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## **DESIGN OF CUTTING MACHINE**

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## **КОНСТРУКЦІЯ МАШИНИ ДЛЯ РІЗАННЯ**

Науковий керівник: к.т.н., Кучвара І.М.

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In modern terms automation of production processes in all branches of engineering and economy has an important place. To this end, proposed cutting machine (Fig. 1). This device can perform cutting steel with thickness up to 4 mm, but it is more effective for cutting wood and plastic.

The design of this product is subject to rapid changeover to different sizes of items subjected to cutting, as well as various energy sources. So, this machine can be operated by both electric motor and internal combustion engine, as well as by human force that is its advantage for use especially in remote regions. The design is intended primarily for the use of human power, which helped to significantly reduce the required effort and increase productivity.

A hacksaw is a cutting machine which can be used manually and automatically according to the input on the sprocket. It can be used in all different types of workshop and homes the machine is built from scrap metal and joint them all together to start welding it, we will see now the process of the cutting machine with brief explanation.

The principle of the cutting machine is by starting from the main sprocket by rotating it with constant speed and then the chain which is connected on it transfer the power from the first shaft to second where there is two gears is installed carries the load to the third shaft which is connected with kinematic flywheel. The flywheel carries all the power from the first step to start our cutting operation with the hacksaw tool the upper head which carries the tool motion is subjected according to the workpiece diameter. The workpiece is clamped manually on the Y-axis with two pieces of metal against and screwed tightly then the operation starts. The cutting machine can work at any condition of the climate. There is a comfort set for the on beginning so the person can set and do the operation. Lubrication is used to lubricate the chains, bearings and tool holder to decrease friction and noise it's not an effect to the pollution. One of the machine aims to withstand for long period without any breakdown the machine it is build efficient for any situation. The cutting operation can be done for 9mm in less than a minute which is more efficient than using hand.



Figure 1. Cutting machine (photo): 1 – sprocket the main power of the cutting system; 2 – chain which carries the power from the sprocket and spread it to the other sprockets; 3 – house bearing which handle the motion from the shafts without frictions or loss power; 4 – shaft, there is two shaft the first one process is to hold the power from the main source and shear it on the gears, the second one is to transfer the power to the kinetic flywheel; 5 – cutting tool which get the power from the kinetic flywheel and starts to do its operation; 6 – clamping there where the workpiece is inserted and clamped tightly to hold the cutting motion and doesn't allow the workpiece to resist during the operation.

### **Safety**

The device also consist safety the aim of it is to let the user out of danger the safety parts in the machine are two system. First system there is a enough distance between the cutting tool and the power source either a human or electric in case if something went out of race during the operation nothing can be crushed. The second system is that the cutting tool holder is fixed on a certain level of the bar which support it so when the process start it can moves on the axis. But we have made a lower level were the holder will stand on it the tool can't move and that is due to the tangent line which is connected to the flywheel starts to hit the tool holder surface which will let it to be out of operation and in this way we have saved any dangerous situation to the device and the person who works with it and during the machine is built on giving high noise during the operation in case of decreasing in lubrication to the machine parts gives a sign to inspect it