

Occupational Health and Safety Management in Small Scale Automobile Repair and Maintenance Workshops in Sri Lanka

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Abstract— The auto mechanic industry in Sri Lanka is at a constant growth. Large scale organizations such as UNIMO, DIMO, and Toyota Lanka etc. tend to follow a specific occupational health and safety plan to minimizing risk and create a safe working environment for their employees. But as for small scale, auto mechanic workshops do not follow an occupational health and safety plan. They tend to use alternative safety precautions which are not reliable. There were five possible risks identified in small scale auto mechanic workshops. That can be summarized as hazardous substances, fire and explosions, risk during tire repair, the risk associated with the use of various tools, and work-related stress and the corresponding solutions of the identified risk are discussed in detail.

Index Terms— Occupational health, Safety plan, Small scale auto-mechanic workshop, Sri Lanka.

1 INTRODUCTION

The above-stated industry formerly known as the auto mechanic industry in which the primary duty is to provide mechanical and electrical repair and maintenance for cars, bikes, trucks, and all sought of automobiles. This particular industry includes self-employed mechanics, garages, car paint shops, wheel alignment, and tire-related workshops, etc. However, petrol sheds, spare parts shops, and car sales do not include to this industry. The auto mechanic repair and maintenance industry had a remarkable growth throughout the years [1]. In Sri Lanka, several large scale organizations are directly engaged in the Automobile repair and maintenance industry, such as UNIMO, DIMO, Ideal Motors, Toyota Lanka, Edirisinghe Brothers, and Auto Miraj, etc. These leading organizations follow an occupational and health safety plan and implement it. As for small scale repair and maintenance workshops, 95% of them fail to perform a proper occupational health and safety plan and only follow some necessary safety precautions, which leads to cause harm on workers, equipment and environment as well. Fig. 1 shows an unsafe method used in small scale repair centers [2], and Fig. 2 shows a technician from UNIMO working with appropriate safety precautions.



Fig. 1 Unsafe method used in small scale repair centers



Fig. 2 Technician working following safety precautions

2 POSSIBLE RISKS IN SMALL SCALE AUTOMOBILE REPAIR WORKSHOP

Hazardous Substances.

Auto mechanics and workers face a different kind of dangers in the workshop. Sometimes to repair or replace an engine component, various types of harmful substances are required, and if workers are exposed to these chemicals, it may lead to serious health issues.

There are two possible ways of exposing to Hazardous Substances in the workshop.

1. Contacting chemicals directly to the skin
2. Breathing Fumes

Exposure to automobile hazardous substances can cause,

- Skin Irritations
- Chemical burns
- Poisoning
- Malfunctioning organs
- Cancer etc.

Auto mechanics also have a high possibility of exposing themselves to heavy metals that are generally found in.

- Brake oil
- Lubricant
- Paint
- Coolant
- Grease
- Metal Cleaning Solvents etc.

Moreover, there are five identified hazardous chemicals which may affect workers due to prolonged exposure.

Asbestos

Asbestos dust is a major known cause of Mesothelioma, a severe lung cancer, automotive mechanics are exposed to asbestos during working with brake pads, clutches, Hood liners, Gasket, seals, valve rings and packings.

Manganese

Automotive mechanics expose themselves to manganese during the welding process. Prolonged exposure causes Manganism neurological syndrome.

Solvents & Diesel Exhaust Fumes

Almost every solvent is toxic and poses a risk to mechanics who often use them for daily repairs, and inhaling diesel fumes can cause asthma, allergies, effects to the immune system, and brain damage.

Lead Dust and Fumes

Mechanics are exposed to lead dust and fume when working with radiators, lubricants, paints, during welding, and servicing batteries. Exposure to lead dust and fumes can cause muscular pains, abdominal disorders, diarrhea, mental ill-health, etc. and they are often misdiagnosed as lead poisoning.

Antiknock Agents

Antiknock agents are used to improving engine efficiency, and the main constituent is methylcyclopentadienyl

manganese tricarbonyl (MMT). Prolonged exposure MMT may cause kidney and liver malfunction etc.

Fire and Explosions

Fire and explosions are prevalent accident which occurs in automobile garages. There should be three elements fulfill to initiate the fire which are oxygen, heat, and fuel. These elements are widely present in garages as fuels, thinner, butane tanks, welding spark, etc. which could quickly start a fire or an explosion to cause severe injury or death. Fig. 3 shows the three elements needed for a fire to ignite [3].

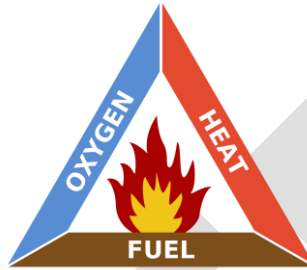


Fig. 3. Fire Triangle

Tyre Repair

During tire repairing and replacement, there is a high risk to mechanics these accidents occur not only by vehicles falling on top of them but by tires bursting. When a tire explodes, the compressed air releases a violent impact on the worker, causing serious harm. Fig. 4 shows the possible damage that can be caused during a tire repair [4].



Fig. 4. Truck tire bursting during repair

Working with hand tools, power tools, and other equipment.

Most small scale workshops lack the proper tools required for each specific job, so the mechanics are forced to use compromises to get the job done. Not having the correct device to the job may cause injury to the mechanic as well as the engine component he is working on, as a primary example removing tensioned springs requires special tools and PPE to mechanics. Still, most of the time, it's done without the proper tools or safety precautions. And also, mechanics working with unmaintained power tools are at risk.

Extended work hours, stress and dealing with abusive customers

In small scale workshops, most of the mechanics are forced to work extra hours until the job is completed leading them to unrest and work-related stress. Stress and turmoil could lead to depression, being unable to focus at work, making simple mistakes often, etc. Another major factor that affects the mental health of the

mechanics is when they have to deal with abusive customers. Generally, in large scale workshops, a separate individual a service adviser or service manager is present to deal with customers, but in small scale workshops, mechanics have to involve in customer handling directly.

3 OCCUPATIONAL SAFETY AND HEALTH ACTIVITIES CURRENTLY IN PROGRESS

Small scale workshops do not follow a specific safety plan. Instead, they take the necessary safety measures to avoid them, but there is a high possibility for them to fail. These measures taken to the above-identified risks are stated below in the below Table 1.

Table. 1 Currently used safety precautions in small scale workshops

Type of the Hazardous	Safety Precaution
Hazardous materials	Only during welding a shield or glasses are used for eye
Fire And Explosions	- Storing flammable substances in secure places. - Carrying out welding and flame cutting away from flammables. - Having sand buckets to extinguish fire. - Use Mechanic expertise to reduce fires and explosions as an example removing battery terminals to eliminate ignition source.
Tire Repairs	Use long hoses to inflate tires from a distance to minimize damage If an explosion is to happen.
Working Under Vehicles	- Applying handbrakes or first gear to avoid vehicle moving. - Using logs as jack stand to support the vehicle to hold it stable.
Working with various hand tools, power tools and other equipment	Senior mechanics training juniors on the proper use of tools and maintenance.
Extended work hours, stress and dealing with abusive customers	Unfortunately, mental health is not much focused in this particular work environment.

4 PROPOSALS TO THE OCCUPATIONAL HEALTH AND SAFETY PLAN FOR ELIMINATING ABOVE-IDENTIFIED RISKS

Below are the steps listed to be implemented to achieve zero risks at small and medium scale automobile workshops.

Hazardous Substances

- Prevent exposing to vehicle fumes.
- All efforts require a good stock of first aid kit.
- Never start an engine in an enclosed space where there isn't sufficient ventilation.
- If a vehicle has to run, minimize the time it running and connect the exhaust pipe to extraction equipment.

- If there is no extraction equipment, open windows and door to maximize airflow.
- When draining oil always use
 - Wear nitrile gloves
 - Wash hands regularly
 - Use hand lotion often

Asbestos

- Best way to stay protected from asbestos exposure is to wear protective suits and respirators.
- Always clean and store the protective suits and equipment in a safe place after using.
- Keep the workplace clean to avoid dust spreading.
- Prolonged exposure to asbestos may cause below stated symptoms if a mechanic shows these symptoms immediately direct them to medical attention.
 - Irregular breathing
 - Back and chest pain
 - Swollen face and arms

Manganese

- Wear personal protective equipment.
- Avoid confined places during welding.
- If it is a confined place, use respirators and ventilators as much as possible.
- Prolonged exposure to manganese may cause below stated symptoms if a mechanic shows these symptoms immediately direct them to medical attention.
 - Easily irritable and very uncomfortable
 - Constantly feeling nervous
 - Hallucinations

Solvents & Diesel Exhaust Fumes

- Prevent exposure to fumes and contact of solvents.
- Use PPE while dealing with solvents and diesel fumes.
- Avoid confined places to work with them.
- If the below stated, symptoms are to be seen in mechanics they are probably exposed if so direct them to immediate medical attention.
 - Vomiting
 - Headache
 - Noisy breath
 - Discomforting feeling in the chest
 - Irritation of the eyes, nose and throat

Lead Dust and Fumes

- Prevent exposure to fumes
- Use PPE while dealing with lead dust and fumes
- Prolonged exposure to lead dust and fumes may cause below stated symptoms if a mechanic shows these symptoms immediately direct them to medical attention.
 - Short-term memory loss and inability to concentrate
 - Exposure to lead dust and fumes for long periods causes a visible blue line to appear on the gums and a bluish, black edge to the teeth.[5]
 - general body discomfort

Antiknock Agents

- All workers should wear protective equipment when working with MMT.
- If a mechanic is exposed, follow the below procedures.
 - Inhaled – Use respirator support
 - Skin contact – Wash immediately with soap
 - Eye contact – Immediately wash the eye
 - If swallowed – seek medical help immediately

Cleaning practices which must be discontinued to achieve zero hazard

- Use of air pressure to clean brake drum.
- Use of solvent spray to clean parts.
- Use of vacuum cleaner to collect asbestos dust etc. is not sufficient enough.
- Using water horse to clean dust.

Fire and Explosions

Overall steps to Fire and Explosion control

- Reduce flammable substances as much as possible.
- Store flammable gas cylinders outside the building in secure cages.
- Store flammables in sealed containers.
- Never do welding or flame cut near flammables.
- Never use thinners/paints or petrol to light rubbish fires.
- Clean flammable oil spills and keep the workplace tidy.
- Carefully store rags used to clean flammable substances.

When draining petrol from a vehicle

- Always chose a well-ventilated area.
- Tell co-workers what you are doing.
- Disconnect the battery first.
- Always have a way to extinguish if any unexpected fire occurs. (powder fire extinguisher)
- Use fuel retriever, Ground the retriever for further more safety.
- If there is no retriever, use a hand-operated manual pump or a siphon.
- Choose a metal container that can be closed.
- Always ground the metal container with the chassis.

Tyre Repair

- Always use an airline fitted with a gage.
- When inflating tires use a cage or other device to retain in case of an explosion.
- All airline hoses should be equipped with quick-release coupling.
- Use a long airline which enables the mechanic to stand away from the inflating tire.

Working under Vehicles

- Always use the correct equipment to raise the vehicle.
- Place support in a substantial part of the vehicle.
- Always use jacks and jack stand in a flat ground surface.
- Before removing parts from the vehicle, ensure that this will not make the vehicle unstable.
- If using two posts to lift the vehicle, use the below safety precautions.
 - First, raise the vehicle about 2m.
 - Then check whether the lifting pads are in corner positions.

- Rock the vehicle before lifting it any much higher than 2m.

Working with hand tools, power tools and other equipment

- Make sure that mechanics are well trained to use these tools.
- Use the right tool for the right job.
- Have proper quality tools and always keep them in good condition.
- Check for defects before using tools.
- Keep the workspace tidy and clean.
- Wear PPE during operating tools.
- If the workshop is unable to afford proper tools to build them yourself following safety protocols.

Extended work hours, stress and dealing with abusive customers

- Job and Work Design

Provides mechanics with stimulating and exciting work and gives them the autonomy and flexibility to perform these jobs well.

- Learning and Development

Enlarge the skill base and develop the levels of competence required in mechanics. Encourage discretionary learning which happens when individuals actively seek to require knowledge and skills.

- Increasing engagement, commitment and motivation

Encourage productive discretionary effort by ensuring that mechanics are positive and interested in their jobs, that they are proud to work for the workshop[6] and want to go on working there.

- Rewards

Develop motivation and job engagement by valuing people in accordance with their contribution.

- Working Environment

Develop a clear vision and set of integrated values. Make the workshop 'a great place to work.'

CONCLUSION

In Sri Lanka, most of the small scale auto mechanic workshops do not follow an occupational health and safety plan which results in the increase of work related accidents and employee dissatisfaction. These auto mechanic workshops use comprises, instead of the proper accepted method jeopardizing the safety of mechanic, equipment, repaired component and customer. By following the above proposed procedures and protocols, small scale workshops will be able to achieve zero risks at the workplace.

REFERENCES

- [1] Linchpin SEO. *Trends That Will Transform The Auto Repair Industry Outlook In 2020* | Linchpin SEO. [online] Available at: <<https://linchpinseo.com/trends-auto-repair-industry>, 2020. [Accessed 31 May 2020].
- [2] Dnevnik H.R. Ovi Mehaničari Ne Ulijevaju Povjerenje, Nisu Sigurni Da Su Aute Ostavili U Dobrim Rukama. [online] Available at: <<https://dnevnik.hr/galerija/folder/zanimljivosti/njihovi-mehanicari-ne-ulievaju-povjerenje-nisu-sigurni-da-su-aute-ostavili-u-dobrim-rukama---559050.html/61679569/559050>> [Accessed 31 May 2020].
- [3] En.wikipedia.org. 2020. Fire Triangle. [online] Available at: <https://en.wikipedia.org/wiki/Fire_triangle> [Accessed 31 May 2020].
- [4] 2020. [online] Available at: <<https://www.youtube.com/watch?v=vavs6QmL40o>> [Accessed 31 May 2020].
- [5] AlSCO. 2020. *5 Most Dangerous Automotive Chemicals In The Workshop* | AlSCO.Com.Au. [online] Available at: <<https://www.alSCO.com.au/2017/06/dangerous-chemicals-automotive-workshop/>> [Accessed 29 May 2020].
- [6] Martins. N, "A Mixed Method Approach to Improve Employee Engagement." European Conference on Research Methodology for Business and Management Studies, Academic Conferences International Limited, June 2019, p. 211.