TRAINING GUIDE FOR LOCAL BLACKSMITHS FROM THE THREE NORTHERN REGIONS OF GHANA

TOPIC: THRESHERS 101

VENUE: TAMALE IMPLEMENT FACTORY

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TOPICS UNDER CONSIDERATION

Threshers

What is a Thresher
Basic Parts and Functions of a Thresher
Types of Threshers
Threshing Drums
Thresher Motors
Materials Selection for Thresher Construction
Interpretation of AUTOCAD drawings

Welding and Fabrication techniques

Welding Operations
Types of Welding Operations
Safety Precautions
CHAPTER ONE

1.0 WHAT IS A THRESHER?

A thresher is a machine which separates the seeds from the stalk (pinnacle in the case of rice) and winnows it by means of blower to obtain clean seeds or grains. Threshing involves three distinct operations: separating the grain from the ear or panicle (the most energy intensive operation); sorting the grain from the straw; and winnowing the chaff from the grain. The threshing can be achieved by three methods: Rubbing action, Impact and Stripping.

Fig. 1: Diagram of a thresher (Source: Indian Standard Institution, 1986).
1.1 Basic Parts and Functions of a thresher

1.1.2 Threshing Drum

The threshing drum is the most relevant part of the thresher. This component beats the crop to release seeds or grains. This action is accomplished by beating the crop against the concave. The speed of the thresher is determined by the pulley of the thresher with respect to the diameter of the drive motor/engine.

Fig. 2: Spike tooth Threshing drum

1.1.3 Blower/Fan

The blower or fan (commonly called) plays an important role in cleaning threshed grain. The fan does this by generating a film of air and blowing it across the direction of threshed grains to get rid of debris and other unwanted particles. The blower is also driven by the motor with its speed controlled by the motor’s pulley. Air can only remove impurities which have different aerodynamic properties from the gran. A thresher that is provided with aspirator unit is usually called aspirator type thresher. Those threshers fitted with blower which blows air in horizontal direction is called drummy threshers.
1.1.4 Fan adjustment

Fan(s) fitted on thresher must provide the proper amount of blast. The shutter(s) at each end of fan should be adjusted properly so that it could provide blast sufficient enough to remove chaff and light materials without grain. Watching the sample and adjusting the blast can help in getting the desired results.

Fig. 3: Fan or blower of thresher (aspirator type- Sudajana et. al, 2002)

1.1.4 Concave/Sieve

Cylinder and concave together makes the threshing unit. It separates the grain from the crop and removes grain from the straw. Concave is provided in the thresher to hold the fed crop inside the threshing chamber and allows only grain and small amount of chaff to pass through it. The threshing takes place only in this space. It is a curved unit, made of iron steel or iron bar, fitted near the threshing cylinder. The clearance between cylinder and concave is adjustable, depending upon the size and type of grain. As the concave clearance is reduced, the threshing efficiency increases but losses increase and vice versa. The concave clearance at the inlet is less as compared to outlet. There are different types of concave, which are used in thresher.
1.1.5 Types of Concaves

1.1.5.1 Screen type concave

It is made of mild steel rod. It is semicircular in shape and sometimes made with wire also. The screen allows the material after threshing to pass through its perforation.

1.1.5.2 Perforated concave

In this, perforations are made in a mild steel sheet. The concave is closed from both the ends by iron sheet. The size of perforation is made as per the size of grain of a crop.

1.1.6 Cylinder and Concave Clearance

In order to get cleaned grains and proper threshing, it is very important to set the proper clearance between tip of cylinder and concave. On an average, concave clearance is kept about 25 mm at the mouth, 10 mm at the middle and 15 mm at the rear end (Farm Machinery and Equipment, 2013). Start operating the thresher, by keeping proper recommended speed, and check if any grain is left in the ears. If it is so, reduce the concave clearance gradually, until drum
is threshing cleanly. Too close concave clearance setting is likely to crack some of the grains and too open concave clearance will result in improper threshing of crops.

![Fig. 5: Cylinder concave clearance between loop cylinder and screen concave type](image)

### 1.1.7 Shaker

The screens are oscillated or shaken with a crank attached to the screen. This crank is powered from main axle either by belt or by rod. The circular motion of the main shaft is converted into oscillating motion of screen, which shakes it and separates the grain from other foreign material and chaff. The separating effectiveness depends on the frequency of strokes of crank, which is adjustable. The shaker, which is not always found on all threshers, plays a very important role in sorting threshed grains.

### 1.1.8 Chute

The chute of a thresher is an outlet for the emission of threshed crops or an outlet for the collection of seed.
1.1.9 Transport Wheels

Threshers are provided with wheels to make movement on the field easier. These wheels are made mostly with cost iron but new and large capacity threshers are equipped with pneumatic wheels for better performance during transportation. Transport wheels should not be so small as movement on the field will be impeded.
CHAPTER TWO

2.0 Types of Threshers

Threshers can be classified based on the power usage as seed below.

2.1 Power Source

The type of power used to drive the motor defines the type of thresher in use. The source of power also determines the quality of work output. The power also determines the amount of time spent in threshing crops. Below are different classifications of threshers based on their power sources.

2.1.1 Manual

Manual threshers are human powered. These threshers require human power to drive their threshing drums and blowers. The action of a pedal actuates the threshing drum for threshing. The problem with the manual threshers is inconsistent threshing drum and blower speeds.

2.1.2 Electric

Electricity driven threshers are another group of common threshers. These threshers have motors which are driven by electricity. The problem with this thresher is that it cannot be moved further away from electricity sources.

2.1.3 Motor

Motors are the most common of all the power sources for power generation on threshers. These motors are either powered by gas (petrol) or diesel. The horse power of the motor usually determines the work output of the thresher.

2.1.4 PTO (Power Take Off) shaft

These groups of threshers are usually very large and towed by the tractor. These threshers are driven by the tractor PTO shaft at very high speeds. Care needs to be taken in operating these threshers because of the PTO shaft. Negligence in its usage can result in serious harm to hand and body.
CHAPTER THREE

3.0 Types of Threshing Drums

The operation of detaching the grains from the ear head, cob or pod is called threshing. It is basically the removal of grains from the plant by striking, treading or rupturing. The diameter of threshing drums should not be too small as it will end up wrapping crop material around its periphery resulting in crops getting trapped in the cylinder.

3.1 Spike Tooth Type Cylinder

In this type of threshing drum, there is a hollow cylinder, made out of Mild Steel flat bars. Over to its entire periphery, a number of spikes/pegs of square /round bars or flat iron pieces are welded or bolted. Now days, in most of threshers, round peg with adjustable length are used. These spikes are staggered on the periphery of the drum for uniform threshing. The crop is fed along with the direction of motion of the rotating drum. The spike tooth cylinders are available in various sizes. A spike tooth cylinder with spikes of flat front and streamlined back has lower energy consumption. The spike tooth cylinder have been very efficient in threshing soya beans, rice and sun flower.

3.1.2 Rasp Bar Type Cylinder

In this type of cylinder, there are slotted plates, which are fitted over to the cylinder rings, in such a way that the direction of slot of one plate is opposite to another plate. This type of cylinder is commonly used in threshers. It can be used for a wide variety of crops viz.-wheat, paddy, maize, soybean etc.

3.1.3 Wire Loop Type Cylinder

In this type of threshing drum, there is hollow cylinder, over which a number of wooden or Mild Steel plates are fitted. On these plates, number of wire loops is fixed for threshing purposes. This type of cylinder is common in the manually operated paddy threshers. Holding the bundle against the loops of revolving cylinder does threshing of paddy crop. This type of threshing drum is excellent for paddy threshing.
Fig. 8: Types of threshing drums (Source: Farm Machinery and Equipment, 2013).
Fig. 9: Different types of threshing drums (Spike tooth and rasp bar type- Sudajana et. al, 2002)

Fig. 10: Wire loop threshing drum
CHAPTER FOUR

4.0 Motors

Motors are the main source of power for most mechanical threshers. These motors which come in different capacities either run on diesel or gas (petrol). These motors are equipped with pulleys which run on belts to drive the components of the thresher.

4.1 Diesel Motors

DieSEL motors come in different size and capacities. Diesel motors are powered by diesel to run their four stroke engines. Starting the motors requires the cranking of the engine with a crank handle whilst holding the displacement handle. To start this machine, a little effort is required from the operator or user.

Fig. 8: Diesel powered motor
4.2 Gas (Petrol) Motors

These motors unlike the diesel motors are powered by gasoline fuel to function. Gas motors used on thresher are mostly four stroke and range in capacity based on the size of the thresher under consideration. Larger capacity means higher cost and maintenance. The market today has so many sales points for thresher motors but care should be taken in selecting a motor for your thresher since many fake machines are available on the market.

The type of motor used on a thresher is determined by the cost of the motor, availability on the local market and ease of maintenance and usage by the customer. The capacity of the motor will also be determined by the size and weight of materials used in the construction of some critical components such as the threshing drum and the blower.

Fig. 9: Gas (Petrol) powered motor
CHAPTER FIVE

5.0 Materials Selection for Threshers

The design and fabrication of threshers cannot be complete with the use of the requisite materials. Metals are the predominant materials used in the construction and fabrication of threshers. The most common metal used in the construction of threshers is mild steel.

5.1 Mild Steel

Mild steel contains approximately 0.005-0.25% carbon making it malleable and ductile. Mild steel has a relatively low tensile strength, but it is cheap and easy to form; it is often used when large quantities of steel are needed. Mild steel contain less steel carbon than other steels and are easier to cold-form, making them easier to handle. Below are some properties of mild steel which makes them excellent choices for thresher fabrication.

5.2 Properties of Mild steel

5.2.1 Weldability

Weldability is defined as “the capacity of a material to be welded under the imposed fabrication conditions into a specific, suitably designed structure and to perform satisfactorily in the intended service”. Carbon steel is generally considered to be quite weldable, particularly when the carbon content is below 0.35%. The term weldability is also used in a narrower sense to mean the ease with which a material can be welded without cracking or other discontinuities. Mild steels and rarely present problems, as long as impurity levels are kept low. Mild steel are all weldable without preheat, using any of the common welding processes.
5.2.3 Forming or Forging

Forming operations on carbon steels include any method of plastically deforming the material to achieve the desired component. Included are bending (both hot and cold), rolling, extrusion, drawing, and forging. Carbon steels are capable of being formed extensively due to the relatively high ductility of the material. Forming that is performed at temperatures lower than the transformation temperatures will result in cold strain, which can both increase the strength and reduce the ductility of the component. Mild steel can be formed into different shapes and forms.

5.2.4 Machinability

Machinability can simply be defined as the ease with which a material can be machined. Machinability can be based on tool life, cutting speed, power consumption, comparison with standard steels, quality of surface finish, and feeds resulting from constant thrust force. As with other properties such as strength, hardness, and ductility carbon content is the dominant factor in machinability. Mild steels can easily be machined with the right tools whether the shaft or metal sheet.

5.3 Cast Iron

Cast iron is a group of iron-carbon alloys with carbon content greater than 2%. The alloy constituents affect its colour when fractured. Cast iron is a metal which is recommended for very few component of the thresher as seen in Table 1 below.

5.3.1 Types of Cast Iron

- Gray cast iron
- White cast iron
- Nodular cast irons
- Malleable cast irons

5.3.2 Disadvantages of Cast Iron

- Cast iron has low strength
- Cast iron has no plastic strain (brittle)
5.3.3 Advantages of Cast Iron

- Good compressive strength
- High damping capability (tool machines)
- Good machinability
- Good wear resistance (graphite as lubricant)
- Lower cost

Table 1: Materials selected for different parts of the Thresher

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of Part</th>
<th>Material</th>
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<tbody>
<tr>
<td>1</td>
<td>Frame</td>
<td>Mild Steel</td>
</tr>
<tr>
<td>2</td>
<td>Shaft</td>
<td>Mild Steel</td>
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<tr>
<td>3</td>
<td>Concave</td>
<td>Mild Steel</td>
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<td>4</td>
<td>Threshing cylinder cover</td>
<td>Mild Steel</td>
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<tr>
<td>5</td>
<td>Blower</td>
<td>Mild Steel</td>
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<tr>
<td>7</td>
<td>Fly wheel</td>
<td>Cast Iron</td>
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<tr>
<td>8</td>
<td>Pulley</td>
<td>Cast Iron</td>
</tr>
<tr>
<td>9</td>
<td>Transport wheels</td>
<td>Cast Iron/Mild Steel</td>
</tr>
<tr>
<td>10</td>
<td>Threshing cylinder</td>
<td>Mild Steel/Cast Steel/Cast Iron</td>
</tr>
</tbody>
</table>

(Source: Indian standard institution, 1986)
CHAPTER SIX

6.0 AUTOCAD DRAWINGS

Computer Aided Designs are electronic representations of machine parts and buildings. These electronic representations are displayed in different views to enhance proper interpretation of the information. Understanding AUTOCAD drawings are essential in the construction of threshers as all engineering drawings are often drawn using computer softwares. AUTOCAD drawings are usually well dimensioned and presented in autographic views. Below is a simple illustration of how AUTOCAD drawings will be represented on the sheet before fabricating the blue print.

6.1 Basic Autographic view interpretation
Fig. 11: Front view of box

Fig. 11: Right hand view of box
Fig. 14: Plan of box

The above figures represent the different views by which the box can be viewed. When these views are observed, the later drawings are presented in two (2) dimensions instead of three (3). The 2D views are also well dimensioned to illustrate the real length of the parts under study. Dimensions are usually in metric standards.
CHAPTER SEVEN

7.0 Welding

Welding is a joining process in which metals or sometimes plastics are heated, melted and mixed to produce a joint with properties similar to those of the materials being joined.

There are three main components needed to create a weld. These are:

- A heat source such as an electric arc, a flame, pressure, or friction. The most common heat source is an electric arc. An arc is the physical gap between the end of the electrode and the base metal. The physical gap causes heat due to resistance of the current flow and arc rays. The arc melts to create the joint.
- Shielding, which is the use of gas or another substance to protect the weld from air as the weld is being formed. Oxygen from the air makes welds brittle and porous.
- Filler material, which is the material used to join to the two pieces together.

(Source: Thomson Rivers University, 2014).

7.1 Types of welding processes

7.1.1 Arch Welding

A welding power supply is used to create and maintain an electric arc between an electrode and the base material to melt metals at the welding point. In such welding process, the power supply could be AC or DC. The electrode could be consumable or non-consumable and a filler material may or may not be added.

The most common types of arc welding are:

- Shielded Arc Welding
- Gas Metal Arc Welding
- Gas Tungsten Arc Welding
7.1.1.1 Shielded Metal Arc Welding (SMAW)

A process that uses a coated consumable electrode to lay the weld. As the electrode melts, the flux coating disintegrates, giving off shielding gases that protect the weld area from atmospheric gases and provides molten slag which covers the filler metal as it travels from the electrode to the weld pool. Once the part of the weld pool, the slag floats to the surface and protects the weld from contamination as it solidifies. Once hardened, the slag must be chipped away to reveal the finish.

Fig. 15: Shielded arc welding operation

7.2 Gas Welding

In this method a focused high temperature flame generated by gas combustion is used to melt the work pieces (and filler) together. The most common type of gas welding is oxy-fuel welding where acetylene is combusted in oxygen.
7.3 Resistance Welding

Resistance welding involves the generation of heat by passing a high current (1000-100,000 A) through the resistance caused by the contact between two or more metals surfaces which causes pools of molten metal to be formed at the weld area. The most common types of resistance welding are spot welding (using pointed electrodes) and Seam-welding (using wheel shaped electrodes).

7.4 Energy Beam Welding

In this method a focused high energy beam (Laser beam or electron beam) is used to melt the work pieces and thus join them together.

7.5 Solid-State Welding

In contrast to other welding methods, solid-state welding processes do not involve the melting of the materials being joined. Common types of solid-state welding include; Ultrasonic welding, explosion welding, electromagnetic pulse welding, roll welding, friction welding (including friction-stir-welding), etc.

7.6 Welding Terminologies

There is some special technical vocabulary that is used in welding. The basic terms of the welding language include:

7.6.1 Filler Material

When welding two pieces of metal together, we often have to leave a space between the join. The material that is added to fill this space during the welding process is known as filler material (filler metal).
7.6.2 Welding Rod

The term welding rod refers to a form of filler metal that does not conduct an electric current during the welding process. The only purpose of a welding rod is to supply filler metal to the joint. This type of filler metal is often used for gas welding.

7.6.3 Electrode

In electric-arc welding, the term electrode refers to the component that conducts the current from the electrode holder to the metal being welded. Electrodes are classified into two groups: consumable and non-consumable.

![Structure of covered electrode (Source: KOBE STEEL LTD., 2015).](image)

7.6.4 Consumable electrode

They do not only provide a path for the current but they also supply filler metal to the join. An example is the electrode used in shielded metal-arc welding.

7.6.5 Non-consumable electrode

These are only sued as conductor for the electrical current, such as in gas tungsten arc welding. The filler for gas tungsten arc welding is a hand fed consumable rod.
7.6.6 Flux

Before performing any welding process, the base metal must be cleaned from impurities such as oxides (rust). Unless these oxides are removed by using a proper flux, a faulty weld may result. The term flux refers to material used to dissolve oxides and release trapped gases and slag (impurities) from the base metal such that the filler metal and the base metal can be fused together. Fluxes come in the form of paste, powder, or liquid. Different types of fluxes are available and the selection of appropriate flux is usually based on the type of welding and type of base metal.

7.8 Safety in Welding

Safety precautions are required in ensuring the health of the professional and the safety of the working environment. Below are some welding precautions for ensuring safety at the welding shop.
7.9 Personal Safety

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<tr>
<td>Welding helmets must be kept in good shape and have protective lenses meeting shade selection requirements for the task.</td>
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<td>Protective clothing must be worn whenever cutting, welding and grinding is done. This includes welding jacket, welding gloves, and respirator is required.</td>
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<tr>
<td>Safety glasses must be worn at all times in work area!</td>
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<td>Respirator with HEPA filters must be worn when working with asbestos containing materials. Workers must be fit tested prior to performing any asbestos work.</td>
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<td>Work Boots must be worn at all times when working in an area where there is risk of serious foot injury due materials falling onto the foot.</td>
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<td>Welding work gloves should be worn when there is a risk of hand injury during the course of work tasks.</td>
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<td>Hard hats must be worn when working in an environment where there is a risk of objects falling from above or where there is a high risk of striking your head on objects.</td>
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(Source: Thomson Rivers University, 2014).
7.9.2 Safety Tips for Using Protective Clothing

Wear clothing made from heavyweight, tightly woven, 100% wool or cotton to protect from UV radiation, hot metal, sparks and open flames. Flame retardant treatments become less effective with repeated laundering.

1. Keep clothing clean and free of oils, greases and combustible contaminants.
2. Wear long-sleeved shirts with buttoned cuffs and a collar to protect the neck. Dark colours prevent light reflection.
3. Tape shirt pockets closed to avoid collecting sparks or hot metal or keep them covered with flaps.
4. Pant legs must not have cuffs and must cover the tops of the boots. Cuffs can collect sparks.
5. Repair all frayed edges, tears or holes in clothing.
6. Wear high top boots fully laced to prevent sparks from entering into the boots.
7. Use fire-resistant boot protectors or spats strapped around the pant legs and boot tops, to prevent sparks from bouncing in the top of the boots.
8. Remove all ignition sources such as matches and butane lighters from pockets. Hot welding sparks may light the matches or ignite leaking lighter fuel.
9. Wear gauntlet-type cuff leather gloves or protective sleeves of similar material, to protect wrists and forearms. Leather is a good electrical insulator if kept dry.
10. Direct any spark spray away from your clothing.
11. Wear leather aprons to protect your chest and lap from sparks when standing or sitting.
12. Wear layers of clothing. To prevent sweating, avoid overdressing in cold weather. Sweaty clothes cause rapid heat loss. Leather welding jackets are not very breathable and can make you sweat if you are overdressed.
13. Wear a fire-resistant skull cap or balaclava hood under your helmet to protect your head from burns and UV radiation.
14. Wear a welder's face shield to protect your face from UV radiation and flying particles.
7.9.3 Work Place Safety

Tidy up the work place and remove any flammable materials, liquids and gases from workplace and adjacent spaces including spaces above/below decks, behind bulkheads and inside pipes or containers. Cover any openings through which sparks may be led to other areas onboard which have not been prepared for hot work.

- Shield the work place to protect others from sparks and radiation from the arc, and post a warning sign that welding is in progress.
- Ensure that sufficient and correct fire fighting equipment is available at the workplace, and that personnel familiar with its use is present. Ensure that the work place is properly ventilated, if necessary with special fume extraction equipment. This is especially important when working on galvanized or coated surfaces which may produce harmful fumes when heated.
- Provide enough ventilation wherever welding and cutting are performed. Proper ventilation will protect the operator from the evolving noxious fumes and gases. The degree and type of ventilation will depend on the specific welding and cutting operation. It varies with the size of work area; on the number of operators; and on the types of materials to be welded or cut. Potentially hazardous materials may exist in certain fluxes, coatings, and filler metals. They can be released into the atmosphere during welding and cutting.
- Check the welding atmosphere and ventilation system if workers develop unusual symptoms or complaints. Do not weld on dirty plate or plate contaminated with unknown material. The fumes and gases which are formed could be hazardous to your health. Remove all paint and galvanized coatings before welding. All fumes and gases should be considered as potentially hazardous.
- Do not weld near vapor degreasers or on metal that has been just degreased. The decomposition of chlorinated hydrocarbons used in vapor degreasers can form into a poisonous gas.
CHAPTER EIGHT

8.0 REFERENCE


5. The Hashemite University. Introduction to welding technology-introduction to non-destructive techniques.

Figure 1: Pedal Operated Thresher
Model: Sil Thresher
Figure 2: Threshing Drum
MODEL: SIL THRESHER
Figure 3: Concave (Screen Type)

Model: Sil Thresher

Number of rods across length: 22.5
Number of rods along length: 59.70
Figure 4: Blower Housing
Model: Sil Thresher

Dimensions:
- Height: 150 mm
- Width: 150 mm
- Length: 450 mm
Figure 5: Blower Housing
Model: Sil Thresher
Figure 6: Blower
Model: Sil Thresher
Figure 7: BLOWER
MODEL: SIL THERMOMETER
Figure 8: AIR CONTROL PLATE
MODEL: SIL THRESHER
Figure 9: Threshing Drum Cover
Model: Sil Thresher
Figure 10: Threshing Drum Cover
Model: Sil Thresher
Figure 11: Threshing Drum Cover
Model: Sil Thresher
Figure 12: Threshing Drum Cover
Model: Sil Thresher

Dimensions:
- 200mm
- 360mm
- 450mm
- 100mm
- 150mm
- 400mm
- 50mm
Figure 13: Seed Tank
Model: Sil Thresher
Figure 14: CYCLE MOUNTING
MODEL: SIL THRESHER
Figure 15: CYCLE
MODEL: SIL THRESHER
Figure 16: FRAME
MODEL: SIL THRESHER

Dimensions:
- Height: 680mm
- Width: 450mm
- Depth: 400mm
Figure 17: Linkage connection on Thresher
Model: Sil Thresher
Figure 18: Blower - Thresher Drum Linkage Model: Sil Thresher

Blower

30mm
5mm
100mm

Thresher

30mm
5mm
130mm

Linkage

35mm
150mm
Figure 1: Motor Driven Thresher
SIL Thresher
Figure 2: Threshing Drum - Spike Tooth Type
Model: Sil Thresher
Figure 3: Concave [Screen Type]
Model: SIL Thresher
Figure 4: Blower Housing
Model: Sil Thresher

Dimensions:
- Height: 150 mm
- Width: 450 mm
- Depth: 150 mm
- Inner Diameter: 100 mm
- Depth: 100 mm
- Width: 150 mm
- Depth: 100 mm

Diagram shows the dimensions and layout of the blower housing model.
Figure 5: Blower
Model: Sil Thresher
Figure 6: THRESHING DRUM COVER
MODEL: SIL THRESHER

430mm
Figure 7: Threshing Drum Counter
Model: Sil Thresher
Figure 8: Threshing Drum Cover
MODEL: SIL Thresher
Figure 5: Blower Housing
Model: Sil Thresher
Figure 12: Blower Model: Sil Thresher
Figure 13: Blower
Model: Sil Thresher
Figure 11: Air Control Plate Model: Sil Thresher
Figure 10: Seed Collection Chute
Model: Sil Thresher

Dimensions:
- Top: 200mm x 600mm
- Bottom: 250mm x 400mm
- Height: 70mm
- Width: 350mm
Figure 13: FRAME
MODEL 3 SIL THRASHER

Dimensions:
- Width: 450 mm
- Height: 830 mm
- Length: 350 mm
Figure 14: MOTOR DRIVEN THRASHER
MODEL: SIL THRASHER
Figure 1: Motor Driven Thresher
; Sil Thresher
Figure 2: Threshing drum - Spike Tooth Type
Model: SIL Thresher
Figure 3: Concave ÷ Screen Type
MODEL : SIL THREMER

Number of rods across length: 22.5
Number of rods along length: 41.63
Figure 6: THRESHING DRUM COVER
MODEL: SIL THRESHER
Figure 8: Threshing Drum Cover
MODEL: SIL Thresher
Figure 7: Threshing Drum Cover
Model: Sil Thresher
Figure 9: Thresher Drum Cover
Model 3 Sil Thresher

Thresher drum cover showing angle of JT's vanes
Figure 5: Blower Housing
Model: Sil Thresher
Figure 12: Blower Model: Sil Thresher
Figure 13: Blower
Model: Sil Thresher
Figure 11: Air Control Plate
Model: Sil Thresher
Figure 10: Seed Collection Chute
Model: Sil Thresher
Figure 15: Frame
Model: Sil Thresher

Dimensions:
- 530 mm
- 450 mm
- 350 mm
- 850 mm
Figure 16: MOTOR DRIVEN THresher
Model 516 THresher
SIL POWER THRESHER [3000]
OPERATIONAL MANUAL

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August-2016
The essence of this manual is to provide relevant information for the operation of the SIL power thresher. The thresher is an important machine if well taken care of will help alleviate the challenges associated with threshing soybeans.

We therefore wish to edge you to follow carefully the instruction in this manual as it will enable you properly handle and take care of your thresher.

In the case of any challenges which will require you to seek external help, call the numbers on your thresher and this will be resolved.

Thank you for spending time to read and adhere to the instructions in this manual.
PART NAME

- Hopper
- Threshing drum cover
- Shatter handle
- Blower shatter
- Blower
- Handle
- Stand
- Seed collection outlet
- Drum cover chute
- Engine mounting
- Transport wheels
- Blower chute
THRESHER OPERATION MECHANISM

A: Feeding point for Soybeans

B: Exit for stems of Soybeans

C: Exit for chaff and small debris

D: Exit for clean Soybeans
THRESHER OPERATION MECHANISM

The diagram above is an illustration of the operation of the thresher. Below is an explanation of the working operation of the thresher.

Feeding System [A]

The feeding system consists of a hopper designed with a sloped neck to prevent the user from getting his or her hand entangled in the spikes of the threshing drum. The neck is also sloped at an angle to prevent the shooting of seeds during threshing operations.

Chute/Exit system

After soybeans is feed into the thresher, there exist different chute or exit systems for the thresher.

Stems chute [B]

This chute is the pathway for the threshed stems to find their way out of the thresher.

Debris chute [C]

This chute allows smaller debris produced from threshing to be carried away by the film of air generated by the blower.

Seed chute [D]

This outlet allows seeds to flow into a receptacle after threshing.
THRESHER MAINTENANCE AND PRECAUTIONS

1. Ensure that the thresher is properly stored after use; store thresher in a shed or under a tarpaulin to avoid direct contact with sunlight/rain.

2. Grease your pillow bearings regularly (at least twice a week during threshing season)

3. Ensure that the engine of your thresher is regularly serviced.

4. Do not overload your thresher during operations as this can shorten the life span of your engine.

5. Tighten all bolts and nuts regularly to avoid vibration.

6. Follow all instruction in this manual carefully.

7. Ensure that all belts are well tensioned during threshing operations.
8. Avoid the belt area during operations to prevent damage to operators.

9. Put off your engine in the event that your thresher gets stuck before trying to remove the blocked material.

10. Avoid putting your hand into the threshing drum hopper during operations as this can result in damage to fingers.
## TROUBLE SHOOTING

<table>
<thead>
<tr>
<th>No.</th>
<th>Problem</th>
<th>Causes/solved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Thresher stopped during operation</td>
<td>Thresher overload, exhausted fuel, torn belt</td>
</tr>
<tr>
<td>2</td>
<td>Poor cleaning efficiency</td>
<td>Loose blower belt, unopened blower shatters</td>
</tr>
<tr>
<td>3</td>
<td>Seed in stalk</td>
<td>Low engine speed, check belt tension</td>
</tr>
<tr>
<td>4</td>
<td>High vibration</td>
<td>Loose bolts and nuts</td>
</tr>
<tr>
<td>5</td>
<td>Crashed seeds</td>
<td>High engine speed</td>
</tr>
<tr>
<td>6</td>
<td>Poor engine start</td>
<td>poor fuel, air cleaner blocked, inspect carburetor for over float</td>
</tr>
</tbody>
</table>