

Embrace it.
Green can be
good for business.

The Green Operation

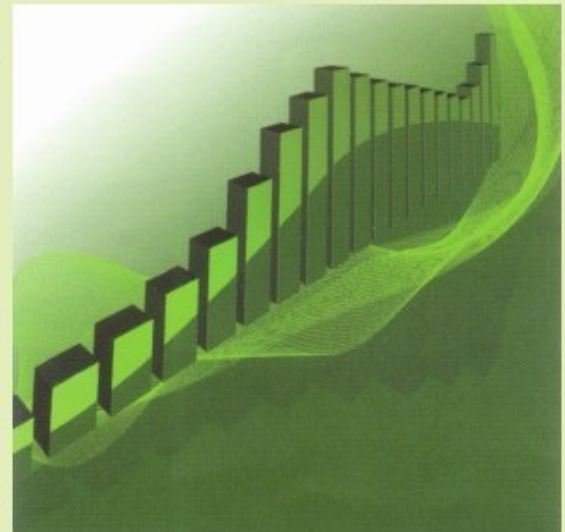


**A sure - shot way to
earn carbon credits**

The Green Operation :

Four industry leaders share with us their experiences in this new environmentally - conscious era of manufacturing. We recognize that "green" is media -hyped but as manufacturers, you will have to contend with escalating fuel costs, government regulations, and consumer expectations - that's a lot of responsibility. We explore, in this and future issues, how the green climate will bring opportunity to those that are prepared.

A significant shift in manufacturing techniques is being noticed in developed economies all over the world. Smarter and leaner production techniques have displaced inefficient means of production. On a more noticeable level, hybrid vehicles are beginning to populate our roads. The term "green" Manufacturing has established itself in the vocabulary of engineers and manufacturing professionals, "green" manufacturing is generically defined as "elimination of waste by re-defining the existing production process or system".



How does this relate to the blast cleaning and shot peening industries ?

Surprisingly, in many important ways! Right from the early days of blast cleaning , this process has unfailingly generated dust due to cast - media. Further development of the technique of blast cleaning resulted in the creation of standards of cleaning and parameters of peening by cut - wire - shot, eventually increasing the application base. Therefore , users of blast cleaning and shot peening processes play a very important role in everyday life instances.

So how do all these relate to green manufacturing ?

Processing parts through a blast machine reduces incidences of waste in downstream production where these parts are required . Increased life of shot peened components has a direct bearing on eliminating short lived parts that are relegated to waste sites. A clean part offers better bonding, whether it is paint, adhesives or any such coating when compared to a part that hasn't been blasted . Best cleaning techniques are used globally by new and re-conditioned railcar manufacturers. End goals are the same to minimize paint usage for economical operation and reduction of volatile organic carbons (VOCs) and paint effluents . Hot rolled steel strips are cleaned in a series of blast machines for descaling purposes a process that could have alternatively been carried out in a series of acid filled tanks, resulting in severe environmental impact when treating the effluent.

Cleaning is an art, peening is a science!

Blast cleaning and shot peening can be carried out using either centrifugal blast wheels or compressed air nozzles, depending on the applications. Centrifugal wheels are used when processing large surface areas and for higher productivity. Nozzles are used when targeting specific areas in the part and when using non-ferrous media. Some cleaning and peening processes dictate the use of non-ferrous media such as aluminum oxide, silicon carbide and glass beads. While the first two are more aggressive in their cleaning nature than glass beads, they also breakdown faster and wear cabinet and nozzle parts much quicker than other

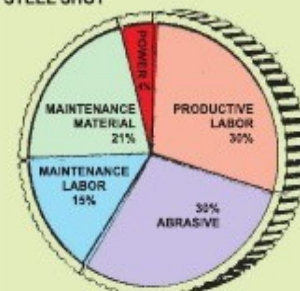
COMPARISON OF COSTS
In Peening Operations, Coil Springs

	Previous Shot	Cutwire Shot
No. of springs peened.....	1,000,000	1,000,000
Bags of shot used	1342	132
Shot cost per spring	Rs. 0.3504	Rs. 0.1200
Maintenance material	Rs. 143727.84	Rs. 69665.76
Total cost per spring	Rs. 0.52608	Rs. 0.21600

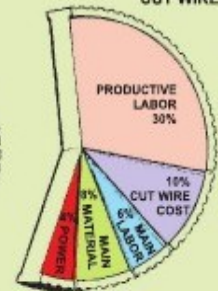
Failure mode vs. microstructure and flaws of Cast Steel Shot.

Before	Low ERVIN cycle	High ERVIN cycle	Wear failure mode
			Surface Peeling
			Core Spall
			Massive Split
			Brittle Fracture

CAST STEEL SHOT



CUT WIRE SHOT



Distribution of costs of shot blasting using conventional shot, left as compared to the cost for the same amount of cleaning with cut wire shot, right

non-ferrous media. Unless dictated by the process, it is advisable to first try out metallic media such as cut wire shot as alternatives. Ferrous media breaks down at a rate of 0.01% while aluminum oxide under the same process parameters experiences a 7% breakdown rate. Choice of media should be carefully evaluated. What appears as a short term gain may not continue to be so in the longer term.

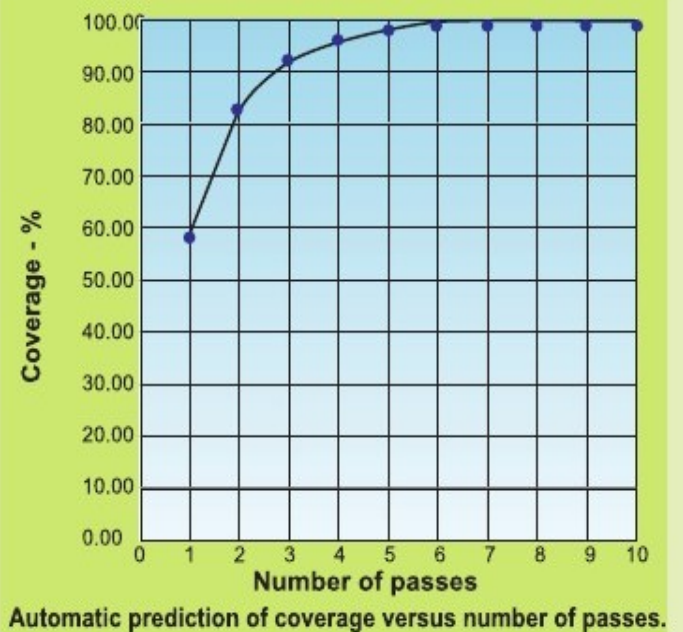
Conditioned cut wire (CCW) media displays greater consistency in size, density, hardness and acceptable shape than cast steel shot. Defect free internal structure results in greater durability. Dust generation with CCW is the lowest among comparable blast media. CCW is rapidly being employed as the peening media of choice in critical peening applications because of these qualities.

It is important to consider the above points in the routine use of this process that will maintain its nature “green”. In summary, “green” manufacturing is more than a social cause. The benefits of adopting this technique and related costs are easily justified considering the benefits of adoption. In our own scale, in the blast cleaning and shot peening universe, let's innovate and set a precedent for downstream and upstream processes.

Predicted coverage values at different pass numbers.

No. of Passes	Coverage - %
1	58
2	83
3	93
4	97
5	98.7
6	99.5
7	99.8
8	99.91
9	99.96
10	99.98

A-value 0.87

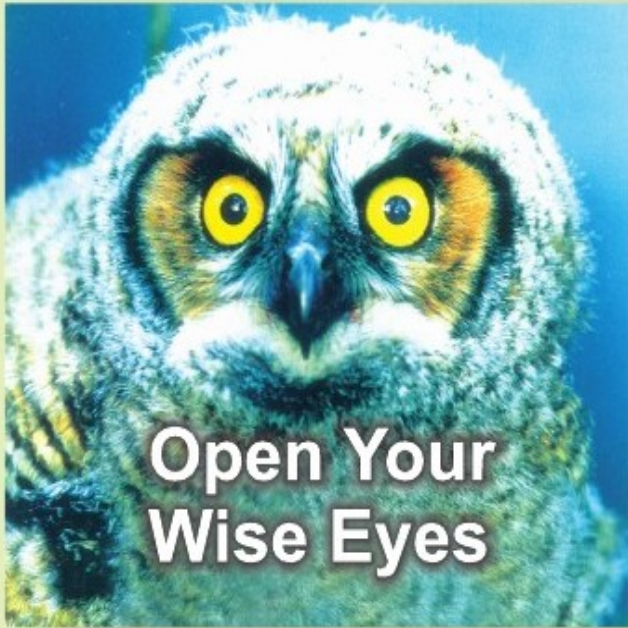


Bakul Shot

The Green Operation

The advantages of Bakul Cut Wire Shot

- ♣ **Highest Durability :-** Due to its wrought internal structure with almost no internal defects (cracks, porosity, shrinkage, etc.) the durability of Bakul Cut Wire Shot can be many times that of other commonly used peening media.
- ♣ **Improved Consistency :-** Highest consistency from particle to particle in size, shape, hardness and density compared to commonly used metallic media.
- ♣ **Highest Resistance to Fracture :-** Cut Wire Shot media tends to wear down and become smaller in size rather than fracture in to sharp - edge broken particles which may cause damage to the surface of the part being peened.
- ♣ **Lower Dust Generation :-** Highest durability equals lowest dust levels.
- ♣ **Lower Surface Contamination :-** Cut Wire Shot doesn't have an Iron Oxide coating or leave Iron Oxide residue parts are cleaner and brighter.
- ♣ **Improved Part Life :-** Parts exhibit higher and more consistent life than those peened with equivalent size and hardness cast steel shot.
- ♣ **Substantial Cost Savings :-** The increase in useful life of Bakul Cut Wire Shot results in savings in media consumption and reclamation, dust removal and containment, surface contamination and equipment maintenance.



**Open Your
Wise Eyes**

A CUT ABOVE THE REST

Number one in cut wire shot since first pioneering the process nearly 35 years ago. Product quantity, consistency and durability combined with knowledge, customer service and delivery still make us number one today.



“ SAVE COST & ENVIRONMENT “



Bakul[®]

(An ISO 9001 : 2008 Certified Company)

Bakul Castings Pvt. Ltd.

Manufacturer of : " Spherical Cut Wire media in all metals."

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"The Green Operation "

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" SAVE COST & ENVIRONMENT "

COST - SAVING

COST SAVING DUE TO SHOT CHANGES & SHOT RECLAMATION

Cost associated with machine down time, cycle time, productive labor, abrasive media, maintenance of machine & material, power etc.

Cost comparison between cast shots & cut wire shots (three grades) as per below :-
(for size S-330 in cast shots & CW-32 in cut wire shots = "0.80 mm.").

Particulars	Cast shots	Cws-grade I	Cws-grade II	Cws-grade III
Avg. Purchase cost	Rs.48/- per kg.	Rs.63/- per kg.	Rs.77/- per kg.	Rs.98/- per kg.
Monthly Consumption	5 MT.	2.5 M.T.	2.5 M.T.	2.5 M.T.
Total purchase cost	Rs.240000/-	Rs.157500/-	Rs.192500/-	Rs.245000/-
Cycle Time	20-30 mints.	8-10 mints.	5-8 mints.	2-5 mints.
Maintenance material	21 %	0 %	0 %	0 %
Power	4 %	4 %	4 %	4 %
Maintenance labor	15 %	6 %	6 %	6 %
Productive labor	30 %	30 %	30 %	30 %
Abrasive qty.	30 %	10 %	10 %	10 %
Shots breakdown	20 % / cycle	1 %	1 %	1 %
Per day no. of cycles	58	160	240	480
Increase Productivity	----	2.75times	4.14 times	8.27 times
Cost of per cycle	Rs.138/-	Rs.33/-	Rs.27/-	Rs.17/-
If run 50 cycles / day	Rs.6900/-	Rs.1650/-	Rs.1350/-	Rs.850/-
Cost of / month	Rs.207000/-	Rs.49500/-	Rs.40500/-	Rs.25500/-
Net saving / Month	----	Rs.1,57,500/-	Rs.1,66,500/-	Rs.1,81,500/-
Net saving / Year	----	Rs.18,90,000/-	Rs.19,98,000/-	Rs.21,78,000/-

Comprehensive research into CWS has placed BAKUL in a position as one of the world's most efficient and technologically advanced cut wire shots manufacturers and suppliers. Focusing on innovation and flexibility in the development of cws, BAKUL is able to provide the optimum shot type for a variety of applications. With over 35 years of experience and training in shots technology, the engineers at BAKUL continue to provide the most appropriate solution to shot blasting & shot peening applications.

BAKUL philosophy of correct shot has at its core the focus of maximum user friendliness in all stages of blast cleaning, including peening technology effects and cost effectiveness. A commitment to, and investment in research has led the expertise developed by BAKUL being sort after by engineers and lot of companies around the globe.

ASSURANCE OF REGULAR SUPPLIES & SERVICES

As per the SME act 2006, evaluation of the production capacity & financial strength is must to keep regular supplies when ordered. To look in to this we are having **SMERA RATING-D3** and **D&B D-U-N-S number 91-667-2017**, for the capacity of production & finance feasibility of company for supply the products regularly.

Wire cost is based on steel cost so when steel cost fluctuate, wire cost automatically fluctuate accordingly. Regarding shots quality, if you don't have shot testing facility, others competitors supplying you mixed shots (soft & hard) which is out of specification and this dose not include in our cost saving. If you will go with right quality shots, only BAKUL able to supply in position those quality shots as per SAE & AMS standards then you will gain be lot of cost savings.

Bakul Castings Pvt. Ltd.

(An ISO 9001:2008 Certified Company)

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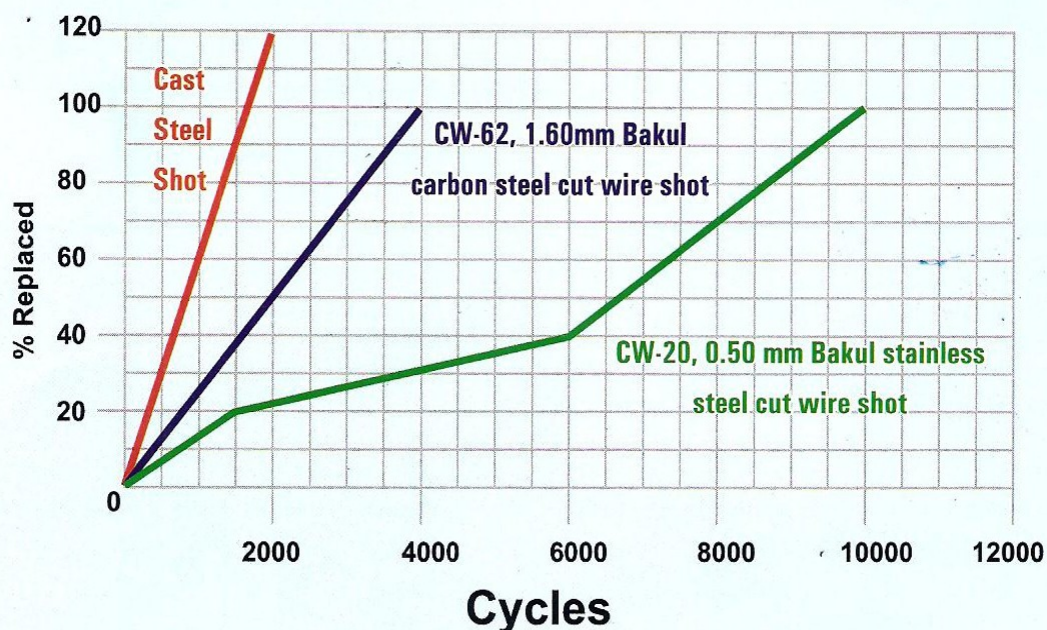


To use **stainless steel cut wire shot**
is the **cheapest method** for
blast cleaning & shot peening operation

then any other shot. i.e. Cast steel shot, carbon steel cut wire shot etc.

i.e. :- Stainless Steel cut wire shot has nickel, chrome, manganese for longer life, brighter white finish, has longer life equivalent to 10,000 cycles. Carbon cut wire shot has only 4000 cycles.

100% Replacement Data Ervin Shot Test Machine



Shot peening to induce compressive residual stress in a surface layer

Compressive residual stress in a surface layer can be produced by different methods. Shot peening has some particular advantages

- reducing fixture, tooling and start up costs
- reducing development and manufacturing time

Shot peening is unaffected by the size or shape of parts. Shot peening induces the highest possible compressive residual stress in a surface layer and is extremely valuable for resisting impact and percussive loads.

Shot peening is also most effective when using very hard steel and parts with high stress concentration factors.

Note : Shot peening is not a substitute for heat treatment, but is very effective as an additional process to improve many characteristic features of a material.

Effects and advantages of shot peening

Effects of Shot peening

- ☐ changing residual stress distribution
- ☐ changing microstructure in the surface layer
- ☐ changing hardness in the surface layer
- ☐ changing superficial structure

Advantages of shot peening

- ☐ increasing fatigue life
(finite life and extended life)
- ☐ preventing stress corrosion cracking
(stress corrosion and stress corrosion fatigue)
- ☐ preventing fretting fatigue
(fretting and fretting corrosion)
- ☐ increasing resistance to wear
(abrasion and cavitation)

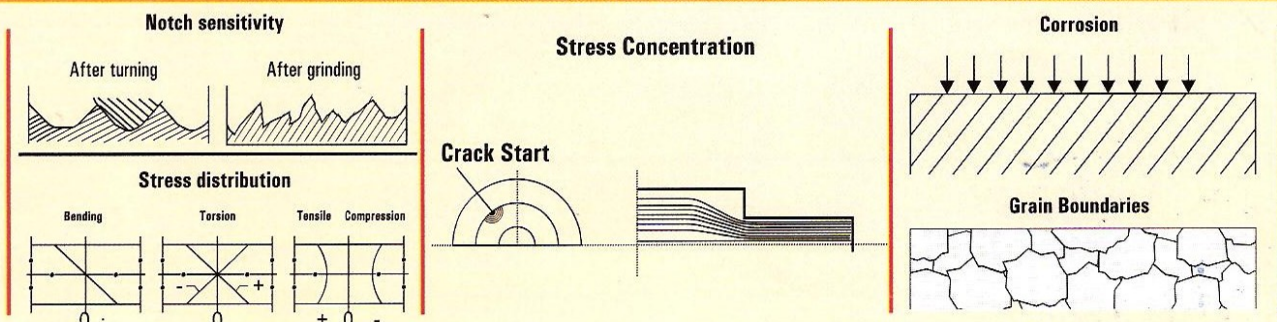
Additional advantages of shot peening

The most important objective of shot peening is to increase the fatigue strength and the fatigue life.

Higher fatigue strength leads to

- less weight by the same performance
 - higher performance by the same weight
 - smaller dimensions by the same performance
 - higher performance by the same dimensions
 - greater material selection by the same performance
 - higher performance by the same material
 - lower surface finish by the same performance
 - higher performance by the same surface finish
 - higher safety margins on components
 - reinforcing already designed components without changing materials or dimensions
 - cost reduction in service and under guarantee
 - improving the reputation of the products
- The process can be applied to all metallic materials.

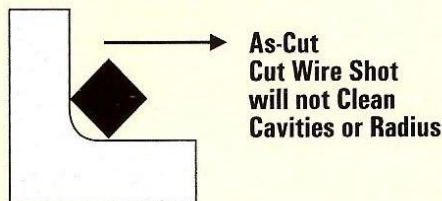
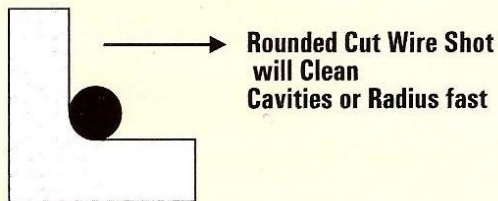
Surface weakness



Analysis shows that crack growth and consequently failure normally start at the surface. The reasons are multifarious :

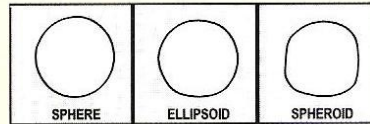
■ machining creates notches ■ the highest stress by nearly all states of load is close to the surface ■ maximum strain concentration is most often found at the surface ■ corrosion starts most often at the surface ■ grain boundaries are weakened by machining.

Shot peening transfers high strain from the surface to the interior. This is the reason why shot peening is very effective with respect to cycle fatigue and extremely valuable for very hard and brittle materials.

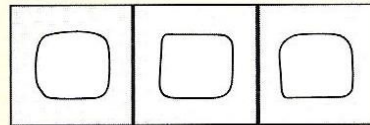


G1, G2 or G3

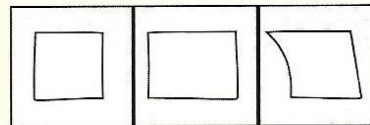
SAE-AMS 2431/3B



Fully conditioned Particles
Figure 1-Acceptable Shapes



Partially Conditioned Particles
Figure 2 - Marginal Shapes



Unconditioned (Particles)
Figure 3 - Unacceptable Shapes

Determining The correct level of conditioning

- The part should never wear out because breakage would catastrophic

A less critical part

- The part will probably never wear out but if failure it should not serious consequences

The least critical part

- If the part fatigues and breaks the part will need to be replaced

Determining what level of conditioning is required G3 would be used for the most essential work e.g. aerospace applications

- G2 would be used on less essential work e.g. some automotive spring and gears
- G1 would be used on the least essential work e.g. some automotive spring gears.

Determining the needs

- Cost and value evaluation of the three levels of conditioning
- The process control on the blast equipment work specifications

REDUCING THE COST OF YOUR PEENING OPERATOR

Cut wire has a longer life.

- Cut wire is free of the defects associated with cast steel cast
- Cut wire resists fracture due to its macro structure

A more consistent peening job is performed using cut wire

- A more consistent peening job decreases the number of defective parts

Cut wire is cleaner to used

- Reduces disposable cost of potential environmentally hazardous waste by product
- Reduces amount of time in (subsequent) operation

Recycle value of spent cut wire is greater

Peening with cut wire improves fatigue life performance

- Allows for better warranties
- Provides a better part and allows for higher market price

Cut wire is becoming the preferred peening media.

THE CONDITIONING PROCESS FOR G1, G2 AND G3

• The rounding or conditioning process is done at the Bakul casting Pvt. Ltd. plant by impacting the cut wire pellet against a specially designed hardness target number of impacts the more spherical pellet becomes :

As Example

- Cut wire designated G1 has a roundness factor greater than .70 and has been impacted for a minimum of 40 cycles.
- Cut wire designated G2 has a roundness factor greater than .75 and has been impacted for a minimum of 80 cycles.
- Cut wire designated G3 has a roundness factor greater than .80 and has been impacted for a minimum of 400 cycles.

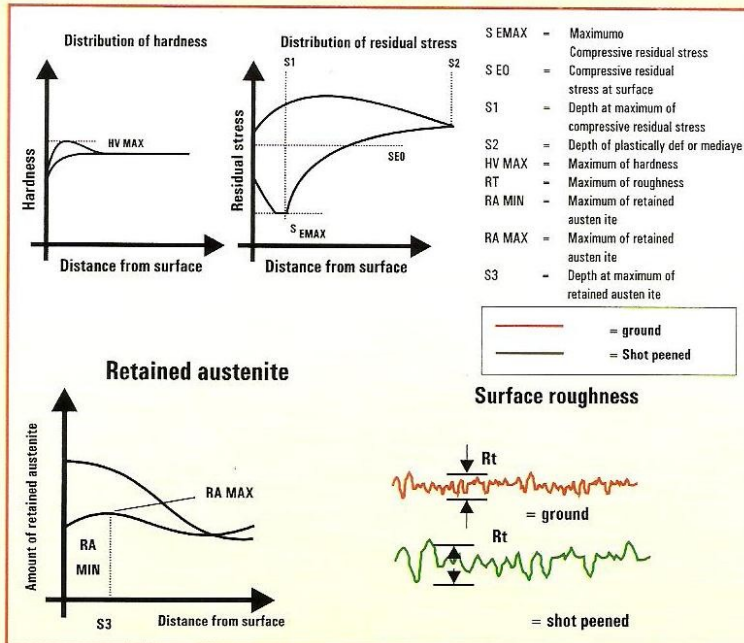
Ultimately, in the course of the peening operation, the following occurs :

- G1 becomes G2
- G2 becomes G3

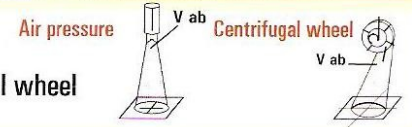
So choose the product with the lowest ACCEPTABLE level of factory conditioning for the peening job, and let your peening equipment complete the rounding process.

- The number of impact to achieve the above roundness factors are governed by the size and hardness of the wire.

Parameter and effects in the shot peening process



Type of machine
Air pressure or centrifugal wheel



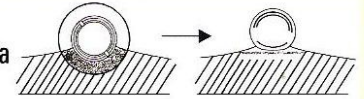
Velocity of impact
Angle of impact



Diameter of shot peening media
Density of shot peening media



Hardness of shot peening media

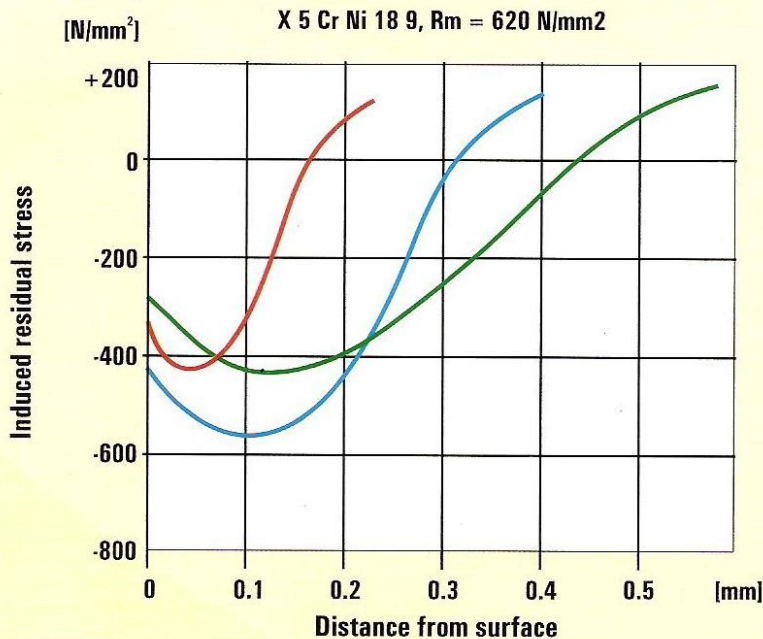


Amount of impacts
peening time

Coverage

Shot peening changes the residual stress, the superficial structure, the hardness and the microstructure in the surface layer. The effects are influenced by the type of material and the depth of the plasticized surface layer.

Distribution of residual stress induced by different shot peening parameters



Line	Shot media	Shot size [mm Ø]	Intensity [mm A]
Red	Glass beads	0.2	0.15
Blue	Cut wire shot	0.6	0.30
Green	Cut wire shot	1.0	0.40

In special materials, such as stainless steels, aluminium alloys, titanium alloys, magnesium alloys, nickel based alloys, powdered metals, shot peening also induces compressive residual stress with all the above mentioned advantages.



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ZINC CUT WIRE

SHOT

Designed specifically for Die Castings

CUT WIRE SHOT is an efficient abrasive media produced in either 99.95% pure zinc or alloyed for your special requirements.

APPLICATIONS :

Deburring & deflashing of zinc or aluminium die cast parts in both wet & dry operations. removal of impregnated sand from sand castings.

FEATURES :

Zinc Cut Wire Shot will not damaged soft-alloy cast parts & in most cases, parts need no other cleaning prior to a plating process. Plattzinc Cut Wire Shot creates less dust than either steel or aluminium abrasive. Provides temporary galvanic protection. A thin film of zinc up to 1.3 microns is deposited onto cast parts which will temporarily protect parts from corrosion. reusable & recyclable. Does not flash rust or red rust during storage. No premature breakdown or flaking. will not cause excessive wear & tear on finishing equipment.

MAGNESIUM :

It is also used for cleaning magnetic parts where a ferrous residue can cause problems. Wire Blast Aluminium & zinc are predominantly used for sand, stain & burr removal & product a glossy finish on the component. it is also used in wheel blast application where soft impact is desired during the blasting process. Magnesium, it is also used for clearing magnetic parts where a ferrous residue can cause problems.

APPLICATION

Deburring, etc

MATERIAL

99.99% Zn to DINEN 1179 : 2003

Other materials available upon request

MANUFACTURING STANDARDS/ APPLICABLE SPECIFICATIONS

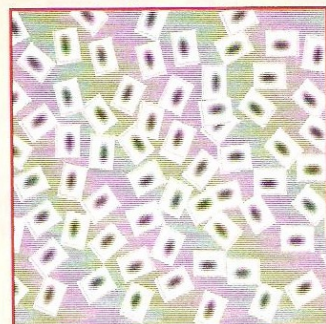
Subject to prior agreement

Sizes in mm (inch)

0,6(.023)	0,9(.035)	1,2(.047)	1,8(.070)
0,7(.028)	1,0(.041)	1,4(.054)	
0,8(.032)	1,1(.043)	1,6(.062)	

Other sizes available upon request

Grain Shape



Cylindrical

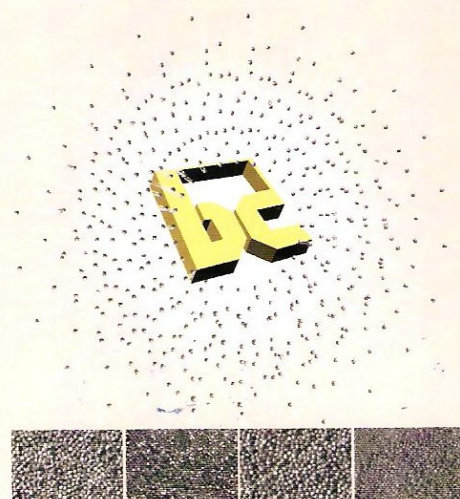
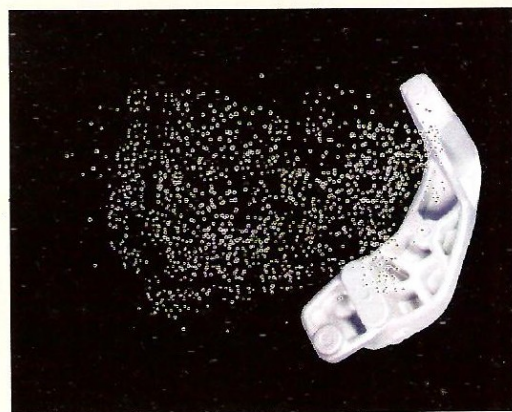
Material Hardness

Approximately 30-45 HV

Packaging

25 kg PE plastic bags on European pallet up to 1000kg Big Bags from 500 to 1000 kg on non-returnable pallet 200 liter barrels from 800 to 1000 kg

Other packaging available upon request



All Design Add # 98266 06280

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Bakul Castings Pvt. Ltd.

"Cut Wire Shots for Blast Cleaning & Shot Peening Applications"

We are committed to generating value for our customers related to Cost-Saving and Eco-Friendly operations. Innovative partnerships and the utilization of latest technology have made this company a success. We reflect a proactive approach to environmental regulations, and the determination to supply outstanding environmentally-friendly products.

As a lead manufacturer with keen awareness of our responsibility to the environment, Bakul Castings is also committed to the development of quality products, more efficient manufacturing methods and actively takes a leadership role in Blast Cleaning and Shot Peening operations.

Our motto being "Customer Satisfaction" through cost-savings and eco-friendly products & services, we have selected team of dedicated staff who are striving for giving reliable, efficient and costs effective service to our customers. We always ensure that our staff are experienced and are professionally trained to provide quality services to our customers at all the times.

We at Bakul Castings will continue to explore, expand and grow professionally in Blast Cleaning and Shot Peening universe by providing high quality products & services to all our valued customers.

Bakul - DEDICATED TO SHOT PEENING AND
BLAST CLEANING UNIVERSE !



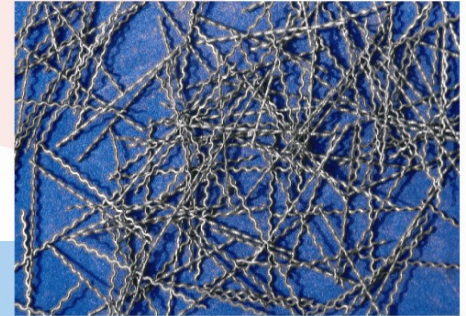
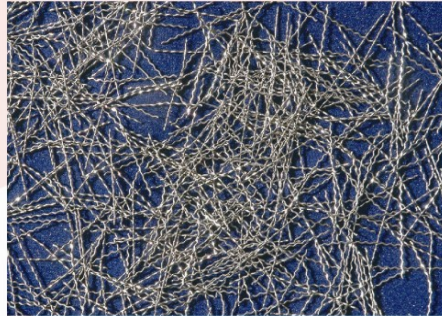
Bakul Castings Pvt. Ltd.

Benefits of Using Fiber in Construction & Infrastructures

Steel Fiber Reinforced Concrete (SFRC)

Physical Properties modified by Steel Fibers

Physical Properties	Beneficial effect
Tensile resistance	Up to 1,5-3 Times
Bending resistance	Up to 3,5 Times
Compression resistance	Up to 1,3 Times
Impact resistance	Up to 10 Times
viscosity resistance	Up to 10-20 Times
Deform ability	At 2-10 Times
Cavitations resistance	Up to 3 Times
Abrasion resistance	Up to 2 Times
Frost resistance	Up to 1,5-2 Times
Heat resistance	Up to 5-7 Times
Corrosion resistance	In 2 Times



Save Labour by 25-27%
Save Material Cost by 20%



**INDUSTRIAL
SLABS**



**SHOTCRETE
UNDERGROUND**



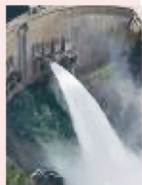
TRANSPORTATION



RAILWAY SLIPPER



**COMPOSITE
METAL DECKS**



Manufacturers & exporters :



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Bakul Castings Pvt. Ltd.

Steel Fiber Reinforced Concrete (SFRC)

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General Information & Application

Fibers are playing an increasing role as the reinforcing medium of choice for concrete construction. Steel fiber reinforced concrete (SFRC) Used now Expanding beyond Pavement applications, into areas where the reinforcing specification has historically been bars or fabric. With development in steel fiber technology SFRC performance characteristics include significant ductile behavior and enhanced tensile, Flexural, Shear and comprehensive strengths.

Compared to historically reinforced concrete, SFRC Exhibits greater crack resistance & control, durability, fatigue life resistance to impact and gouging, shrinkage thermal shock and seismic ductility characteristics.

Depending on the specification of the concrete and the dosage rate of steel fibers, the various physical properties of concrete may be modified by the following degree, as shown in the below.

Physical Properties modified by steel fibers	
Physical property	Beneficial effect
Tensile resistance	Up to 1,5-3 times
Bending resistance	Up to 3,5 times
Compression resistance	Up to 1,3 times
Impact resistance	Up to 10 times
Viscosity resistance	Up to 10-20 times
Deformability	At 2-10 times
Cavitations resistance	Up to 3 times
Abrasion resistance	Up to 2 times
Frost resistance	Up to 1,5-2 times
Heat resistance	Up to 5-7 times
Corrosion resistance	In 2 times

Steel fiber is a primary and secondary reinforcing medium and is most suited to thin sections and plates where stresses are highly variable. these typically occur in pavement, shot Crete, bored piers and pre-cast elements. Other application include its use in decking systems with toppings, refractory applications, seismic and explosive resistant structures, machinery bases, chemical containment, mine blocks and other suited areas.

Moreover, the use of SFRC results in decrease of labors input by 25-27% and economy of building materials per 1 cubic meter of ready product.

PAVEMENTS

Steel fibers have been successfully used for pavement applications in many hundreds of thousands of square meters of concrete. It has been used as the primary reinforcement for commercial and industrial pavement projects such as, heavy duty workshop floors, heavy duty tiles, roads, roundabouts, airport runways, timber bridge and jetty overlays, boat and barge ramps, hardstand areas, bike paths, factory and warehouse floors.

The use of steel fibers reduces labors and material costs because it allows rapid site preparation and speedier concrete placement with the elimination of conventional reinforcing. All of these features combine to make SFRC more economical both during construction and over the life of the pavement.

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SHOTCRETE

Steel fiber reinforced shot Crete has now become an accepted method of ground control around the world. Major mining, infrastructure and capital works using shot Crete have a large component that is steel fiber reinforced.

Steel fiber reinforced shot Crete offers the client a product which is easier and safer to apply, cost effective and superior in strength and toughness than conventional forms of reinforcing. Some key applications for reinforced shot Crete are embankment stabilization, tunnel and cavern linings, erosion control, dam and water course lining, pipeline coatings and architectural features.

Significant cost savings result from productivity improvements, as there are none of the delays commonly encountered by placing conventional mesh reinforcement. Other obvious benefits are the more efficient use of concrete as the shot Crete follows the natural surface contours of the ground, this results in a reduction of cross-section as steel cover is no longer an issue.

PRECAST PRODUCTS

With pre-cast products, SFRC has a special place in thin walled products. There is no mesh to place, and often mesh can not be placed where it is required or it needs greater cover, which increases the section size.

Comprehensive research into SFRC has placed BAKUL in a position as one of the world's most efficient and technologically advanced steel and synthetic manufacturers and suppliers. Focusing on innovation and flexibility in the development of fibers, BAKUL is able to provide the optimum fibertype for a variety of applications. With over 25 years of experience and training in construction technology, the engineers at BAKUL continue to provide the most appropriate solution to concrete reinforcing.

BAKUL philosophy of fiber design has at its core the focus of maximum user friendliness in all stages of construction, including construction technology effects and cost effectiveness. A commitment to, and investment in research has led the expertise developed by BAKUL being sort after by engineers and construction companies around the globe.



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