

# Development of a Lotus Seed Shell Peeling Machine

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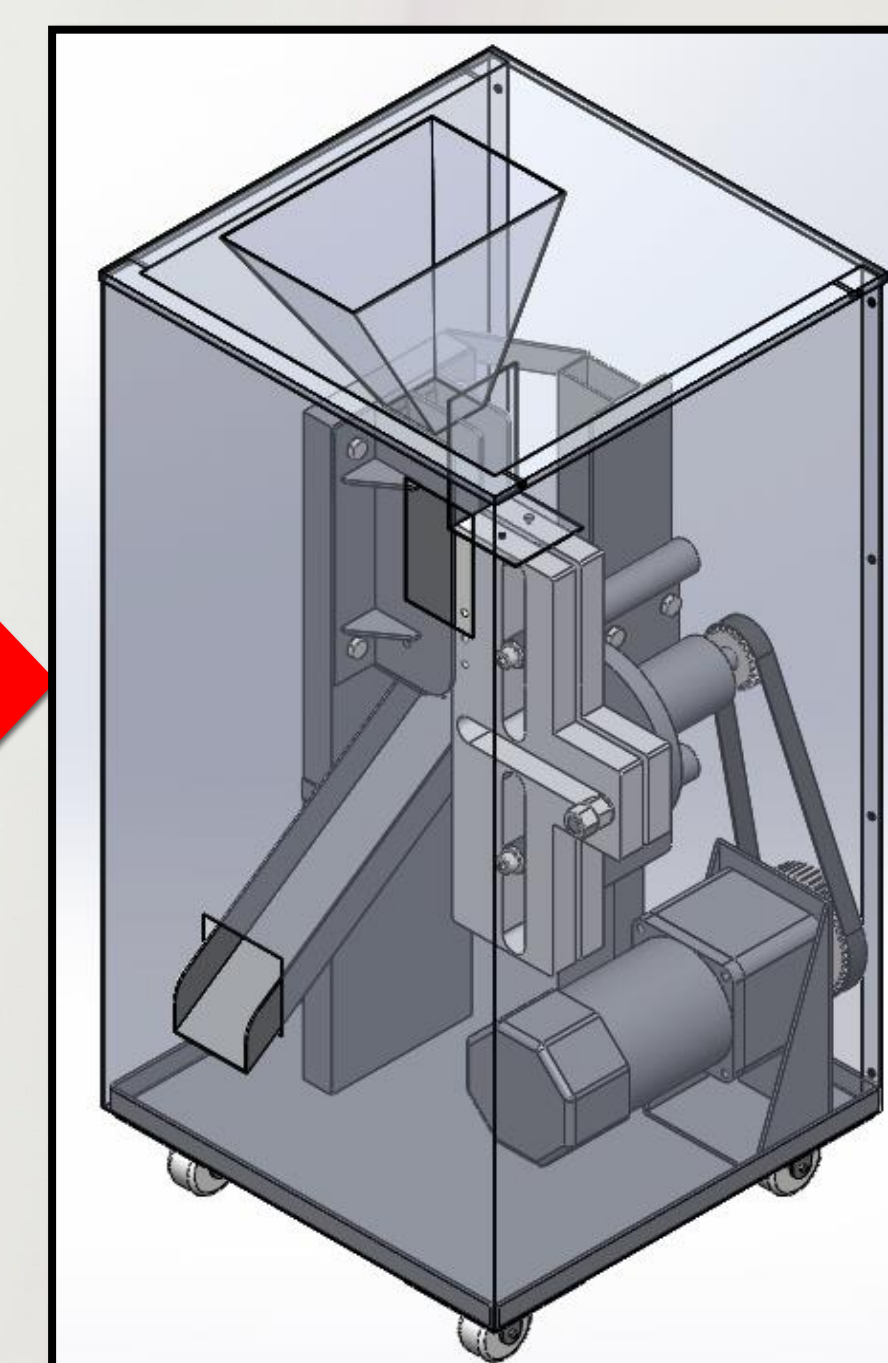
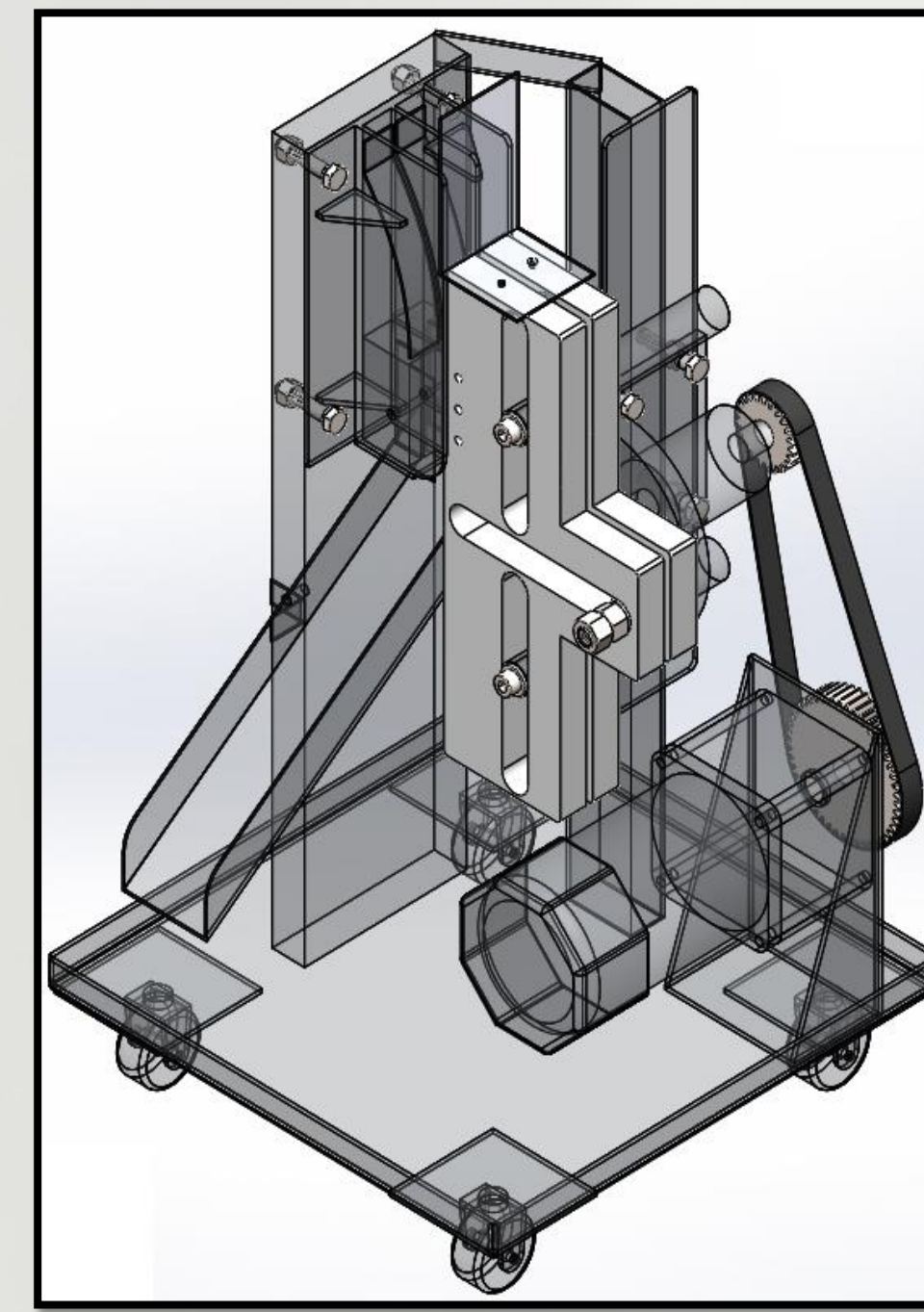
## Productivity Feature

The lotus seeds are great importance to East Asian cuisine and are used extensively in traditional Chinese and Indian medicine and in Chinese/Indian desserts. In Thailand, Lotus seeds snack is very famous, particularly in Surin and Phichit Province; it is called “Med-bua-op”.

This research attempted to design and fabricate a prototype lotus seed shell peeling machine to minimize the time and labor requirement in the fresh lotus seed shell removal. This prototype peeler consists of the main frame, cutting blade unit, Scotch Yoke mechanism, the power transmission unit and a prime mover by 90W-gear-motor. The operation started with manually feeding lotus seeds into chute at the top of machine. Then they were conveyed to blade unit to cut lotus peel in diametrical axis by Scotch Yoke mechanism, and finally seeds were released through outlet chute at the bottom.

The results revealed that the average speed of blade 7 m/min worked well among the average speed of blades 6, 7 and 8 m/min respectively. The peeling percentage was 79% without any seed damage with working capacity of 3.6 kg/hour consuming 0.06 kW-hour of energy. An engineering economic analysis showed that it cost an average of THB 6 per kilogram at 1,440 hours per year with 23-months payback and 247 hours per year for break-even point. This prototype can work at least three times as fast as human labor.

## 2. Designing and Fabrication of the Prototype



US \$600

## 3. Performance Evaluation and Economic Analysis



Fresh lotus seed



Lotus seed after peeling by the prototype



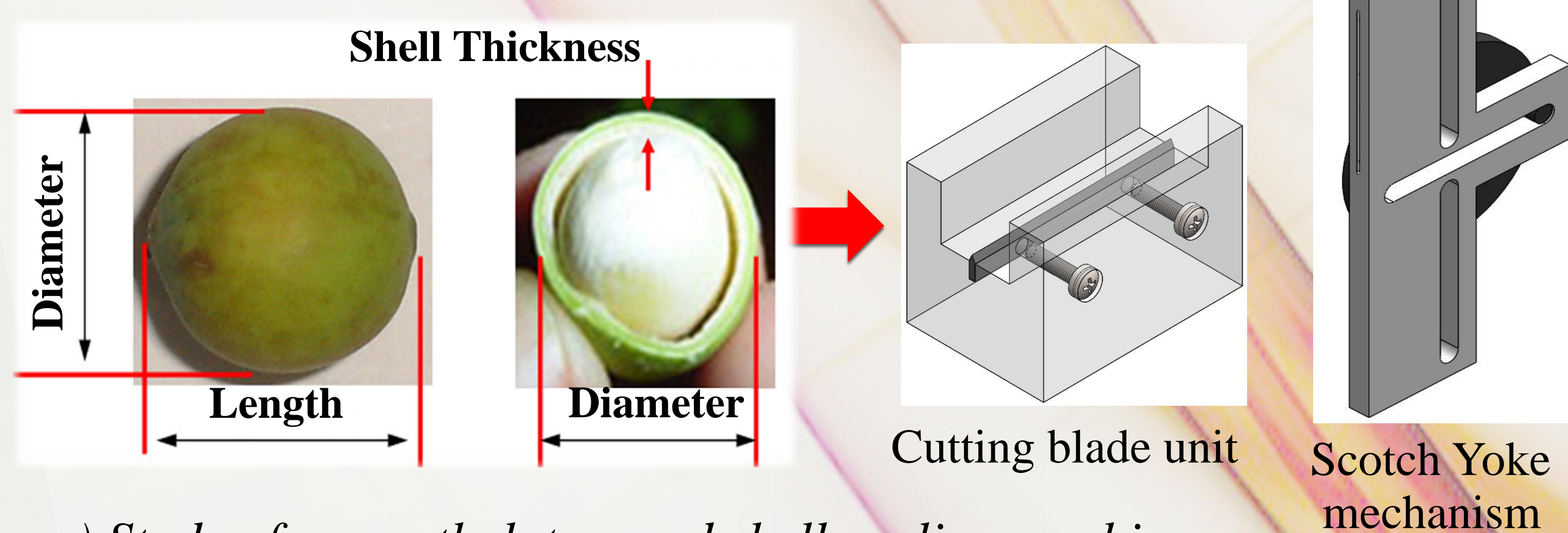
## Methodology

### 1. Collection of Related Information about Lotus Seed Conditions

#### a) Study of process for producing lotus seed snack (Med-bua-op)



#### b) Study of some physical properties of lotus seed



#### c) Study of currently lotus seed shell peeling machine

Many lotus seed peeling machine were developed in other counties such as China and Vietnam. However, the machine did not work under Thai condition and also the price of the machine was too high for farmer and farmer cooperative to afford.



US \$200



US \$5,000



US \$6,000

## Innovation & Creativity

This study was focused on creating a new concept of removing the fresh lotus seed pericarp, and verified this concept by design and development of a lotus seed shell peeling machine prototype for small and micro community enterprises in Thai condition. Following criteria were conducted for the design: Cheap, Compact, Simple mechanism (Scotch Yoke mechanism was selected), No electronic parts, Ease to use, repair and maintenance.

## Applications

This research was moved to commercial scale including:

1. Small and micro community enterprises (OTOP) in Thailand: One cutting unit of prototype was able to work at least three times faster than human labor, then it can reduce time and labor requirement in process for producing lotus seed snack.

2. Agricultural machinery Industries: The machine being simple it could be constructing by the local manufacturer, so it can be used commercially and economically.



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