



Product Investigation Report On Electric Drill Machines

An electric drill is powered with an electrical motor that revolves drill bit to create a deep pit in wood, plastic, or metal. Interchangeably, a screwdriver accessory can be connected to rotate screws. The units of an electric drill for a user comprises of the holder, an on/off trigger with protection handle, a reversing switch for altering the direction of rotation for the drill bit, and the chuck that grasps the drill bit in position.

The electric drill is utilized through drill bits to produce or widen holes in range of materials such as steels, plastics & woods. Through additional fixtures the electric drill can be utilized for grinding, burnishing, wire scrubbing, or as powered screw driver. A specimen of the electric drill to be explained in this study is presented in Figure 1.

Drills are obtainable that can house drill bits and other fixtures with different sizes of shaft diameters. Different sizes can be 1/4, 1/2, 3/8 and 3/4 inches etc. Sizes used in homes & in other minor uses are 1/4 and 3/8 inches. The Model 6404 3/8" drill can be used for 1/4 inches as well, and it is excellent equipment for home based applications.

Components: An electric drill is composed of two entities; mechanical and electrical. The Mechanical entity is composed of mechanisms whose purpose is to transfer, translate or apply forces. The Electrical subsystem contains components that supply and control electric flow. These two subsystems are discussed in greater detail below. The Model 6404 3/8" drill is utilized here to demonstrate product investigation. Parts of electric drill are stated as under:

1. Piston Grip
2. Cord Strain Reliever
3. Electrical Cord
4. Switch Lock
5. Trigger Switch
6. Chuck Wrench
7. Reversing Switch
8. Chuck

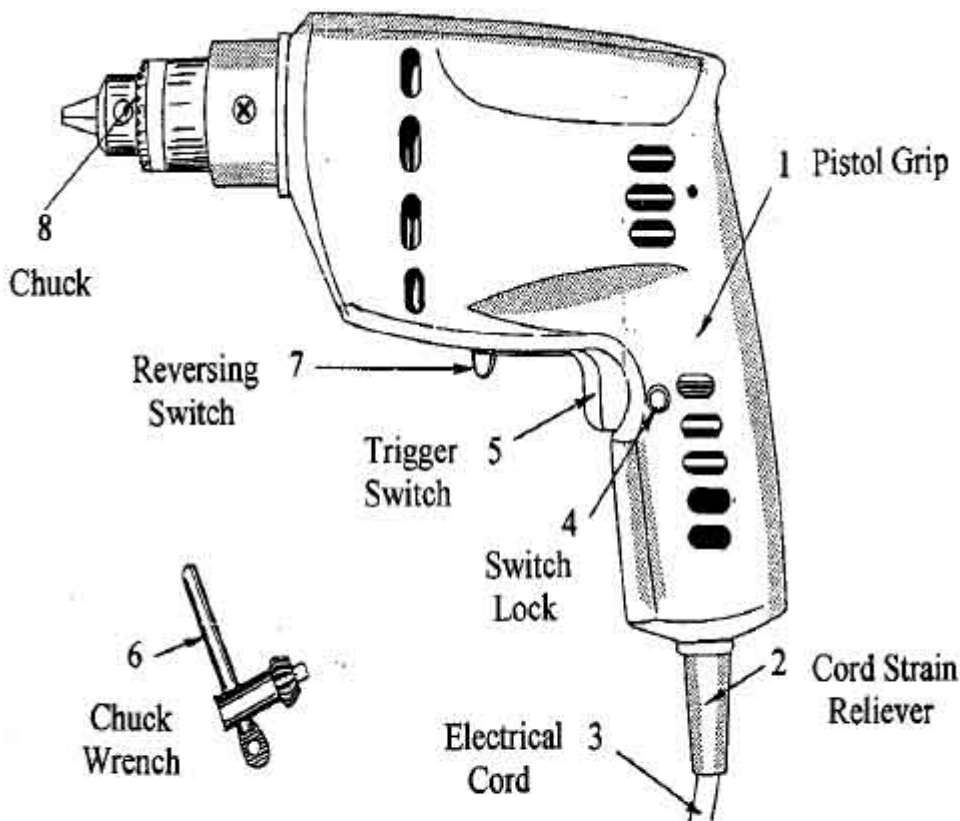


Figure 1

Materials: The drill cover encompasses and guards the inside constituents of the drill. It offers steadiness and ease while drilling by allowing user a robust foundation to hold on. The cover also enhances visual charm to the drill. This is made up of Polystyrene, which is a plastic. The handle of the casing of the drill is made up of Rubber.

The trigger switch is utilized to complete the circuit within the drill so as to allow electrical current to flow. Trigger is made up of plastic & inside attached with copper wirings. The electrical cord is utilized to transfer the electric energy from some external energy source to the drill. These electrical cords are made up of Copper Wires which are Flexible.

The chuck is main part of drill which grasps the bit and is focused to guide its rotation. The chuck exterior is made up of Hard Plastic (Polystyrene), & the interior of the chuck is Stainless Steel. The chunk wrench, which is used to tighten & loosen drill bits from the chunks, is also made up of stainless steel. Drill bits are also made of stainless steels.

The cord strain reliever is utilized to retain the cord from twisting or dragging too much at



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the foundation of the electric drill. This saves the copper wires on the interior of the cord strain reliever from breaking or getting out of the electric drill. The cord strain reliever is made up of Plastics. Switch lock is made up of mild steel sheet metal.

Processes: Drill cover parts are made up of injection moulding with two separate moulds, & the rubber for gripping is similarly injection moulded and fixed over the plastic casing utilizing a durable adhesive. The plastics of trigger switch are made up of Injection Moulding, & the wires inside the switch are usually drawn.

Chuck which is the main part is made of stainless steel is made up of metal casting and the Exterior plastic on the chuck is again produced by Injection Moulding. However plastics manufactured from injection moulding could have been produced from pressure forming plastics and other alternative can be blow moulding. The stainless steel metal which is casted needs least level of machining for finishing purpose. The other-way around for producing the same part is forging little cylindrical shapes parts, and then producing the desired chuck on milling machine. But this will increase the cost since the wastage will be more and extra machining is required to make the desired part. Switch lock is made by simple shearing punch.

Assembly/Joining: Electrical drill is internally a complex assembly that includes gears, bearings, armature assembly, fan, field assembly, motor, terminal assembly and then the cord. The drill casing is basically L-shaped as an entity, so as to ease the assembly & joining process of the internal assembly as well as the external parts. The drill casing is three dimensional in its physique. It is made three dimensional so as to fix the three dimensional interior constituents inside the covering. The casing is manufactured connecting the internal & external constituents in such a technique that reduces the size of the drill. First of all the internal assembly is joined with one another then it is mounted on the casing along with external features embedded.

Finish: The finishing is being applied to the casted parts of the electric drill for example chuck. Moreover the injection moulded plastics used are being polished by a polishing technique known as PM-F0 commercially known as Non-cosmetic—finish to Proto-mould discretion (Rajput, 2007). Other plastics such as trigger switch is finished by PM-T1 i.e. Proto-mould texture, SPI-C1 followed by light bead blast.

Controls/Ergonomics: Switch lock is a basic control; if the user does not want to use the drill the switched must be made off. In-case if the trigger switch is pressed switch lock will prevent the drill to operate, this control reduces chances of accidents. Switch lock only needs to be on when user wants to operate the electric drill.

Chuck wrench is used to tighten the chunk with drill bit before operation. The chuck wrench ensures the drill bit is firmly tightened with the chunk. In case if the drill bit is fixed with



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chunk and not properly tighten it can cause a serious accident resulting in injury and damages. Therefore the chuck wrench ensures that such risk of a drill bit accident is substantially minimized.

One of the features of ergonomic is that the handle is slanted to a minor angle for full ease and steadiness of the user hands. The grip comprises of the channels to direct finger adjustment on the drill holder.

Energy Source: Electric drills of this model are powered by external source of alternating current. However electrical drills also come in rechargeable batteries installed which permits electric drills not to use external power supply; the spare battery can be used during the process of recharging a battery. But in this model 6404 3/8" only the external source of AC power supply is the energy source.

One-quarter inch drills bit for this drill model run up to 2250 rpm and the three-eighth inch drills run up to 2100 rpm. The drill model uses a minor electric motor having a rating of 1/6 to 1/4 horse power. The energy is transmitted by this motor with the help of gears to the shaft that drives the chuck and the drill bit.

Labels: Model 6404 3/8" Electric drills are labelled by the maximum dimensions of the drill bit channel that the drill chuck can withstand. In this case 3/8 inch is the maximum diameter of the drill bit. This label is attached on casing of electric drill.

Use: This model of electric drill is extraordinarily easy to utilize, so it's a simple device. Essentially, a push on the trigger switch makes the electric motor start rotating, which then revolves the drill bit. When using the electric drill, it is essential to wear safety glasses, and remove loose clothing. Hearing protection can also be applied to avoid sound pollution. It is necessary to detach the energy source from the drill before changing bits with a chuck wrench. The chuck of the drill may become hot after drilling, so it is sensible to use some gloves for removing drill bits. When drilling the house, a scanning device can be used to examine electrical wirings or water piping. The electric drill must be connected to the type of circuit with an earth outflow breaker.

Maintenance: Due to regular working of electric drill, routine maintenance is particularly significant. Routine maintenance includes using a toothbrush to eradicate persistent, dirty patches from the drill's fan. When it is done, take a clean cloth and dry the drill using the cloth. Furthermore, one should cover metal exteriors with a light layer of oil utilizing a soft fabric to preserve these surfaces. To avoid breakdown during the operation, electric drill bits should be made sharp when it appears to be blunt. Sharpening or replacing drill bits on timely basis is important to avoid breakdown. When electric drill is utilized for lengthy periods, let it cool to evade hotness. Additional means to stop this overheating are keeping the vents and the motor smooth by asserting pressurized air on them.



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Disposal: Electric drills are composed of various materials, and thus the disposal of every material differs. The steel recycling is very easy, all gears, chunk, bearing, drill bits, shafts, fans is recycled in melt shops. These are treated as melting scrap and recycled in difference furnace processes. Plastics are however difficult to recycle, though there are some processes but these are not cost effective. Plastic is a long-lasting material and reluctant stress-free disposal. It is tough to reprocess, & harmful to burn. It is placed normally in landfill. But however due to the activities of sun, water, wind, and time it can permit to atmosphere once more as pollution.

Bibliography

Rajput R.K. (2007). A Textbook of Manufacturing Technology: Manufacturing Processes. Laxmi Publications Ltd.