficiency and decrease percentage flesh loss and the peeling process is easier to control.

CONCLUSION

- The configuration resulted into careful removal of the tuber peels achieving > 90% flesh recovery at average rotational speed of 1600 rpm < Nt < 2600 rpm.
- The average peeling efficiency of the machine was 58.6-85.75% depending on the maturity (age) and variety.
- The cost of a single unit was estimated at $1,230.

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Thank you for listening