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|  Project Report onSMASHO-CRUSHERGuided By-Er. Mrs. P. Zode |
| **Name of Projectees Roll No Vivek Patel 128 Rohit Ganorkar 100 Pranav Wandhare 81 Ravi Bisane 97 Amit kumar Singh 24**  |
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|  **Department of Mechanical Engineering KDK COLLEGE OF ENGINEERING** |
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NEED OF THE PROJECT

 In our olden days people used to produce ayurvedic kadas with the help of conventional means of rubbing stone on stone bed. This process being simple was very effective since the nutritional value of the batter does not decrease. But as machine age came in mixer grinder replaced this conventional method of manufacturing ayurvedic products.

The use of mixer grinder produced products at faster rate but on the cost of decreased nutritional value. For example in wheat grass nutrients such as Laetrial B-17, β-Carotene, Vitamin K, Antioxidants, Enzimes and Chlorophyll destroys above 30oC and produces different compounds at temperature more than 30oC.

So we are about to make a project that facilitates combination of conventional method and modern machining mechanism. In this project we have mechanized the stone and stone bed arrangement for both smashing and crushing.

AIM OF THE PROJECT

* In mixer grinder the fibrous protein present in wheat grass gets cut and its nutritional value decreases, but it is not the case in conventional process of stone and stone bed
* In mixer grinder the fibrous protein present in wheat grass gets cut and its nutritional value decreases, but it is not the case in conventional process of stone and stone bed
* Cost and power consumption reduces consequently as compared to mixer grinder

LITERATURE SEARCH

Many leading dieticians consider wheat grass a panacea on earth. Which are the ingredients that make it such an ideal and most sought after remedy for a variety of ailments?

There are many nutritious and prophylactic ingredients contained in it. It contains all the minerals essential for our body. It also contains vitamin A-18,000 international units/100g, vitamin C- 100 mg/100 gm, vitamin B,E,K and Laetrile-B17 etc. Besides these, it also contains carbohydrates, proteins and fat. Many cancer patients have been cured with Laetrile. But the most vital ingredient o the wheat grass is chlorophyll-is contained in a special type of cells called chloroplasts. Chloroplasts produce nutritious elements with the help of sunlight. It is therefore that a research scientist like Dr. Bursher calls it ‘concentrated solar energy’. In fact ‘chlorophyll is a perhaps the best source for obtaining plenty of chlorophyll.

By: Dr Dhiren Gala

Panacea on the earth Wheat Grass Juice

(Naveet Publication)

[WHEATGRASS BENEFITS](http://www.dynamicgreens.com/wheatgrass-benefits-of-wheatgrass.html)

You just can't supplement your way to good health...you need real living food.  Science has identified over 3,800 nutrients in live food with countless more still unidentified.  Our flash frozen wheatgrass juice is unpasteurized real living food which is distinctly different than powders and tablets that are just chopped wheatgrass blades.  Read more to understand our unique processes, land management, organic methods, outdoor growth and use of natural growing seasons to produce wonderful, clean wheatgrass juice.

### The Benefits of Wheatgrass Juice



[Wheatgrass](http://www.dynamicgreens.com) juice is extremely bioavailable. This occurs because wheatgrass requires 50 times more pressure to juice than other fruits and vegetables. This force pulverizes the cellular structures and expresses out miniscule nutritional elements.  The benefit of these tiny nutritional elements is that they are easy for the body to assimilate.

When you drink high quality wheatgrass juice, your body may produce spectacular results such as:

* A physical and mental sense of well-being
* More energy and better sleep
* Stronger immune system
* Detoxification on a cellular level
* Reduced inflammation in the entire body
* Lessened appetite cravings
* Increased mental clarity
* Steadier nerves
* Improved eyesight and night vision
* You suddenly start accomplishing more every day
* Actively engaging in and enjoying activities you had been dreading in the past
* Visually seeing results via live blood cell analysis such as the unclumping of oxygen-carrying red blood cells

RESEARCH HISTORY



Grasses are the foundational food for most  land based life.  Wheatgrass was identified as the finest grass food of all after a series of intensive agricultural research studies spearheaded by Dr. Charles Schnabel and assisted by Dr. George Kohler, Dr. Richard Graham, Conrad A. Elvehjem and E. B. Hart in the 1930s, 40s and 50s.  Of particular note, they performed direct comparisons of wheatgrass against other well regarded vegetables including spinach, broccoli and alfalfa.  While animals fed these foods exclusively began to waste away, those fed only wheatgrass thrived on it.  This spawned further research which showed that wheatgrass contains a broad spectrum of vitamins, minerals, antioxidants, amino acids, essential fatty acids and enzymes.  In addition, their research also identified benefits that could not be associated with any of these known nutrients.  The expression "grass juice factor" was termed to descibe beneficial powers in grasses that were distinct.

Juicing-Origins

Juicing wheatgrass was started in the 1950's by Ann Wigmore independent of the agricultural research above.  Her story is fascinating (check out "Wheatgrass Nature's Finest Medicine" by Steve Meyerowitz).  The essence is that she was a Boston resident of Lithuanian descent who suffered from a variety of ailments in her early life.  Drawing on her peasant background and the experiences of her grandmother (a self taught naturalist), she healed herself with wild weeds, herbs and greens.  She consumed many different types of greens and also fed the same to her animals.  Her observations led her to conclude that wheatgrass was the best source of greens.  One day, at a local yard sale, she picked up an old cast iron meat grinder.  With a few modifications, the first wheatgrass juicer was born.  Ann Wigmore later formed the Hippocrates Health Institute in Boston and worked with thousands of people over the years.  Visitors to the institute were thrilled with their results and many of the health retreats across the country were formed by former Hippocrates clients.

DESIGN OF THE PROJECT



DESIGN CALCULATIONS

|  |  |  |  |
| --- | --- | --- | --- |
| **Design Procedure For Smasho-Crusher** |  |  |  |
|  |  |  |  |
| mass of crushing stone (m) | 2.23 | kg |  |
| Acceleration due to gravity (g) | 9.81 |  |  |
|  | (FN)=m\*g |  |  |
| Normal Force (FN) | 21.8763 | N |  |
| coefficient of friction(u) | 0.75 |  |  |
|  | (Fr)=FN\*u |  |  |
| Force of friction (Fr) | 16.407225 |  |  |
| angle 1 | 25 |  |  |
| angle 2 | 45 |  |  |
| compressive force on link | 16.26288755 |  |  |
|  | 8.619076068 |  |  |
| considering maximum force | 16.26288755 |  |  |
| Considering factor of safety | 2 |  |  |
|  | 32.52577511 |  |  |
|  |  |  |  |
| **Design of Bush** |  |  |  |
| Allowable Yield Strength in shear | 135 | Mpa |  |
| Yield Strength in shear |

|  |
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|  |

 |  |  |
| cross-sectional Area of pin required | 0.2 | mm2 |  |
| Area  |

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| --- |
|  |

 |  |  |
| Diameter of pin required | 0.55 | mm |  |
| std diameter | 5.00 |  |  |
|  |  |  |  |
| **Design of Connecting Rod** |  |  |  |
| Allowable force | 32.5 | N |  |
| Yield strength in compression (Syc) | 240 | Mpa |  |
| Yield strength in compression |  |  |  |
| Area of crossection required |

|  |
| --- |
| 0.1 |

 | mm2 |  |
| Area of crossection |  |  |  |
| diameter | 0.415502248 | mm |  |
| std diameter | 12.0 |  |  |
|  |  |  |  |
| **Checking flat for buckling** |  |  |  |
| Length of flat | 150 | mm |  |
| Moment of inertia of flat |  |  |  |
| Moment of inertia of flat (I) |

|  |
| --- |
| 1017.4 |

 | mm4 |  |
| Crossectional area |  |  |  |
| Crossectional area (A) | 113.04 | mm2 |  |
| Radius of gyration |

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 |  |  |
| Radius of gyration (K) = | 3.0 | mm |  |
| Slenderness ratio |  |  |  |
| Slenderness ratio (λ) | 50.0 |  |  |
| If λ>90 the we have to use Euler's formula , if 10<λ<90 then we have to use Johnsons formula |
| End fixidity coefficient ( C ) for both ends fixed | 1.0 |  | [27] |
| Modulus of elasticity (E) | 204000.0 | Mpa | [27] |
|

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| Buckling load by Euler's formula |

 |  |  |  |
| Safe Buckling load (W) for bar 17A | 120681.5 | N |  |
| It is more than actual load hence it is safe. |  |  |  |
|  |  |  |  |
| **Design of Bush** |  |  |  |
| Force | 32.52577511 |  |  |
| Allowable Yield Strength in shear | 135 | Mpa |  |
| Yield Strength in shear |

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 |  |  |
| cross-sectional Area of pin required | 0.2 | mm2 |  |
| Area  |

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 |  |  |
| Diameter of pin required | 0.55 | mm |  |
| std diameter | 5.00 |  |  |
|  |  |  |  |
| **Finding the Torque** |  |  |  |
| distance of pin from centre of pulley | 25 | mm |  |
| Torque | 813.1443777 | Nmm |  |
|  | 0.813144378 | Nm |  |

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| COMPONENT SPECIFICATIONS |  |  |

# Bearing

6200-2RS Sealed Ball Bearing, the inner diameter is 10mm, outer diameter is 30mm and the width is 9mm, Bearing is made of Chrome Steel, each bearing has 2 Rubber Seals to protect the bearing from dust or any possible contamination, also bearing is pre-lubricated with grease,

* Item: 6200-2RS Ball Bearing
* Type: Deep Groove Ball Bearing
* Material: Chrome Steel
* Closures: Rubber Seals
* Lubrication: Self Lubricated (Grease)
* Dimensions: 10mm x 30mm x 9mm/Metric
* ID (inner diameter)/Bore: 10mm
* OD (outer diameter): 30mm
* Width/Height/thickness: 9mm
* Size: 10 x 30 x 9 mm
* Quantity: One Bearing
* Dynamic load rating Cr: 5,100 N
* Static load rating Cor: 2,390 N
* Limiting Speed:
	+ Grease Lubrication: 18,000 RPM
* Equivalents: 200KDD, 200SS, 6200.2ZR, 200SFF 6200-2Z and 6200ZZE

# V-BELT

 Section: 4L

 Top Width (in): 0.5

 Top Width (mm): 13

 Outside Circumference (in): 41

 Outside Circumference (mm): 1041

# Stainless Steel - Grade 304 (UNS S30400)

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| Chemical Formula |
| Fe, <0.08% C, 17.5-20% Cr, 8-11% Ni, <2% Mn, <1% Si, <0.045% P, <0.03% S |
|  |
|  |
| Background |
| Grade 304 is the standard "18/8" stainless; it is the most versatile and most widely used stainless steel, available in a wider range of products, forms and finishes than any other. It has excellent forming and welding characteristics. The balanced austenitic structure of Grade 304 enables it to be severely deep drawn without intermediate annealing, which has made this grade dominant in the manufacture of drawn stainless parts such as sinks, hollow-ware and saucepans. For these applications it is common to use special "304DDQ" (Deep Drawing Quality) variants. Grade 304 is readily brake or roll formed into a variety of components for applications in the industrial, architectural, and transportation fields. Grade 304 also has outstanding welding characteristics. Post-weld annealing is not required when welding thin sections.Grade 304L, the low carbon version of 304, does not require post-weld annealing and so is extensively used in heavy gauge components (over about 6mm). Grade 304H with its higher carbon content finds application at elevated temperatures. The austenitic structure also gives these grades excellent toughness, even down to cryogenic temperatures. |
| Key Properties |
| These properties are specified for flat rolled product (plate, sheet and coil) in ASTM A240/A240M. Similar but not necessarily identical properties are specified for other products such as pipe and bar in their respective specifications.CompositionTypical compositional ranges for grade 304 stainless steels are given in table 1.**Table 1.** Composition ranges for 304 grade stainless steel

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Grade | C | Mn | Si | P | S | Cr | Mo | Ni | N |
| 304 | min.max. | -0.08 | -2.0 | -0.75 | -0.045 | -0.030 | 18.020.0 | - | 8.010.5 | -0.10 |
| 304L | min.max. | -0.030 | -2.0 | -0.75 | -0.045 | -0.030 | 18.020.0 | - | 8.012.0 | -0.10 |
| 304H | min.max. | 0.040.10 | -2.0 | -0.75 | -0.045 | -0.030 | 18.020.0 | - | 8.010.5 | - |

Mechanical PropertiesTypical mechanical properties for grade 304 stainless steels are given in table 2.**Table 2.** Mechanical properties of 304 grade stainless steel

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Grade | Tensile Strength (MPa) min | Yield Strength 0.2% Proof (MPa) min | Elongation (% in 50mm) min | Hardness |
| Rockwell B (HR B) max | Brinell (HB) max |
| 304 | 515 | 205 | 40 | 92 | 201 |
| 304L | 485 | 170 | 40 | 92 | 201 |
| 304H | 515 | 205 | 40 | 92 | 201 |
| 304H also has a requirement for a grain size of ASTM No 7 or coarser. |

Physical PropertiesTypical physical properties for annealed grade 304 stainless steels are given in table 3.**Table 3.** Physical properties of 304 grade stainless steel in the annealed condition

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Grade | Density (kg/m3) | Elastic Modulus (GPa) | Mean Coefficient of Thermal Expansion (m/m/°C) | Thermal Conductivity (W/m.K) | Specific Heat 0-100°C (J/kg.K) | Electrical Resistivity (n.m) |
| 0-100°C | 0-315°C | 0-538°C | at 100°C | at 500°C |
| 304/L/H | 8000 | 193 | 17.2 | 17.8 | 18.4 | 16.2 | 21.5 | 500 | 720 |

Grade Specification ComparisonApproximate grade comparisons for 304 stainless steels are given in table 4.**Table 4.** Grade specifications for 304 grade stainless steel

| Grade | UNS No | Old British | Euronorm | Swedish SS | Japanese JIS |
| --- | --- | --- | --- | --- | --- |
| BS | En | No | Name |
| 304 | S30400 | 304S31 | 58E | 1.4301 | X5CrNi18-10 | 2332 | SUS 304 |
| 304L | S30403 | 304S11 | - | 1.4306 | X2CrNi19-11 | 2352 | SUS 304L |
| 304H | S30409 | 304S51 | - | 1.4948 | X6CrNi18-11 | - | - |
| These comparisons are approximate only. The list is intended as a comparison of functionally similar materials **not** as a schedule of contractual equivalents. If exact equivalents are needed original specifications must be consulted. |

Possible Alternative GradesPossible alternative grades to grade 304 stainless steels are given in table 5.**Table 5.** Possible alternative grades to 304 grade stainless steel

|  |  |
| --- | --- |
| Grade | Why it might be chosen instead of 304 |
| 301L | A higher work hardening rate grade is required for certain roll formed or stretch formed components. |
| 302HQ | Lower work hardening rate is needed for cold forging of screws, bolts and rivets. |
| 303 | Higher machinability needed, and the lower corrosion resistance, formability and weldability are acceptable. |
| 316 | Higher resistance to pitting and crevice corrosion is required, in chloride environments |
| 321 | Better resistance to temperatures of around 600-900°C is needed…321 has higher hot strength. |
| 3CR12 | A lower cost is required, and the reduced corrosion resistance and resulting discolouration are acceptable. |
| 430 | A lower cost is required, and the reduced corrosion resistance and fabrication characteristics are acceptable. |

Corrosion ResistanceExcellent in a wide range of atmospheric environments and many corrosive media. Subject to pitting and crevice corrosion in warm chloride environments, and to stress corrosion cracking above about 60°C. Considered resistant to potable water with up to about 200mg/L chlorides at ambient temperatures, reducing to about 150mg/L at 60°C. Heat ResistanceGood oxidation resistance in intermittent service to 870°C and in continuous service to 925°C. Continuous use of 304 in the 425-860°C range is not recommended if subsequent aqueous corrosion resistance is important. Grade 304L is more resistant to carbide precipitation and can be heated into the above temperature range.Grade 304H has higher strength at elevated temperatures so is often used for structural and pressure-containing applications at temperatures above about 500°C and up to about 800°C. 304H will become sensitised in the temperature range of 425-860°C; this is not a problem for high temperature applications, but will result in reduced aqueous corrosion resistance.Heat TreatmentSolution Treatment (Annealing) - Heat to 1010-1120°C and cool rapidly. These grades cannot be hardened by thermal treatment.WeldingExcellent weldability by all standard fusion methods, both with and without filler metals. AS 1554.6 pre-qualifies welding of 304 with Grade 308 and 304L with 308L rods or electrodes (and with their high silicon equivalents). Heavy welded sections in Grade 304 may require post-weld annealing for maximum corrosion resistance. This is not required for Grade 304L. Grade 321 may also be used as an alternative to 304 if heavy section welding is required and post-weld heat treatment is not possible.MachiningA "Ugima" improved machinability version of grade 304 is available in bar products. "Ugima" machines significantly better than standard 304 or 304L, giving higher machining rates and lower tool wear in many operations.Dual CertificationIt is common for 304 and 304L to be stocked in "Dual Certified" form, particularly in plate and pipe. These items have chemical and mechanical properties complying with both 304 and 304L specifications. Such dual certified product does not meet 304H specifications and may be unacceptable for high temperature applications. |
| ApplicationsTypical applications include:•         Food processing equipment, particularly in beer brewing, milk processing & wine making.•         Kitchen benches, sinks, troughs, equipment and appliances•         Architectural panelling, railings & trim•         Chemical containers, including for transport•         Heat Exchangers•         Woven or welded screens for mining, quarrying & water filtration•         Threaded fasteners•         Springs |

MOTOR

# Introduction

30 RPM Side Shaft Super Heavy Duty DC Gear Motor is suitable for bigger robots / small automation systems. It has sturdy construction with large gears. Gear box is built to handle the stall torque produced by the motor. Drive shaft is supported from both sides with metal bushes. Motor runs smoothly from 4V to 12V and gives 30 RPM at 12V. Motor has 8mm diameter, 19mm length drive shaft with D shape for excellent coupling.

Table below gives fairly good idea of the motor’s performance in terms of RPM vs voltage at no load and that of stall torque at different voltages.

**Note:** This motor will be bit noisy while running.

## Specifications

* RPM: 30 at 12V
* Voltage: 4V to 12V
* Stall torque: 42.90 Kg-cm at stall current of 4.8 Amp.
* Shaft diameter: 8mm
* Shaft length: 25 to 30mm
* Gear assembly: Spur
* Brush type: Carbon
* Motor weight: 380gms
* Dimension: Refer to diagram below

## Side Shaft Super Heavy Duty DC Gear Motor Dimension



|  |
| --- |
| Motor performance specifications |
|

|  |  |  |  |
| --- | --- | --- | --- |
| **Voltage (V)** | **RPM (No Load)** | **Stall torque (Kg/cm)** | **Stall Current (A)** |
| 2 | 3.0 | 2.73 | 0.8 |
| 4 | 7.2 | 8.19 | 1.7 |
| 6 | 11.7 | 16.38 | 2.5 |
| 8 | 12.9 | 26.13 | 3.2 |
| 10 | 16.0 | 37.05 | 4.0 |
| 12 | 20.9 | 42.90 | 4.8 |

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TEAK WOOD

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|   |
| Teak is found in tropical areas of the world. Thailand, Burma and India are just three countries. Teak is a natural wood, ideal for outside furniture. It contains natural oils that protect it against wet and cold weather. It can also be treated with teak oil giving it more protection against the elements. Teak is expensive although the growth of sustainable teak plantations means that the price will eventually fall and it will be more widely available. |
|   |
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| --- | --- | --- |
| PROPERTY |   | DESCRIPTION |
|   |   |   |
| High in natural oil and rubber content. |   | The oil content will protect the wood against the rigours of winter weather and summer sunshine |
|   |   |   |
| Teak is a close grained hardwood. This makes it possible to cut joints very accurately and makes it suitable for carving as the close grain means it can be carved to include great detail. |   | Tenon joints, dovetail joints, finger joints and many more can be cut to a high degree of accuracy due to the quality properties of teak |
|   |   |   |
| It is one of the hardest, strongest and most durable of all natural woods |   | This natural wood is strong enough to take the weight of adults and children - if constructed correctly. It is very strong making it suitable for furniture. |
|   |   |   |
| Resistant to rotting and to the effects of hot sun, rain, frost or snow, making it most suitable for outside. |   | Teak can withstand almost all conditions the weather can throw at it. |
|   |   |   |
| Shorea wood and Iroko( often called 'African Teak') are known as teak substitutes. However, their properties do not match those of teak. |   | Teak is expensive and sometimes hard to find/purchase. For this reason substitute woods are sometimes used. They do not have the same outstanding qualities as teak. |
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Research the internet for more information on a range of woods that resist the rigours of winter weather and summer temperatures. List their names and their individual properties.

ADVANTAGES OF SMASHO-CRUSHER

* Higher nutritional value of product is obtained
* Fibrous structure is maintained.
* Traditional taste is maintained
* Less cost
* Negligible maintenance cost
* Simple mechanism
* Negligible wear and tear

APPLICATIONS

* All types of food materials can be used.
* Applicable both at household and commercial level by varying sizes.
* Also used for making of ayurvedic medicines and their extracts.

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