

# Importance of Cutting Using Table Saw in Different Industrial Applications

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**ABSTRACT:** *The table saw is a compact machine utilized in the cutting process that employs a rotational motion of the blade to cut any item. Table saws are used to cut aluminum and wood, and they are commonly seen in carpentry workshops or on building sites. The study's goal is to examine innovative techniques, technologies, and strategies for improving table saws in the industry. Another goal of the research is to demonstrate the many characteristics of the table saw as the influence of sawdust is researched to successfully highlight the usage of sawing in any cutting operation. A beneficial new technique is the usage of a diamond chain in the machine. Thus, studying the table saw is crucial since the equipment is highly beneficial for any workshop because it is multipurpose and requires little maintenance. Table saw research will soon be automated, which will enhance the sawing process and minimize the number of accidents that occur during any sawing procedure.*

**KEYWORDS:** *Bench Top, Feed Rate, Cutting, Table Saw.*

## 1. INTRODUCTION

A table saw is a carpentry machine consisting of a round blade mounted on an arbor that is driven by a direct DC motor. The blades continue into the top of the frame, which supports the cutting material, which is usually wood. In some early table saws, the blade and arbor were stationary, with the tabletop being cycled vertically and horizontally to reveal more or less of the blade. The angle of the blade can be changed to change the degree of cut and the cut angle. To avoid losing a finger in the event of a cutting accident, the blade should protrude as little as possible over the piece. Jigsaws have various applications in an industry where different cutting processes for different materials range from manual saws to automatic saws. The cutting is a very primary operation in any manufacturing and construction work. The table saws now used in the market are multi-operational and help to reduce the working time for the process. Cabinet, compact, hybrid, Jobsite, contractor, sliding and bench-top table saws are the most common varieties [1]–[5].

### 1.1. Components of Table Saw:

Out-feed tables are the longboards, sheets of plywood, and other sheet materials are frequently ripped with table saws. This technique is made safer and easier by using an out-feed table. Infeed tables are aided in the feed of longboards as well as plywood. Downdraft tables: These tables pull dangerous dust away from users without impeding their mobility or productivity. A rip fence runs from the front of the table to the rear, parallel to the blade's cut surface. The distance between the fence and the blade may be modified, determining where the cut is made on the workpiece. The fence is usually referred to as a "rip fence" since it is used to guide the workpiece during the rip cut operation.

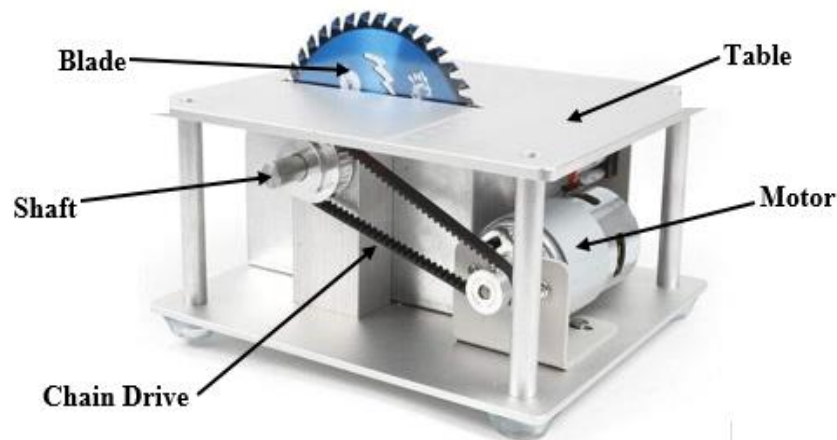
A Feather board is used to protect the timber from ripping through the rip fence. Hold downs are a vertical form of feather boards that are magnetized or clamped to a fence. Another form of hold-

down employs spring wheels that adjust the workpiece to blades. A miter gauge is a table with 1-2 slots running to and fro directions which is parallel with the cut section. The crosscut sled holds the object perpendicular to the blade. A “stacked dado” blades are equipment that includes 2 outside edges and multiple interior “chip breakers” for cutting dados up to the maximum width of 6-10 inch diameter stacked.

The blade is projected through a replaceable insert in the table and a material, like plastic or wood, can be used to create zero-clearance inserts. The blade is elevated through the insert when a zero-clearance insert is first introduced, forming the slot with no gaps. Other inserts, such as a dado insert, can be purchased or made in the same way. A riving knife, sometimes known as a splitter, is a perpendicular protrusion situated back to the saw blade. It is somewhat thinner than the blade and is positioned parallel to it. The splitter helps to avoid backlash by preventing the rotation of the material from being sliced. A push stick is a safety device that is used to maintain the level of the table.

### 1.2.Bench-top:

Bench-top table saw is small and light, and they're meant to be used on a table or other surface as shown in Figure 1. Homeowners and Dyers are the most common users of this sort of saw. They nearly always have a universal direct-drive motor. Some early versions had tiny induction motors that were not particularly strong, causing the saw to be heavily weighted and vibrate more. The most current saw can be lifted and transported by one person to a specific spot. Steel, aluminum, and plastic are commonly used in these saws, which are the cheapest and least competent of the table saws, yet they can handle most tasks with enough ripping capacity and precision.

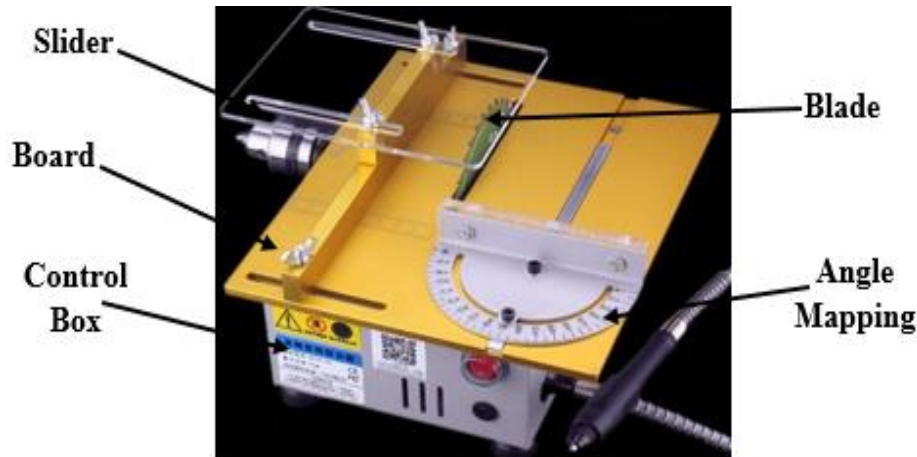


**Figure 1: Represents the Design of Bench-Top Type Table Saw Used for Various Cutting Operations [Google].**

### 1.3.Mini and micro:

Table saw blades with a radius of fewer than 2 inches (50 mm) are known as mini and micro table saws as shown in Figure 2. Hobbyists and model builders often utilize mini and micro table saws, while building companies that only require a tiny saw to cut little sections have begun to use mini table saws. They are significantly simpler to handle and travel and they are quarter dimensions than a traditional saw which is significantly safer in use for cutting extremely small bits because

they are small in size. By using blades with a lower kerf than standard edges, less material is wasted and the risk of kickback is decreased [6].



**Figure 2: Represents the Design of Mini and Micro Type Table Saw Used for Various Cutting Operations [Google].**

The saw table is used for cutting purposes in industries and workshop applications. Various materials can be cut using these machines, which include both metals and nonmetals. There are many types of table saws available in the market but little research is done on this type of table saw, the focus of doing this study is to know the technical aspects of different types of saws and their area of application. A saw table is a well-known machine, but the analysis of its different types is less, which is to be discussed in this study. The study also highlights the types of sawdust and the cutting ability of the machines.

## 2. LITERATURE REVIEW

Jawad Ul Haq et al. designed a Machine for various cutting materials. Power saws are extremely helpful instruments for cutting and shaping materials used in a variety of construction projects, but they may also inflict significant hand injuries. The operator's hands are vulnerable in a table saw operation for wood cutting, for example, because they are utilized to guide pieces into the saw. Existing table saws have a cutting capacity that prevents them from cutting both wood and aluminum. In this study, an Axiomatic Design idea for a Saw Cutting Machine is offered to guarantee design objectives such as safety, user comfort, domestic use, and the capacity to cut both types of materials are met. Based on the aforementioned design objectives, the mapping from Customer Attributes to Functional Requirements and then associated Design Parameters resulted in an uncoupled design, which led to a comprehensive mechanical design and finally the control system [7].

Bartosz Pałubicki et al. studied different speeds of feed and their effect on the design of sawdust. The goal of the research was to determine the relationship between feed rate, feed force, and sawdust particle size. In the trials, a K700 machine was employed which was connected to a horizontal pneumatic actuator having 3 different feed rates in meter/min. According to the findings, there is a positive association between feed rate and feed forces in a circular sawing process, as well as an unanticipated particle size distribution based on the feed rate [8].

Thus, the table saw is a machine that is very useful in many applications in a workshop as well as on construction sites. Woodcutting, metal cutting as well as polymer material cutting can be done using these machines which help small startups to use this device with ease. There are many machines available in the market which are used to cut thick material from thin material. The use of machines saves the power which is researched as well as reviewed by many experts where the usage of the machine and the various aspects of the machine are discussed. So the use of a table saw is necessary with precautions as the machines are used for cutting and trimming objects. Table saw machines have several points that make the machine industrially applicable and are useful for cutting operations.

### **3. DISCUSSION**

The table saw has a vast field of application, which is related to the cutting and shaping of elements in the desired size. There are many types of table saws available in the market their applications are different depending on their industrial installations. The use of mini and micro table saw is for cutting the small objects having a small diameter of 4 millimeters, while the other types of the saw are for cutting the big objects. The blade arrangement is the same in all these table saws out of which some table saw uses the diamond chains and toothed blades for cutting the objects. The use of a table saw is done since ancient times for cutting purposes which evolved from manual to automatic and which is being able to operate using AI. The focus of all the machines is to cut the object in less time with less noise and vibrations [9].

The design of table saws is simple in construction, and using different technologies makes it automatic. The study of different aspects of table saw is done by many experts which focuses on their cutting speed, type of sawdust and its effect and the feed rate of the object in the table saw. The use of blades and motor affects the working efficiency of the machine. The sawdust for wood is more and which may affect the inhalation of the user so it is necessary to use masks while cutting the softwood. The studies by different experts conclude the significance of using a table saw with button starts, now the technologies used in the machines are using IoT and AI for smart cutting of objects. The table saws used in the industry should have high efficiency and cutting speed of the motor. The cabinet table saw provides the extra cabinet for cutting the object, while the bench top table saw is cheap and used in most cutting operations and also has simple constructions [10].

The table saw design is easy to understand and the functioning of the machine is smooth. Different designs are used in different countries for different applications depending on the object they used as inputs. The machines used for cutting operations are unique and have a specific function like mini and micro machines cut the small size objects without damaging them. While the bench top is a low-cost machine as compared to other machines. The smart machines are now on the market which provides the extra functions during the working to control the speed of the blade as well to control the sawdust exploration in the environment. As the study focuses on the different types of table saw used for cutting different elements in different parts of the world to understand their design and working all together. Thus, the study of table saws is beneficial for workshops and construction site applications.

### **4. CONCLUSION**

Many experts have conducted a variety of studies on the various elements of table saws, with some focused on design and manufacture and others on blade configuration and dust generated during

operation. The manufacture and design of a portable table saw are easy and effective as the user can carry it to the work site and process the task. The use of slipping aids in tool adjustment and maintains the working efficiency of the machine. As a result, the table saw is particularly beneficial for both metal and non-metal cutting activities, which are studied. The different approaches made by different experts in table-saw help to improve the cutting process using modern machinery using technology. The use of IoT and AI helps in the development of machines with smart technology for operating. The study will also increase the atomization of such machines, reducing the risk of injuries or accidents.

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