

DESIGN OF ANGLE DRESSING UNIT OF GRINDING WHEEL FOR BROACHING TOOL

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ABSTARCT:

We are moving towards more comfortable and time saving method, for this reason make Simple, Easy Handling and Save Time Consumption for Production. This project work has a versatile range in wheel dresser, while angle dresser can be used for tool making, for production process like surface grinding, cylindrical grinding, creep-feed grinding process. Angle dresser is a device which is used for cleaning abrasive material surface makes them effectively ready to do grinding process again. Also the high technology of mechanism used in angle dresser construction ensure that they can process long lasting hours and trouble free usage. This angle dresser can be mounted on the table, or near the side of grinding wheel. the different models available are suitable for various machine like surface grinding, cylindrical grinding, creep-feed grinding machine, etc.,

KEYWORDS: Easy handling, Long lasting, Simple, Time consumption, free usage.

INTRODUCTION:

Heavy business involves one or additional characteristics like giant and significant products; giant and significant instrumentality and facilities (such as significant instrumentality, giant machine tools, and large buildings); or complicated of various processes. attributable to those factors, significant business involves higher capital intensity than lightweight business will, and it's conjointly typically additional heavily cyclic in investment and employment.

Transportation and construction alongside their upstream producing provide businesses are the majority of significant business throughout the commercial age, alongside some capital-intensive producing. ancient examples from the mid-19th century through the first twentieth enclosed steelmaking, artillery production, locomotive erection, machine building, and also the heavier varieties of mining. From the late nineteenth century through the mid-20th, because the {chemical business industry} and electrical industry developed, they concerned elements of each significant business and light-weight business, that was before long conjointly true for the automotive business and also the craft business. fashionable building (since steel replaced wood) is taken into account significant business. giant systems square measure typically characteristic of significant business like the development of skyscrapers and huge dams throughout the post-World War II era, and also the manufacture/deployment of huge rockets and large wind turbines through the twenty first century.

Several East Asian countries have faith in significant business as a part of their overall economies. Among Japanese and Korean companies with "heavy industry" in their names, several also are makers of region merchandise and defence contractors to their several countries' governments like Japan's Fuji significant Industries and Korea's Hyundai Rotem, a joint project of Hyundai significant Industries and Daewoo significant Industries.

GRINDING WHEEL

INTRODUCTION TO GRINDING

Grinding, or abusive machining, is the process of removing metal in the Form of minute chips by the action of regularly shaped abrasive particles. These particles may be in bonded wheels, coated belts, or simply loose Grinding wheels are composed thousands of small abrasive grains held Together by a bonding material. Each abrasive grain is a cutting edge. As the Grain passes over the work piece it cuts a small chip, leaving a smooth, accurate Surface. As each abrasive grain becomes dull, it breaks away from the bonding Material.

TYPES OF ABRASIVES

Two types of abrasives are used in grinding wheels are manufactured. Except for diamonds, manufactured abrasives have almost entirely replaced natural abrasive materials. Even natural diamonds have been replaced in some instances by synthetic diamonds.

ALUMINIUM OXIDE

Refining bauxite ore in an electric furnace makes aluminium oxide. The Bauxite ore is heated to eliminate moisture, and then mixed with coke and iron to form a furnace charge. The mixture is then fused and cooled. The fused mixture resembles a rocklike mass. It is washed, crushed and screened to separate the various grain sizes. Aluminium oxide wheels are manufactured with abrasives of different Degrees of purity to give them certain characteristics of different grinding Operations and applications. The colour and toughness of the wheel are influenced by the degree of purity. General-purpose aluminium oxide wheels, usually gray and 95 percent Pure are the most popular abrasives used. They are used for grinding most steels And other ferrous alloys, they are used for grinding most steels and other Ferrous alloys. White aluminium oxide wheels are nearly pure and are very Friable (able to break away from the material easily.) They are used for grinding High- strength, heat-sensitive steels.

SILICON CARBIDE

Silicon carbide grinding wheels are made by mixing pure white quartz, Petroleum coke and small amounts of sawdust and salt, and then by firing the Mixture in an electric furnace. The process is called synthesizing the coke and Sand. As in the making of aluminium oxide abrasive, the resulting crystalline. Mass is crushed and graded by particle size. Silicon carbide wheels are harder and more brittle than aluminium oxide wheels. There are two principal types of silicon carbide wheels black and green. Black wheels are used for grinding cast irons, non-ferrous metals like Copper, brass, aluminium, and magnesium, and non-metallic such as ceramics and gemstones. Green silicon carbide wheels are more friable than the black Wheels and used for tools and cutter grinding of cemented carbide.

CUBIC BORON NITRIDE (CBN)

Cubic boron nitride is an extremely hard, sharp and cool cutting abrasive. It is one of the newest manufactured abrasives and 2.5 times harder than aluminium oxide. It can withstand temperatures up to 2, 5000 F. CBN is produced by high- temperature, high-pressure processes similar to those used to produce Manufactured diamond and is nearly as hard as diamond. CNB is used for grinding super-hard, high-speed, tool and die steels, hardened Cast iron, stainless steels two types of cubic boron nitride wheels are used in industry today. One type is metal-coated to promote good bond adhesion and used In general purpose grinding. The second type is an uncoated abrasive for use in electroplated metal and vitrified bond systems.

DIAMOND

Two types of diamond are used in the production of grinding wheels natural are manufactured. Natural diamond is a crystalline form of carbon, and very expensive. In the form of bonded wheels, natural diamonds are used for grinding very hard materials such as cemented carbides, marbles, granite and stone. Recent developments in the production of manufactured diamonds have brought their Cost down and let to expanded use. Manufactured diamonds are now used for grinding tough and very hard steels3 cemented carbides and aluminium oxide cutting tools.

OTF-S OF BOND

Abrasive grains are held together in a grinding wheel by a Bonding material. The bonding material does not cut during grinding operation. Its main function is to hold the grains together with varying degrees of strength. Standard grinding wheel bonds vitrified, retinoid, silicate, shellac, rubber and metal.

RUBBER BOND

Rubber-bonded wheels are extremely tough and strong. Their principal uses are as thin cut-off wheels and driving wheels in centre less grindings machines. They are used also when extremely fine finishes are required on bearing surfaces.

METAL BONDS

Metal bonds are used primarily as binding agents for diamond abrasives. They are also used in electrolyte grinding where the bond must be electrically conductive.

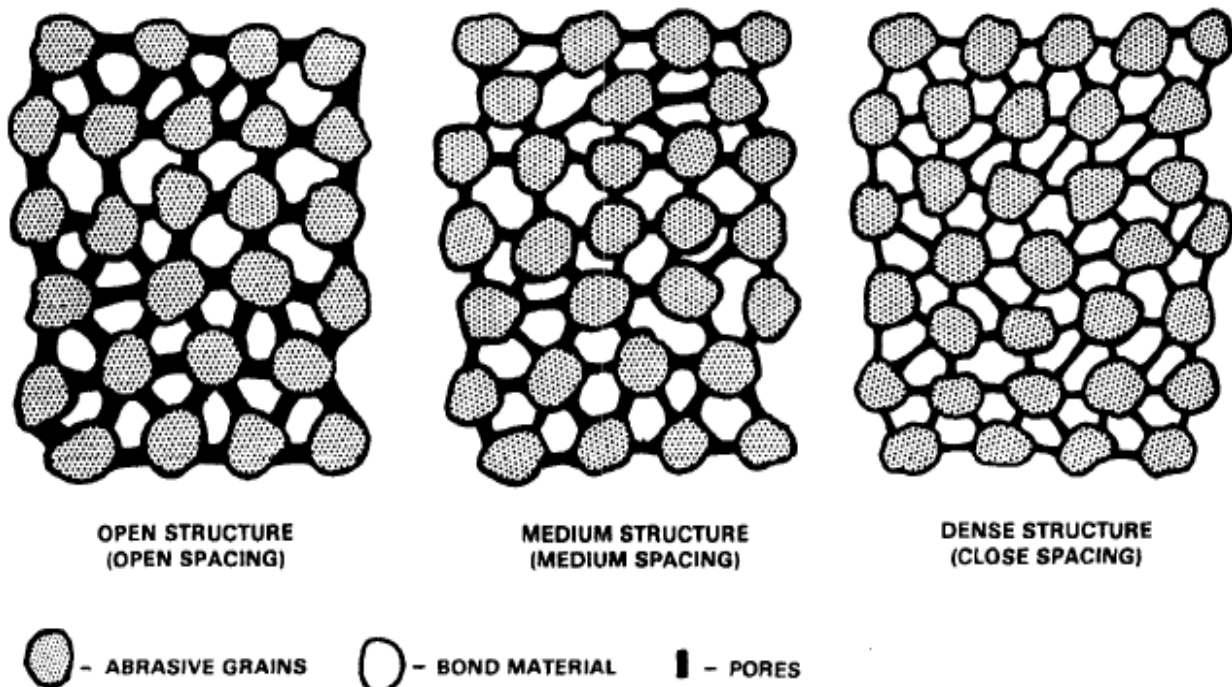
GRINDING WHEEL GRADE

The grade of a grinding wheel is the measure of the strength of the bonding material holding the individual grains in the wheel. It is used to indicate the relative hardness of a grinding wheel. Grade or hardness refers to amount of bonding material used in the wheel, not to the hardness of the abrasive. The range used to indicate grade is A to Z, with A representing maximum softness and Z maximum hardness. The selection of the proper grade of wheel is very important. Wheels that are too soft tend to release grains too rapidly and wheel wear is great. Wheels that are too hard do not release the abrasive grains fast enough and the dull grains remain bonded to the wheel causing a condition known as "glazing".

ABRASIVE GRAIN SIZE

The size of an abrasive grain is important because it influences stock removal rate, chip clearance in the wheel and surface finish obtained. Abrasive grain size is determined by the size of the screen opening through which the abrasive grits pass. The number of the nominal size indicates the number of the openings per inch in the screen. For example, a 60 grit-sized grain will pass through a screen with 60 openings per inch, but it will not pass through a screen size of 65. A low grain size number indicates large grit, and a high number indicates a small grain.

Grain sizes are broadly defined as coarse (6 to 24), medium (30 to 60), fine (70 to 180), and very fine (220 to 1,000). Very fine grits are used for polishing and lapping operations, fine grains surface finish and small-diameter grinding operations. Medium grains are used in high stock removal operations where some controlled surface finish is required. Coarse grain sizes are used for billet conditioning and snagging operations in steel mills and foundries, where stock removal rates are important and there is little concern about surface finish.



GRINDING WHEEL STRUCTURE

The structure of the grinding wheel refers to the relative spacing of the abrasive grains; it is the wheel's density. There are fewer abrasive grains in an open-structure wheel than in a closed-structure wheel. A number from 1 to 15 designates the structure of a wheel. The higher the number, the more open the structure will be and the lower the number, the more dense the structure.

GRINDING WHEEL SPECIFICATION

Grinding manufacturers have agreed to a standardization system to describe wheel composition as well as wheel shapes and faces, length of the hob, which aid in cutting and chip removal. There are also special I lobes designed for special gears such as the spline and sprocket gears. The cross-Sectional shape of the hob teeth are almost the same shape as teeth of a rack gear that would be used With the finished product. There are slight changes To the shape for generating purposes, such as extending the hob's tooth length to Create a clearance in the gear's roots. Each hob tooth is relieved on the backside to Reduce friction.

Most hobs are single-thread, but double-, and triple-thread hobs increase production rates. The downside is that they are not as accurate as single-thread Hobs. Depending on types of gear teeth to be cut, there are custom made hobs and General purpose hobs. Custom made hobs are different from other hobs as they are Suited to make gears with modified tooth profile. The tooth profile is modified to Add strength and reduce size and noise of gears.

GEOMETRICAL SPECIFICATION

- Wheel diameter
- Width and depth of rim
- Bore diameter

COMPOSITIONAL SPECIFICATION

- Type of grit material
- Grit size
- Bond strength of the material commonly known as wheel hardness
- Structure of the wheel denoting the porosity
- i.e. the amount of inter grit spacing
- type of bond material
- other than these parameters the wheel manufacturing may add their own
- identification code prefixing or suffixing (or both) the standard code

BOND MATERIALS

A. Vitrified Bond (v)

- Wheel surface speed 2000 m/min
- Cannot be used where mechanical impact or thermal variations are like to occurs

B. Resin bond (B)

- For operations requiring very strong wheels
- Surface speed up to 3000 n/min

C. Shellac bond (s)

- Grinding fine edges on cutters
- Making large wheels

D. Rubber (R)

- High finish at 5000 m/min
- Thin wheels for wet cut-off operation

An engineering material with range of application and are used in pipes, Machines and automotive components industry parts such as cylinder(declining Usage), cylinder blocks and gear box causes(declining usage), It is resistance to destruction and weakening by oxidation.

TYPES OF GRINDING WHEEL

STRAIGHT WHEEL

To the right is an image of a straight wheel. These are by far the most common style of wheel and can be found on bench or pedestal grinders. They are used on the periphery only and therefore produce a slightly concave surface on the part. This can be used to advantage on many tools such as chisels. Straight wheels are generally used for cylindrical center less, and Surface grinding operations. Wheels, of this form vary greatly in size, the diameter and width of face naturally depending upon the class of work for which is used and the size and power of grinding machine.

CYLINDER OR WHEEL RING

Cylinder wheels provide a long, wide surface with no center mounting support (hollow). They can be very large, up to 12" in width. They are used only in vertical or horizontal spindle grinders. Cylinder or wheel ring is used for producing flat surfaces, the grinding being done with the end face of the wheel. This arrangement is stronger than straight wheels and can accept higher lateral load. Tapered face straight wheel is primarily used for grinding thread, gear teeth.

ELECTROPLATED GRINDING WHEEL

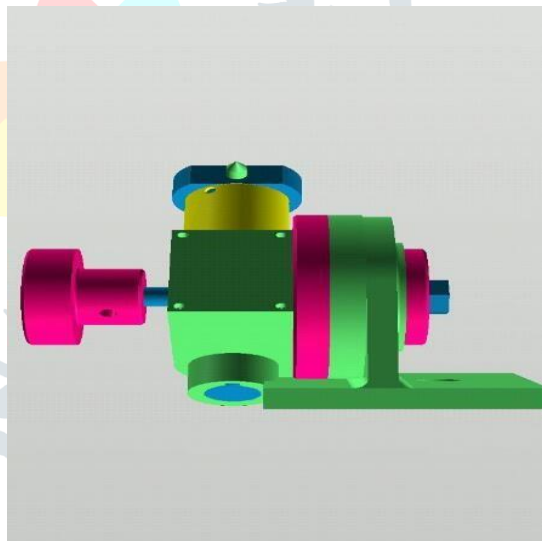
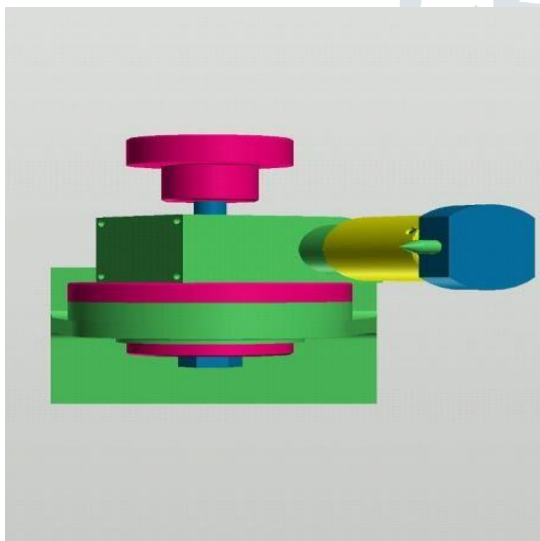
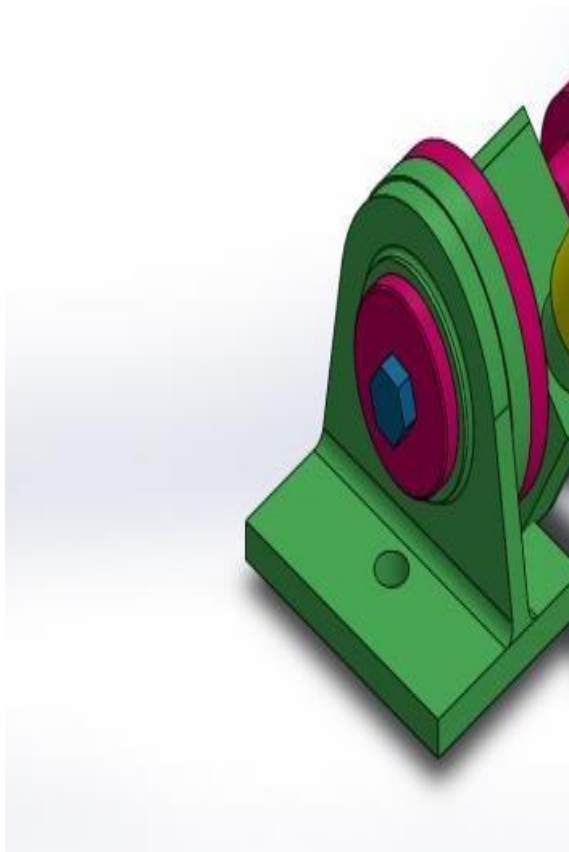
Several methods used for fixing super abrasive particles of diamond or CBN to the working surface of an abrasive tool, electroplating is the fastest growing. More and more production operations involve combinations of hard-to-grind materials and complex wheel shapes that virtually dictate the use of electroplated super-abrasive tools. Characteristically, such tools consist of a precision tool from or mandrel with super-abrasive particles deposited on the working surface and locked in place by electro deposition of a bonding matrix, most frequently nickel

DESIGN OF ANGLE DRESSING UNIT:

COMPONENT NAME

- Main base
- Angle disc
- Diamond holder housing
- Dust production service
- Rack
- Pinion shaft
- Pinion
- Handle
- Spacer
- Cover plate

FIGURES: (SOLID WORKS 3D MODEL)



COST ESTIMATION

6.1 MATERIAL COST

S.NO	COMPONENT NAME	WEIGHT IN (Kg)	MATERIAL NAME	TOTALCOST
1	Main base	2.304	Cast iron	173
2	Angle disc	0.842	Cast iron	578

3	Diamond hold housing	1.233	Mild steel	93
4	Dust protecting service	0.177	EN24	20
5	Rack	0.517	EN24	59
6	Pinion shaft	0.062	EN24	8
7	Pinion	0.103	EN24	13
8	Spacer	0.277	EN24	32
9	Handle	0.368	EN24	43
10	Cover plate	0.097	EN24	12
	Total	5.98 kg		RS.1,031

Cost of Cast iron per kg = RS.75

Cost of mild steel per kg =RS.688

Cost of EN 24 steel per kg =RS.113

PRODUCTION COST

S.NO	COMPONENT NAME	LABOUR COST	MACHINE COST	TOTAL COST
1	Main base	188	350	538
2	Angle disc	440	725	1165
3	Diamond holder housing	200	375	575
4	Dust production service	63	375	438
5	Rack	313	400	713
6	Pinion shaft	200	150	350
7	Pinion	313	500	813

8	Handle	100	75	175
9	Spacer	75	100	175
10	Cover plate	113	163	276
	TOTLE	RS 2,005	RS 3,213	RS 5,218

TOTAL MANUFACTURING COST

S.ON	DESCRIPTION	COST
1	Material cost	1,031
2	Production cost	4,938
	TOTAL	5,966

ADVANTAGES OF ANGLE DRESSING UNIT:

- We can cut back the dimension exploitation this Dressing Unit.
- Conjointly perform Angle form into the innovative of the wheel.
- Same time reduces the wheel diameter.
- It reduces operator work and save the dressing time economically.
- Angle Dresser is of swiveling sort and might dress quite 180°.
- Their compact and house saving style makes them convenient and simple to use.

DISADVANTAGES OF ANGLE DRESSING UNIT:

- Currently the Angle Dressing unit is operated by hand to decorate the wheel.

APPLICATIONS OF ANGLE DRESSING UNIT:

Using this Angle Dressing Unit we can perform angle dressing into following machine.

- CYLINDRICAL GRINDING.
- SURFACE GRINDING.
- BROACH GRINDING.
- SPLINE GRINDING.

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