REPAIR MANUAL

Part 1 of 4

XYLO

Mahindra
Rise.

mHAWK

MAN-00168

Mahindra Technical Information System

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ALL INFORMATION CONTAINED IN THIS MANUAL IS MOST UP-TO-DATE AT THE TIME OF PUBLICATION. HOWEVER, SPECIFICATIONS AND PROCEDURES ARE SUBJECT TO CHANGE WITHOUT NOTICE. THIS MANUAL IS STRICTLY MEANT FOR RESTRICTED INTERNAL CIRCULATION WITHIN M&M AUTHORIZED DEALER SERVICE CENTERS.

About this Repair Manual

This Repair Manual is published for the information and guidance of the service technician of authorized **MAHINDRA & MAHINDRA** dealers to help them provide efficient and correct service and maintenance on **Mahindra** vehicle. It contain information on the operation and maintenance of the **XYLO E9 Euro-III & Euro-IV** as well as descriptions of the major units and their functions in relation to the other components of the System.

To ensure customer satisfaction with Mahindra products, proper service and maintenance by Mahindra Dealer Technicians is essential. Technician should know and understand the content of this manual before starting actual work on the vehicle. The copy of this manual should be kept in a handy place on the shopfloor for quick and easy reference.

This manual includes special notes, important points, service data, precautions that are needed for the maintenance, adjustments, service, removal and installation of Engine and other aggregate components.

All information, illustrations and specifications contained in this manual are based on the latest product information available at the time of publication. Dealers will be provided Technical Service Bulletins or Supplementary Notes in case modifications done in future.

All rights are reserved to make changes at any time without prior notice.

Pictures, photographs used in this manual are illustrations only and may pertain to some variation than actual in the vehicle.

(Part 1 of 4)

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How to use this manual

There is table of contents for the whole manual on the second page of this manual, where the required section can be easily found. Also, there is ***content*** on the first page of each section, where the main objects in that section are listed. Each section is further divided in to sub-sections –

- **Description** section gives an overview of the functioning of the system.
- **Construction, Operation and Identification** section gives details of construction of System, its operation and serial number identification.
- **Care of the system** details the maintenance and adjustments, if any, to be carried out on the system to keep it functioning at its best performance level.
- **Trouble shooting** section details a generic trouble shooting for major problems.
- **In-car repair** outlines the procedure to carryout minor repairs/adjustments without removing the aggregate from the vehicle.
- **Dismantling/overhauling** section covers the detailed process and procedures to be followed, while repairing the system. This is generally carried out after removing the aggregate/system from the vehicle.
- **Inspection** section gives information on how and what are all components to be inspected.
- **Assembly section** covers the detailed process and procedures to be followed, while repairing the system.
- **Repair & maintenance data** provides information on the dimensions of a new part as well as how much wear can be tolerated on a specific part, respectively.
- **Technical Specification** section provides information on the dimensions; service and wear data of system components.
- **Torque Specification** is the specified torque values for all crucial fasteners in the Component/ vehicle system.
- **Mahindra Special Tools** (MST) lists out the special tools should be used for the service and repair work described in that section.

The proper performance of service is essential for both the safety of the technician and the efficient functioning of the system. The service methods in this repair manual are described in such a manner that the service may be performed safely and accurately. Service varies with the procedures used, the skills of the technician and the tools & Parts available. Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by MAHINDRA & MAHINDRA must first completely satisfies himself that neither his safety nor the vehicle's safety will be jeopardized by the service method selected.

General Informations

1. Health and Safety Precautions –

Toxic Substances

Many liquids and other substances used are poisonous, so care should be taken while handling the same. It is also advisable to keep all the substances away from open wounds. These substances include anti-freeze, brake fluid, fuel, windscreen washer additives, air conditioning refrigerant, lubricants and various adhesives. These toxic substances are irritant to the skin, eyes, nose and throat. They can cause burns and destroy ordinary protective clothing. Wear a suitable protective apron, gloves and goggles. Do not breathe the mists. Make sure that the access to eye wash bottles, soap and shower are readily available.

Air Conditioning Refrigerant

Instructions given by the manufacturer must be followed. The air conditioning system contains refrigerant under high pressure. Severe personal injury may result due to improper service procedures. Repairs should only be performed by a qualified service personnel. Avoid breathing the refrigerant or refrigerant oil vapor or mist. Exposure may irritate the eyes, nose and throat. Wear suitable protective gloves and goggles for eye protection while servicing the air conditioning refrigerant system. If eye contact occurs, immediately seek medical attention.

Adhesives and Sealers

A number of renowned products are recommended in this manual for use during maintenance and repair work. They should be available locally at garage equipment suppliers. If there is any problem in obtaining the supplies, contact the company for advice and the nearest dealer. Cleanliness should be observed where necessary, for example disposable paper covering benches should be dispensed from applicators and secondary containers should be labeled appropriately.

Antifreeze

Antifreeze is an ethylene glycol base coolant, which is harmful if swallowed or inhaled. If swallowed, drink two glasses of water and induce vomiting. If inhaled, move to fresh air area. Seek medical attention immediately. Do not store in open or unmarked containers. Wash skin and clothing thoroughly after coming in contact with ethylene glycol. Keep out of reach of children. To dispose the glycol base coolant properly, contact your dealer or government agency for the location of collection center in your area. Do not open a cooling system when the engine is at operating temperature or hot under pressure, which may result in personal injury. These products should not be used in any cooling or industrial water system that is connected or linked to general, food preparation or drinking water supplies.

Asbestos

Breathing asbestos dust may cause lung problems or in some cases, cancer. Asbestos is used in brake & clutch linings, transmission brake bands and gaskets. The use of drum cleaning units, vacuum cleaning or damp wiping is preferred. Asbestos dust waste should be dampened first, and placed in a sealed container and marked for safe disposal. If any cutting or drilling is attempted on materials containing asbestos the item should be dampened and only hand tools or low speed power tools are to be used.

Chemical Materials

Chemical materials such as solvents, sealers, adhesives, paints, resin foams, battery acids, antifreeze, brake fluids, fuels, oils and grease should always be stored and handled with care. They may be poisonous, harmful, acidic or highly flammable and give rise to harmful vapors and dust. The effects of excessive exposure to chemicals may be immediate or delayed, temporary or permanent, life threatening or may decrease life expectancy.

Corrosion Protection Materials

These materials are varied and the manufacturer‘s instructions must be followed. They may contain solvents, resins or petroleum products. Skin and eye contact should be avoided. They should only be sprayed in conditions of adequate ventilation and not in confined spaces.

Engine Oil

Prolonged and frequent contact with the engine or motor oil will result in removal of natural fats from the skin, leading to dryness and irritation. An used engine oil contains potentially harmful contaminants which may cause skin cancer. Adequate means of skin protection and washing facilities should be provided.

Transmission Fluids

Transmission and power steering fluids contain additives which have the potential to cause irritation or even skin disease when prolonged or repeated skin contact with the fluid occurs. These fluids are used for vehicle initial fill and service purposes. Draw attention to the existence of Material Safety Datasheets (MSDS's) for the fluids. These MSDS's contain detailed information on hazards and appropriate controls.

Fuel Handling Precautions

This information is issued only for basic guideline. Fuel vapor is highly flammable, and in restricted spaces it is highly explosive and poisonous. The vapor is heavier than air and will always fall to the lowest level, which flows throughout the workshop by air current. Even a small spillage of fuel is very dangerous. Always have fire extinguisher containing foam CO2 gas or powder close at hand while handling fuel or dismantling fuel systems, and in areas where the fuel containers are stored.

- Always disconnect the vehicle battery before working on the fuel system.
- Avoid prolonged and frequent skin contact with oils, particularly engine oils.
- Properly ventilate the area so that the flammable fumes do not become concentrated.
- Never smoke or have an open flame in the work area.

- Always check for leaks after fuel system repairs.
- Clean up fuel spills immediately with absorbent materials, by using proper disposal procedures.
- Wear protective clothing, including resistant gloves wherever required.
- Do not put oily rags in your pockets.
- Avoid wearing contaminated clothes.
- Overalls must be cleaned regularly.
- First-aid treatment must be given immediately for open cuts and wounds.

Do not operate the engine for unlimited period of time without proper exhaust ventilation. Keep the work area well ventilated and free of any flammable materials.

Special care should be taken when handling any flammable or toxic materials such as gasoline, refrigerant gas, etc.

Fuel Transfer

The transfer of fuel from the vehicle fuel tank must be carried out in a well ventilated area. An approved transfer tank must be used according to the transfer tank manufacturer's instructions and local regulations, including attention to grounding of tanks.

Fuel Tank Repair

The fuel tank should not be repaired in case of damage and has to be replaced with a new tank.

Fire

Many materials related with the repair of vehicles are highly flammable. Some give off poisonous or dangerous fumes if burnt. Observe strict fire safety standards while storing and handling flammable materials or solvents particularly near the electrical equipment or during welding processes. Make sure a suitable fire extinguisher is available before using the welding or heating equipment.

To avoid severe burns:

- Avoid contact with hot metal parts. Do not remove the degassing tank cap, when the engine is hot.
- Dispose or recycle drained oil or solvent used for cleaning parts in a proper manner.
- Do not try to top off the fuel tank after the fuel pump nozzle shuts off automatically.
- Continued refueling may cause fuel overflow, resulting in fuel spray and possibly fire.
- Clean all disassembled parts in the designated liquid or solvent prior to inspection or assembly.
- Replace oil seals, gaskets, packing's, O-rings, locking washers, cotter pins, self-locking nuts, etc. with new ones.
- Replace the inner and outer races of tapered roller bearings and needle bearings as a set.
- Arrange the disassembled parts in accordance with their assembled locations and sequence.
- Do not touch the terminals of electrical components which use microcomputers.
- Static electricity may damage internal electronic components.
- After disconnecting vacuum or air hoses, attach a tag to indicate the proper connection.
- Use only the fluids and lubricants specified in this manual.

- Use approved bonding agent, sealants or their equivalents when required.
- Use hand tools, power tools (disassembly only) and recommended special tools which are specified for safe and efficient service repairs.
- When repairing the fuel, oil, and water, vacuum or exhaust systems check all affected lines for leaks.

First Aid

It is desirable for someone in the workshop to be trained in first-aid procedures. Splashes to the eye should be flushed carefully with clean water for at least ten minutes. Soiled skin should be washed with soap and water. In case of cold burns from alternative fuels place the affected area in cold water. Individuals affected by inhalation of gases and fumes should be immediately moved to fresh air area. If there is no improvement, consult a doctor immediately. If liquids are swallowed accidentally, consult a doctor giving him the information on the container or label.

Health Protection

- Avoid extended and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including resistant gloves where possible.
- Do not put oily rags in your pockets.
- Avoid contaminating clothes, particularly underpants with oil.
- Heavily soiled clothing and oil-impregnated footwear should not be worn. Overalls must be cleaned regularly.
- First aid treatment should be obtained immediately for open cuts and wounds.
- Use barrier creams, applying them before each work period removes oil from the skin.
- Wash with soap and water to ensure that all oil is removed (skin cleansers and nail brushes will help).
- Preparations containing lanolin replace the natural skin oils which have been removed.
- Do not use gasoline, kerosene, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- If skin disorders develop, obtain medical advice without delay.
- Where practical, degrease components prior to handling.
- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields and an eye wash facility should be provided.

Guidance to safe working

Always follow the safety instructions provided by the respective manufacturers for all the equipment, tools, safety gears etc. used in the workshop.

2. Precautions for repairing a vehicle in the workshop

When working on the vehicle in the workshop, always follow the below mentioned procedure:

- Make sure the work area is ventilated and well lit. When it is necessary to run the engine indoors, make sure that the the area has adequate ventilation to disperse exhaust gases such as carbon monoxide and other fumes.
- Do not perform service work in areas where combustible materials can come in contact with a hot exhaust system. When working with toxic or flammable materials, make sure that the area you work in is well-ventilated.
- Make sure that the work area such as floors, workbenches, tools are clean and free from debris and clutter. Keep work area clean, dry and well organized.
- Be sure that all necessary tools and measuring equipment are available before starting any work. Keep tools and parts off the floor or in a trolley.
- Use Mahindra Special Tools where ever applicable and recommended.
- Do not allow other people near the vehicle during servicing.
- When it is necessary to do service work with the engine running, make sure that the parking brake is set fully and the transmission is in Neutral. Keep hands, hair, clothing, tools, etc. away from the fan and belts when the engine is running.
- Do not let fuel, coolant and other fluids spill over electrical and hot vehicle parts.
- Avoid repeated contact with fluids.
- The battery should be disconnected while, working on the engine, underneath the vehicle or if the vehicle is raised.
- Cover seats and carpets, wear clean overalls and wash hands or wear gloves before working inside the vehicle.
- Avoid spilling hydraulic fluid or battery acid on paint work. Wash off with water immediately if this occurs. Use Polythene sheets to protect carpets and seats.
- While using the welding equipment on the vehicle, keep a suitable fire extinguisher readily available. Follow the recommended standard procedure before doing welding job.
- Make sure that the Transmission, Transfer Case, Oil/ Exhaust system has cooled down sufficiently before attempting to remove any components, for your safety.
- Use correct lifting devices whenever raising a vehicle for service. Follow the instructions.
- Wear proper safety equipment as recommended and authorized for the job. Wear proper hearing protection.
- Wear protective safety glasses/ goggles or face shields. Wear safety shoes.
- Wear correct work clothing, do not wear wrist watches, jewelry, rings, loose or hanging apparel, such as ties, torn clothing, unzipped jackets that can catch on moving parts.
- New and used engine oil, Brake or Clutch oil, Radiator Coolant, Transmission and Differential oils can be hazardous. Continuous contact with used engine oil has been found to cause [skin] diseases. Brief contact with used oil may irritate skin. To minimize your exposure to used engine oil, wear a long-sleeve shirt and moisture-proof gloves (such as dish washing gloves) when changing engine oil. If engine oil contacts your skin, wash thoroughly with soap and water.
- Recycle or properly dispose the used Coolant, oil and filters.
- Make sure that charged fire extinguishers are available in the workshop.
- Make sure a first Aid Kit is available in workshop.

Preparation before dismantling the vehicle parts

- Clean components and surrounding area prior to removal.
- Blank-off any openings exposed by component removal using masking tape.
- Using plastic caps or plugs immediately seal fuel, oil or hydraulic lines when separated to prevent loss of fluid and entry of dirt.
- Close the open ends of oil ways, exposed by component removal with tapered hardwood plugs or readily visible plastic plugs.
- Before dismantling the component, clean it thoroughly with a recommended cleaning agent. Check that agent is suitable for all materials of the component.
- After a component is removed, place it in a suitable container/tray. Use a separate container/tray for each component and its associated parts.

Dismantling of the vehicle parts

- Observe cleanliness while dismantling the components, particularly brake, fuel or hydraulic system parts. A particle of dirt or cloth fragment can cause dangerous malfunction if trapped inside the system.
- Blow out all tapped holes, crevices, oil ways and fluid passages with an air line. Ensure that any O-rings used for sealing are correctly replaced or renewed.
- Use marking ink to identify mating parts and ensure correct reassembly. If a centre punch or scriber is used they may initiate cracks or distortion of components.
- Label and separate the mating parts to prevent accidental interchange.
- Label parts which are to be renewed and requiring further inspection before being passed for reassembly. Place these parts in separate containers.
- Do not discard a part due for renewal until it has been compared with the new part, to ensure that its correct replacement has been obtained.

Environmental protection precaution

It is illegal to dispose used engine oil, engine coolant, brake fluid, transmission fluid, battery and electrolyte transfer case oil, differential oil and power steering fluid in to the sewers, drains or into waterways. Dispose the used oil through authorized waste disposal contractors, licensed waste disposal sites or to the waste oil reclamation trade. Rubber and plastic parts should be disposed through the authorized recycle centers and/or agencies. If you have doubt on disposal of any of the above mentioned materials, contact your local authority for advice for disposal facilities.

Noise

Several operations may produce high noise levels, which might damage hearing. In these cases, proper ear protection must be worn.

Accessories and Conversions

Do not fit unapproved accessories or conversions, as they could affect the safety of the vehicle.
Mahindra will not accept liability for death, personal injury or harm to property which may occur as a direct effect of fitting non-approved accessories or conversions to the vehicle.

DANGER

Fitment of non-approved accessories could lead to vehicle not performing as intended resulting in personal injury or death in case of an accident.

Workshop Tools and Equipment

It is essential that all tools and equipment are maintained in good condition. Never use tools or equipment for any purpose other than that for which they were designed. Never overload equipment such as hoists, jacks, axle and chassis stands or lifting slings. Damage caused by overloading is not always immediately apparent and may result in fatal failure when the equipment is used another time. Do not use damaged tools or equipment, mainly high-speed equipment such as grinding wheels. The damaged grinding wheel can break up without warning and cause serious injury. Wear suitable eye protection when using the grinding or sand blasting equipment. Wear a suitable breathing mask when using the abrasive blasting equipment, working with asbestos-based materials or while using the spraying equipment. Make sure there is adequate ventilation to control dusts, mists and fumes. Always maintain the tools in a neat and good condition for quality repairs. Always keep the tools and equipment calibrated.

Hose Removal and Installation

- To prevent damage to rubber hoses, do not force open rubber hoses with the screwdriver.
- To reinstall rubber hoses securely, make sure that the hose length and direction is correct.

Hose Clamping

- If old rubber hose is re-used, install the hose clamp in its original position (at the groove in which the old clamp is fixed). If there is a trace of tube bulging on the old rubber hose, align the rubber hose accordingly.
- Discard old clamps, and replace with new ones.

Removal of Parts

While correcting a problem, try to determine its cause. Begin to work only after first learning which parts & subassemblies need to be removed and disassembled for replacement or repair. After removing the part, plug all holes and ports to prevent entering of foreign materials.

Disassembly of Parts

If the disassembly procedure is complex and requires many parts to be disassembled, all parts should be temporarily marked in a place that will not affect their performance or external appearance and identified so that reassembly can be performed with ease and efficiency.

Inspection during Removal/ Disassembly

When removed, each part should be carefully inspected for malfunctioning, deformation, damage, and other problems.

Arrangement of Parts

All disassembled parts should be carefully arranged for reassembly. Be sure to separate or otherwise identify the parts to be replaced from those that will be reused.

Cleaning of Parts

All parts to be reused should be carefully and thoroughly cleaned by using the appropriate cleaning agent and method.

Using compressed air will cause dirt and other particles to fly out, and cause injury to the eyes, wear protective goggles to avoid probable injury.

Reassembly

- Standard values, such as torques and certain adjustments, must be strictly adhered to while reassembling the parts.
- If removed, these parts should be replaced with new ones:

1. Oil seals
2. O-rings
3. Cotter pins
4. Lock washers
5. Nylon nut

- Specified oil/lubricant should be applied to the moving components of parts.
- Specified oil or grease should be applied at the prescribed locations such as oil seals before reassembly.

Adjustment

Use recommended/appropriate gauges and testers while making adjustments.

Rubber Parts and Tubing

Prevent fuel or oil from spilling on rubber parts or tubing.

Hose clamps

When reinstalling, position the hose clamp in the original location on the hose, and squeeze/tighten/ compress the clamp lightly to ensure better fit.

Bench Vise

When using a bench vise, use protective padding in the jaws of the vise to prevent damage to parts.

Component Cleaning

To prevent the ingress of dirt, accumulation of loose dirt and greasy deposits should be removed before disconnecting or dismantling components or assemblies. Components should be thoroughly cleaned using appropriate cleaning agent before inspection and prior to reassembly. Use Mahindra recommended cleaning agents only.

Cleaning Methods:

- Dry cleaning.
- Removal of loose dirt with brushes.
- Scraping off dirt with metal/wood scraper.
- Wiping off dirt with a rag.

⚠ DANGER

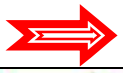
Wear eye protection while cleaning vehicle components with compressed air, a steam cleaner or power washer. Failure to follow this instruction will result in personal injury.

- Various solvents are available which are suitable for component cleaning. All the components should be cleaned only with appropriate solvents. Ensure that the solvent does not affect the performance of the component as intended. Always follow the safety precautions recommended by respective solvent manufacturer.

3. General Inspection

- Never inspect a component for wear or dimensional check unless it is absolutely clean.
- Slight smear of grease can conceal an incipient failure.
- When a component is to be checked dimensionally against figures quoted for it, use correct equipment (surface plates, micrometers, dial gauges, etc.) in serviceable condition. Makeshift checking equipment is dangerous.
- Reject a component if its dimensions are outside the quoted limits, or if damage is apparent. A part may however be refitted if its critical dimensions are given to the prescribed size limits, and is otherwise satisfactory.

- **Legend of the Standard Operating Procedure Symbols**

Symbol	Denotation
	Set / Place / Check here
	Locate / Show
	Move forward / Fit
	Rotate / Turn Clockwise
	Rotate / Turn anti-clockwise

- ## Legend of the Safety Symbols

Carefully read, understand and follow the safety symbols/ instructions given in this manual.

To emphasize information and procedures regarding safety, use, maintenance, etc., the following symbols are used throughout the manual. **DANGER, WARNING, CAUTION** and **NOTICE** symbols are given in this manual to alert the service technician to an area of potential hazard or to note something of importance.

Any repairs related to safety or critical items such as the steering, brakes, suspension or the supplementary restraint system should be carried out by a Mahindra dealer/ certified technician only. Following correct service methods and repair procedures are essential for the safe, reliable operation of vehicle as well as the personal safety of the individual while carrying out the work. This manual cannot possibly predict all such variations and offer warning or cautions as to each. Deviation from the instructions provided in this manual could lead to personal injury or damage to the vehicle.

Term/ Symbol	Denotation
DANGER	***DANGER*** *indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.*
WARNING	***WARNING*** *indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.*
CAUTION	***CAUTION*** *indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.*
CAUTION	***CAUTION*** *used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.*
NOTICE	*Indicates important information relevant to the vehicle, the vehicle's use or to sections of this manual to which particular attention must be paid for optimum use of the vehicle.*
	***If you see this symbol, it indicates "no", "do not," "do not do this," or "never".***

Refer below illustrations for **XYLO - E9** vehicle overall dimensions –

Technical Specification of XYLO mHawk	
DIMENSION	
Wheel Base	2760 mm
Overall Length	4520 mm
Overall Width	1850 mm
Overall Height	1895 mm (w/o ski rack) / 1905 mm (with ski rack)
Minimum Ground Clearance	186 mm
Track Width (Front & Rear)	1500 mm
Departure Angle	15.4° (Laden)
Ramp over Angle	18.6° (Laden)
Approach Angle	24.1° (Laden)
WEIGHTS	
Kerb weight with 90% fuel (with spare wheel, tools, etc)	1800 kg
Maximum GVW	2495
Maximum FAW	1070 kg
Maximum RAW	1425 kg

Engine

(mHawk 2.2L)

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Description

The 2.2-liter (2179 cc)Turbocharged and intercooled common rail direct injected diesel engine with a bore 85 mm and stroke of 96 mm develop 88 KW(118 BHP) at 4000 RPM and a torque of 280 Nm at 1800 -2800 RPM. Xylo mHawk engines are with BSIII & BSIV emission norms.

A variable geometry turbocharger controls the boost to 2.2 bars. The compressed air is cooled by the charged intercooler which is mounted upstream of the turbocharger. The cooled air enters the inlet manifold's plenum and it enters the Aluminium cylinder head through the inlet valves having an angle.

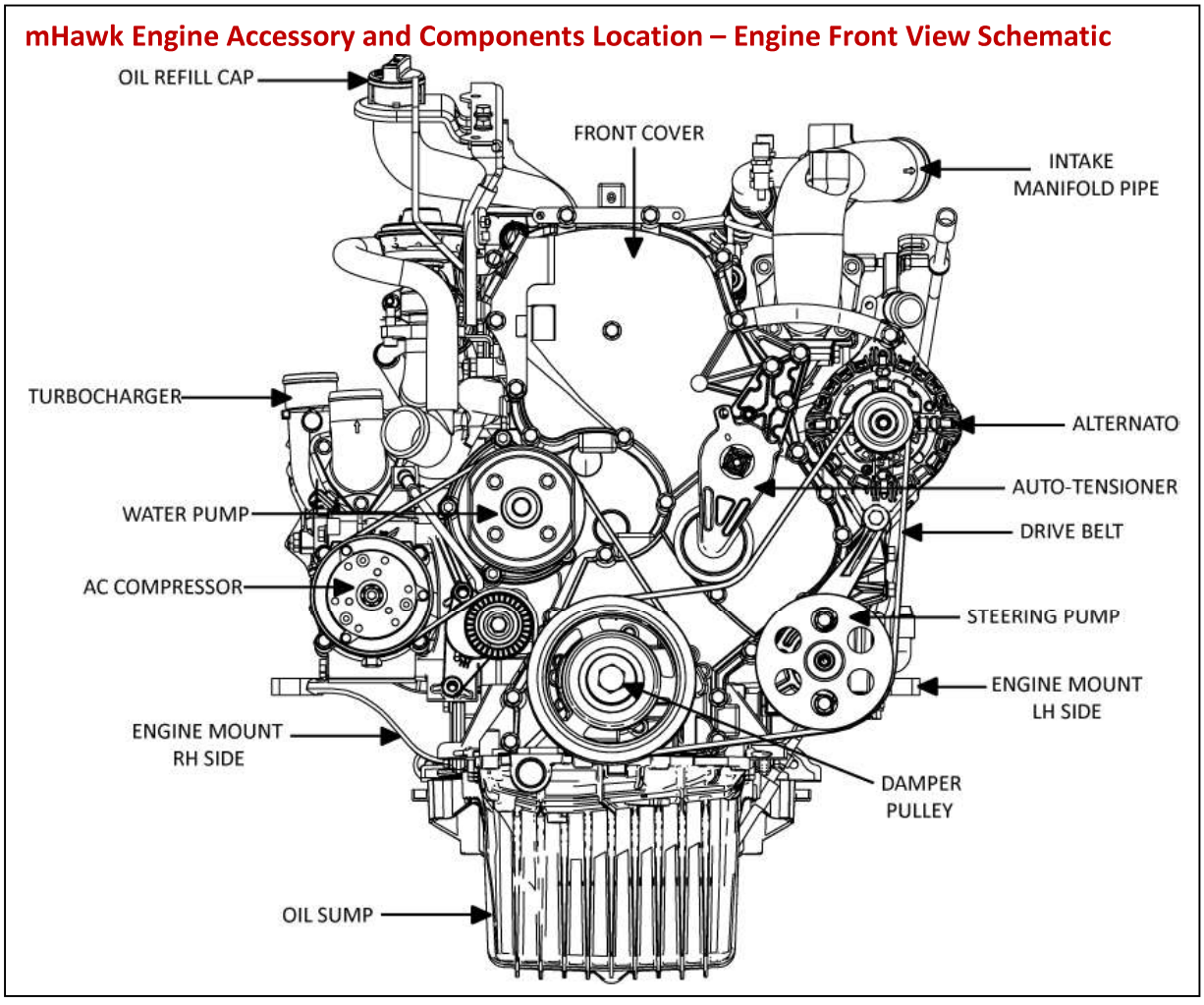
The piston features re-entrant type combustion chamber and having ferrous ring insert in the Top ring groove. A 3-ring pack is used. The top ring is asymmetrical barrel face and with CKS coating and keystone shape. The 2ndring is taper faced. The 3rd is conformable Oil Ring.

The forged connecting rod is connected to induction-hardened crankshaft. The small end of the connecting rod is trapezoidal shaped to reduce the mass as well as to ensure higher loading. The crankshaft is induction hardened with the filets hardened & ground. The flywheel has a shrunk fit ring gear and also a ball bearing to act as pilot for the gearbox input shaft. The front end is having a rubber molded dampener pulley.

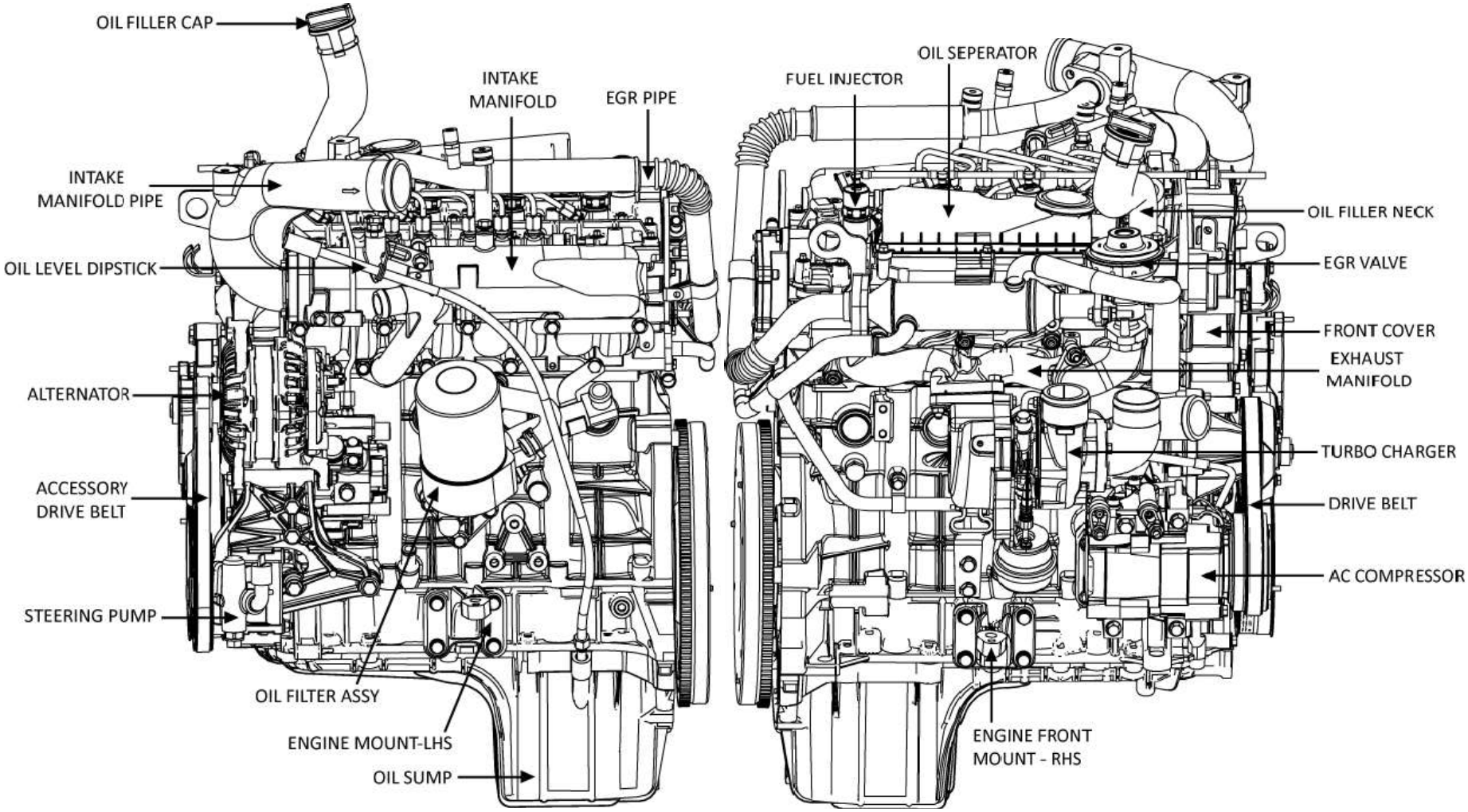
The high pressure pump & camshaft are chain driven. There are two overhead camshafts (Inlet and exhaust). The valves are actuated through HFF & RLA (hydraulic tappets). There are four valves per cylinder. This ensures that the charge fill as well as the purging is optimum.

Refer below illustrations for XYLO mHawk engine accessory & component location -

mHawk Engine Accessory and Components Location – Engine Front View Schematic



mHawk Engine Accessory and Components Location – Engine Side View Schematic



mHawk Engine Accessory & Component Location – Engine Top & Bottom View Schematic