

COUNTRY PRESENTATION PAPER

THAILAND

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Mechanization play very important role in the present agricultural production of Thailand. Labor shortage and necessity to reduce production cost have obviously shown off. Undoubtedly, demand for agricultural machinery will remarkably increase during next ten years.

Agricultural mechanization for rice production is the most progressive compare to other crops. The Central plain region is the highest progressive mechanization and nearly full mechanization then increased and expanded to other regions of the country.





Supporting Policies

Government policy on the sector

There is no declared policy on farm mechanization by the government in Thailand. After determining the role which agricultural machinery has played in agricultural development in many other developing countries, and realizing its responsibilities, the government started showing increasing interest. These include formulation of policies; determining priority needs; selection of suitable agricultural machines; research and development; dissemination of information and extension services; provision of credit; coordination of activities; training of farmers, extension agents, and manufactures; assistance for manufacturing and on the farm use of mechanization inputs

Standard and safty

One of the common problems faced by both contractors and farmers are frequent breakdown of the components of rice combine harvester. The replacement and repair of which needed a considerable time and effort and these are one of the most serious drawback of the machine for effective operation.

Serious accidents with rice combine harvester during operation, many accidents were reported while working in the field. The main reasons for their occurrence were the operator's skill, machine design, and the condition of surroundings. Direct drive rice combine harvester which using the belt – pulley and chain – sprocket mechanisms in their transmission system, is one of the reasons of accidents. The operator had many accidents due to failures in the other moving parts of the machine such as clogging in the re-threshed grain auger and front auger. The operator had to de-clog these faults in the field during harvesting only.



Development of agricultural machinery testing networks in Thailand

Thai Industrial Standard Institute (TISI), Ministry of Industry is responsible for standardization of agricultural machinery. TISI was established in 1968. It is the official agency with the responsibility in the development of Thai Industrial Standards (TIS), including agricultural machinery standards

The preparation of agricultural machinery standards is undertaken by the Technical Committee (TC). The TC, appointed by the TISI, includes representatives from Agricultural Engineering Research Institute (AERI), manufacturers, the Bank of Agriculture and Agricultural Cooperatives (BAAC), universities. Approved standards are published in the government gazette.

Agricultural machinery standards from various countries have been studied and then adapted to be suitable with Thai agricultural machines and their corresponding working conditions. Research is required to get a basic data for developing standards. Safety standard is one part of each agricultural machinery standard.

Most of agricultural machinery standards are voluntary standards.

Only small diesel engine standard is a mandatory one and a few number of agricultural machinery manufacturers apply for the TISI standard certification.

TIS 1172-2536 (1993) Groundnut shellers

TIS 818-2531 (1988) Power maize shellers

TIS 1418-2540 (1997) Rice reapers

TIS 2037-2543 (2000) Soy - bean reapers

TIS 1428-2544 (2001) Rice combine harvesters

TIS 768-2544 (2001) Axial flow rice threshers

TIS 1173-2536 (1993) Sorghum threshers

TIS 1044-2534 (1991) Soybean threshers

TIS 1480-2540 (1997) Sugar cane planters

TIS 1323-2539 (1996) Rotary cultivators

TIS 787-2551 (2008) Small size water cooled diesel engines Compulsory Standard (Effective Date 7 November 2004) Please be informed that TIS 787-2531 (1988) is being enforced by TISI

- TIS 888-2532 (1989) Small rice mill
- TIS 893-2532 (1989) Rubber brake blocks for rice whitener machine
- TIS 633-2531 (1988) Rubber rolls for paddy dehuskers
- TIS 1385-2539 (1996) Paddy dryers
- TIS 1236-2537 (1994) Seeders
- TIS 1315-2538 (1995) Agricultural vehicles: farm trucks
- TIS 1350-2539 (1996) Walk-behind tractors
- TIS 1429-2540 (1997) Small four-wheeled tractors
- TIS 1322-2539 (1996) Trailers for walk-behind tractors
- TIS 1000-2533 (1990) Agricultural discs
- TIS 852-2532 (1989) Hoes
- TIS 1196-2536 (1993) Dozers for agricultural wheeled tractors
- TIS 1258-2537 (1994) Three-point hitch-mounted polydisc tillers
- TIS 1127-2535 (1992) Tractor-operated disc ploughs
- TIS 1397-2540 (1997) Disc ploughs for walk-behind tractors

TIS 1126-2535 (1992) Moldboard ploughs for power tiller
TIS 1350-2539 (1997) Test methods for power tillers

TIS 1172-2536(1993)Groundnut shellers

TIS 818-2531(1988)Power maize shellers

TIS 1418-2540(1997)Rice reapers

TIS 2037-2543(2000)Soy - bean reapers

TIS 1428-2544(2001)Rice combine harvesters

TIS 1283-2538(1995)Rotary slashers

TIS 768-2544(2001)Axial flow rice threshers

TIS 1173-2536(1993)Sorghum threshers

TIS 1044-2534(1991)Soybean threshers

TIS 1480-2540(1997)Sugar cane planters

TIS 1323-2539(1996)Rotary cultivators

TIS 1385-2539(1996)Paddy dryers

TIS 888-2532(1989)Small rice mill

TIS 1125-2535(1992)Vertical/Inclined pumps

TIS 1236-2537(1994)Seeders

TIS 1000-2533(1990)Agricultural discs

TIS 768-2531

Thai Industrial Standard for Axial Flow Rice Threshers

1. Scope

- 1.1 This standard specifies components and construction, requirements, mark and label, sampling and criteria for acceptance, and testing for axial flow rice thresher hereinafter referred to as "thresher".
- 1.2 Threshers in this standard shall use, as power source, engine, electric motor or tractor for threshing crops which are conveyor-fed through the feed board and moved parallel to the axis of the spike-tooth threshing drum. Threshed grains will be separated from foreign materials in a continuous operation.

- 3.1.1 Threshing system for threshing and for discarding straw through the straw outlet.
- 3.1.2 Cleaning system for separating foreign materials from threshed grain.

An example of crop flow diagram of the thresher is given in Figure 3.

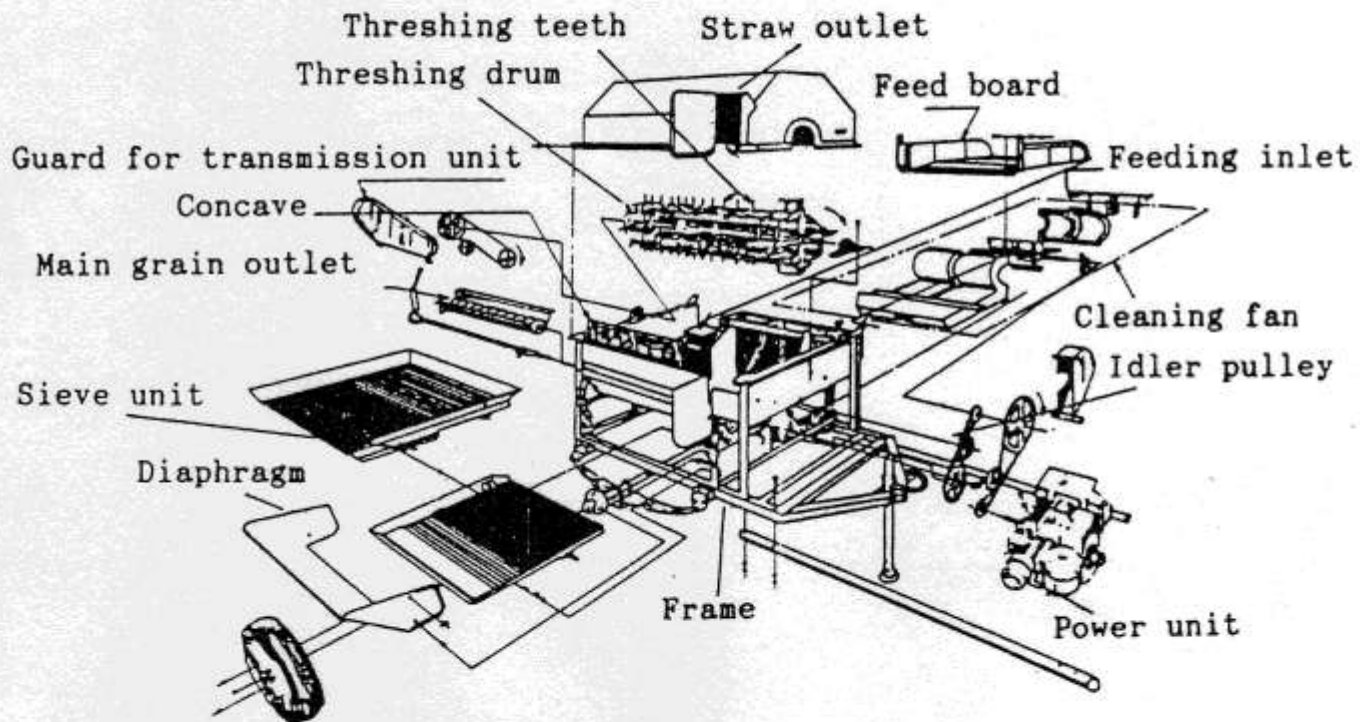


Figure 2 : Example of thresher components
(clause 3.1)

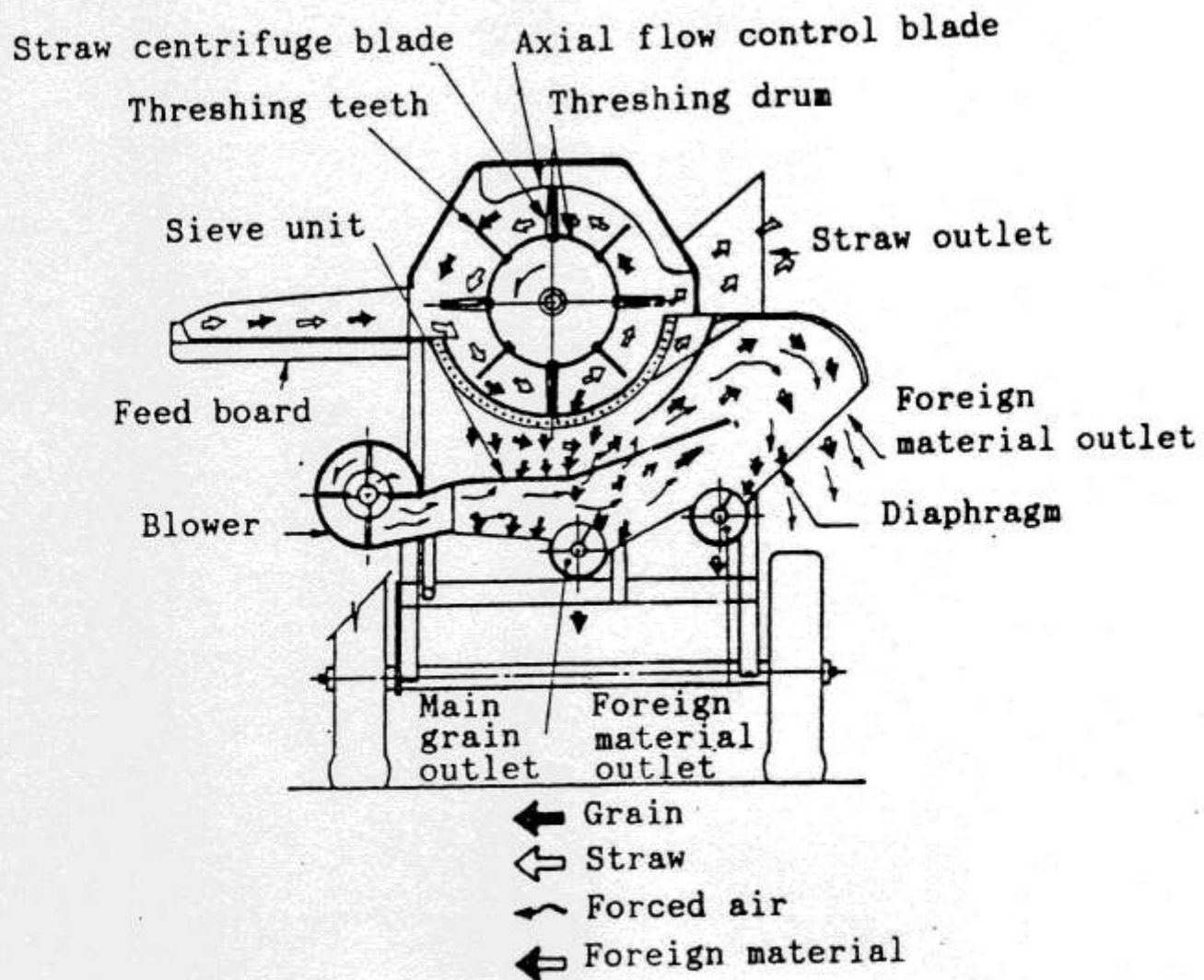


Figure 3 : Crop flow diagram of thresher
 (clause 3.1)

- 3.2.1.2 Means of lubrication for moving components and points of contact between metal parts shall be provided.
- 3.2.1.3 All points requiring frequent lubrication and cleaning shall be easily accessible.
- 3.2.2 All metal components except the threshing drum, the inner surface of concave, and transport instruments shall be painted or finished for protection against rust.
- 3.2.3 Safety for operator of the thresher shall be ensured as follows :
- 3.2.3.1 Protruding fasteners shall be avoided.
- 3.2.3.2 Any sharp corners shall be avoided.
- 3.2.3.3 Guards shall be provided to prevent accidental contact of operators in the transmission system. They shall be so designed as not to hinder in the adjustment, servicing and operation of components, and shall not be easily removed without the aid of tools.

4. Requirements

4.1 Components and instruments shall comply with the following :

4.1.1 Feed board

The feed board shall be made from steel sheet of at least 1.2 mm thickness.

The shortest normal distance measured in a horizontal plane from the tip of the threshing teeth to the outer edge of the feed board (a) shall not be less than 750 mm, as shown in Figure 4.

Compliance is checked by measurement.

4.1.2 Threshing drum and teeth

4.1.2.1 When tested as in clause 7.1.2.1, threshing drum shall statically balance.

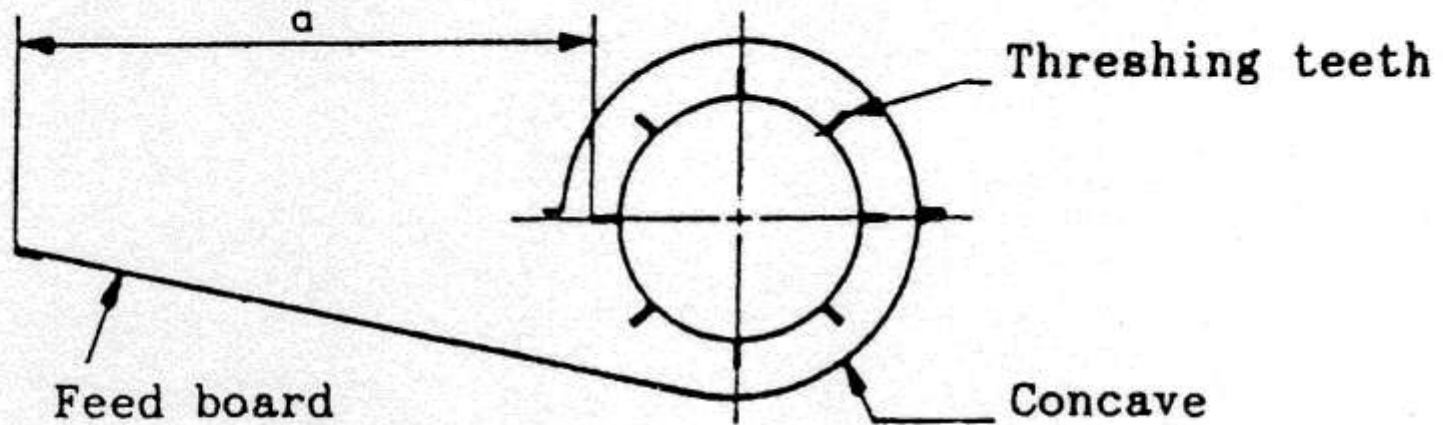


Figure 4 Normal distance from threshing teeth to feed board
(clause 4.1.1)

4.1.2.2 Threshing drum shaft shall be made from steel having a tensile strength of 451 to 755 MPa and a hardness of 69 to 100 HRB. Compliance is checked by the test of clause 7.1.2.2.

4.1.2.3 Threshing teeth shall be made from hardened low alloy steel averaging 32 to 40 HRC in hardness. Compliance is checked by the test of clause 7.1.2.3.

4.1.2.4 One end of the threshing tooth shall be fastened to the drum by means of screw thread conforming to TIS 159, "General purpose ISO metric screw threads and selected sizes for screws, bolts and nuts", having a pitch of not less than 1.75 mm and a screw length not less than 25 mm. Where the threshing drum is not threaded, a spring lock washer shall be attached to all threshing teeth.

Compliance is checked by visual inspection and by inspecting the diameter and pitch using a go and no-go gauge.

4.1.3 Bearing

Bearing shall be of a type provided with seal for adequate protection against the ingress of dust.

Compliance is checked by visual inspection.

4.1.4 Power transmission V-belt

TIS 146, "Power transmission V-belt" shall be complied with.

4.2 Efficiency

4.2.1 No-load condition

When tested in accordance with clause 7.2.3.1, the following shall be ensured.

- 4.2.1.1 The thresher shall operate without shock or blockage in the threshing and the cleaning systems;
- 4.2.1.2 Rotating or oscillating components shall operate smoothly without undue knocking or rattling sound as a result of abrasion or imbalance;
- 4.2.1.3 None of the components or instruments shall be damaged. Fastening connections between different components by means of rivets, bolts or welding shall be such that they will not get separated or loosened.

4.2.2 Load condition

When tested in accordance with clause 7.2.3.2,

- 4.2.2.1 Threshing efficiency shall not be less than 99% ;
- 4.2.2.2 Cleaning efficiency shall not be less than 97% ;
- 4.2.2.3 Percentage of spilled grain shall not exceed 4 ;
- 4.2.2.4 Percentage of damaged grain shall not exceed 2 ;
- 4.2.2.5 Specific output capacity shall not be less than 120 kg/hr/kw ;
- 4.2.2.6 The running of the thresher as given in clauses 4.2.1.1, 4.2.1.2 and 4.2.1.3 shall still be maintained.

7.2 Efficiency

7.2.1 General requirements for calculations and measuring devices used for the tests shall be as follows :

7.2.1.1 Revolution speed

Apparatus for measuring revolution speed shall be accurate to within 2 %.

7.2.1.2 Weight

Weighing apparatus shall be accurate to 0.1 g.

7.2.1.3 Straw and grain ratio

Take five samples of the crops each weighing about one kilogram. Separate the grains from stalks manually for each sample. Take the mass of grain and straw separately for each sample, and calculate their ratio. The average of the five samples shall be taken as the straw and grain ratio.

7.2.1.4 Weight of crop bundle and length of cut crop

Ten bundles of cut crop shall be used. Weigh each bundle, and obtain the average length of cut crop from a number of these samples.

7.2.1.5 Moisture content of grain

Use the samples as of clause 7.2.1.3. Determine its moisture content in accordance with the method specified in ISO 712.

7.2.1.6 Sampling of threshing output

Use a container of a size sufficient to permit single collection of all samples within the specified time. Sampling at straw outlet and foreign material outlet should be carried out using a sack or any other apparatus that permits the air to pass through.

7.2.1.7 Analysis of samples

Manual separation or standard analysis instrument shall be applied.

Test Result of Rice Thresher

Date of Test	20 July 2006
Type of Thresher / Size(ft)	Farm Truck Model / 5
Moisture Content (% wb)	17.40
Grain/Straw Ratio(%)	58.33
Weight of Paddy/Bundle(g)	720
Engine, hp	80
Drum Speed at no load condition(rpm)	550
Threshing Efficiency(%)	100
Cleaning Efficiency(%)	100
Spilled Grain(%)	0.44
Damaged Grain(%)	0
Capacity(kg/hr)	3,098.88

The National Agricultural Machinery Center (NAMC) was established in 1979 organized under Research and Development Institute at Kamphaengsaen, Kasetsart University.

The main functions of the center was

1) Testing and Standardization

2) Responsibilities to testing of agricultural machines either locally fabricated in Thailand or imported from abroad and collaborating with the Thai Industrial Standards Institute in standardizing agricultural machinery testing.



THANK YOU