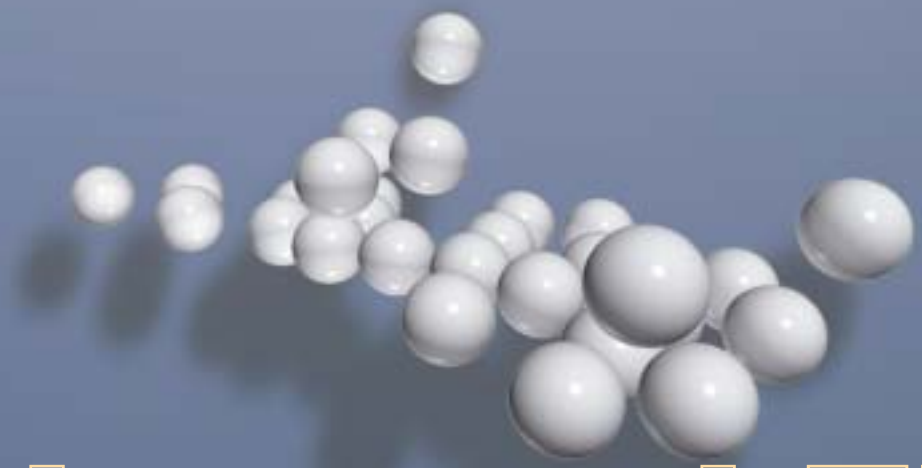
Zirblast
Zirshot



Zirblast and Zirshot

Ceramic beads for impact surface treatments

- Enhanced work piece quality and surface finish
- Lower production costs
- Support from a competent team

Try them you'll be convinced!

SEPR

SEPR BGP GROUP

Zirblast and Zirshot
for impact surface treatments

Société Européenne des Produits Réfractaires (SEPR) manufactures Zirblast and Zirshot ceramic beads for impact surface treatment applications by a unique fusion process of oxides at very high temperature.
In addition to giving superior treatment quality with lower production costs, these beads offer enhanced operating conditions and greater versatility.
They are equally effective whether used in air blast (dry or wet) or wheel-blast systems.

I/ Zirblast and Zirshot beads enhance work parts quality and surface finish

Three main factors contribute to these qualitative improvements:

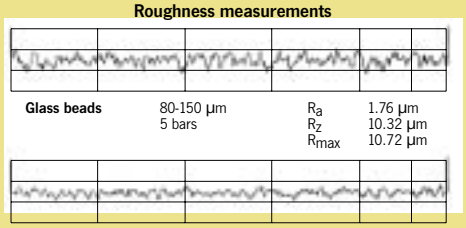
1/ no contamination of treated surfaces

Ceramic beads do not contaminate treating parts by embedment of reactive particles. Their exceptional mechanical properties (toughness, impact resistance, hardness, elastic properties) allow them to maintain their initial shape without shattering and without being subject to strain hardening, even after being used for a long period of time.

2/ uniform, reproducible treatment quality

The results are uniform over the entire surface of the parts. Above all, treatment quality is consistent and reproducible, part after part. Surface finish is of consistent quality from one production run to the next.

Compressed Air – Stainless steel samples
Roughness measurements



Glass beads	80-150 µm 5 bars	R_a R_z R_{max}	1.76 µm 10.32 µm 10.72 µm
Zirblast Ceramic beads	70-125 µm (B120) 5 bars	R_a R_z R_{max}	0.99 µm 5.83 µm 6.08 µm

Because of their elastic properties, ceramic beads rebound several times during the blasting process. This property makes them ideal for treating parts of complex geometry and areas that are inaccessible using conventional treatment media.

3/ no damage to the parts

Their relative density is optimal:
– higher than that of glass beads, for higher treatment intensity,
– lower than that of steel shot.
The high rate of coverage of ceramic media makes it possible to treat only the necessary surfaces with no damage to the rest of the part. For example, the edges and markings of glassmaking molds or the pattern of tire molds remain intact.

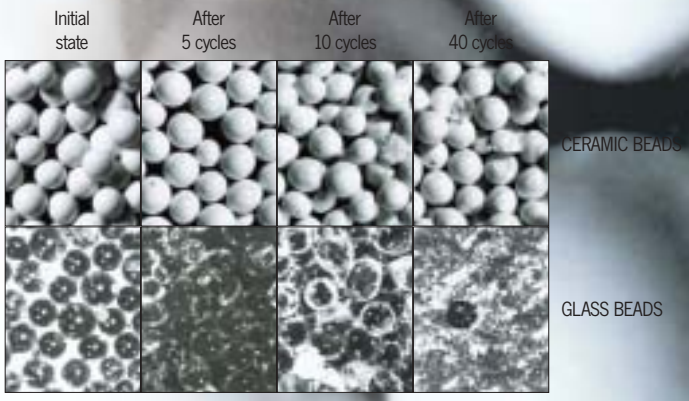
The finish condition (after cleaning, descaling or stress relieving of welds) is remarkable.

II/ SEPR ceramic beads reduce operating costs

Cost reduction is a key priority for production managers, and the feedback from our customers is unanimous: the use of SEPR ceramic beads drives down production costs significantly.

1/ consumption of ceramic media is one-tenth that of glass media

Because of their high toughness, ceramic beads do not break into small particles during use, thereby minimizing the use of the dust collection system. Moreover, the beads themselves can be recycled more times, extending their service life.



Bead behavior during use.
Under identical operating conditions, glass beads are destroyed after 40 treatment cycles (turned into dust), while nearly all ceramic beads remain intact.

2/ enhanced working conditions boost operator productivity

Freedom from dust ensures excellent visibility inside or outside the blast rooms and keeps beads flowing smoothly. As a result, operators spend less time on each work piece and on machinery adjustments.

3/ equipment lasts longer

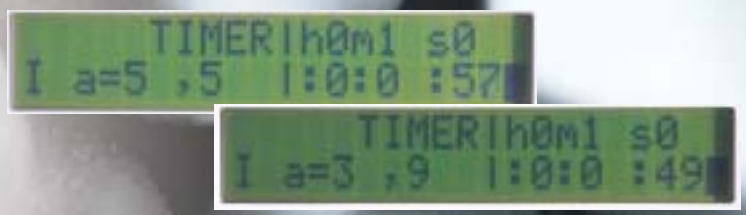
The dust generated by traditional media creates a highly aggressive environment for machinery. With ceramic media, the reduction or elimination of dust means longer service life for the equipment. Wear parts last longer, making for more streamlined maintenance programs.

The use of ceramic beads (left) vs. steel shot (right) leads to a significant difference in abrasive wear on bakelite.

Unlike steel shot, Zirblast and Zirshot beads keep their smooth, spherical shape during treatment. These stable properties help reduce wear on machinery and tooling, especially in wheel-blast systems.

4/ energy consumption is reduced

The low relative density and optimal effectiveness of ceramic beads, when delivered even at low velocities, allow the use of lower air pressure in air blast systems or a lower power requirement in wheel-blast systems. These savings are coupled with enhanced treatment quality and higher productivity.



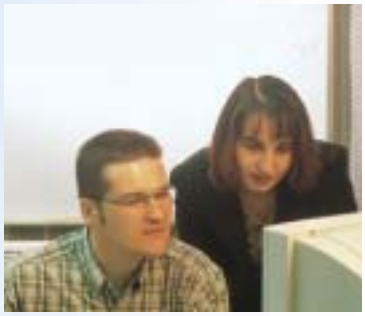
Power consumption (amperage) can be reduced while still improving treatment effectiveness.

5/ waste production is limited

This feature is the direct result of the lower bead consumption and reduced production of dust, which usually requires costly disposal.

III/ Technical support: a vital component of the SEPR offering

The use of SEPR ceramic beads in an existing installation or a new machine is preceded by trials to determine the most appropriate operating conditions. SEPR provides technical support during pilot (pre-production) testing to determine the main settings and parameters. The user is then given a copy of the testing procedure or can arrange to have assistance on site.



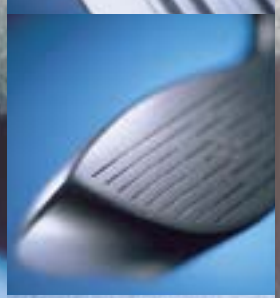
If necessary, full-scale tests can be conducted at the SEPR showroom, in the company's plant near Avignon at Le Pontet (France).

– the customer or potential user may send a representative to attend the testing and thus acquire all information and data needed for the use of ceramic beads in his application, or

– tests can be conducted according to a program defined jointly with the customer, to be followed up by the issuance of a test report and recommendations for use.

Backed by its experience in the field of impact surface treatment, SEPR has a highly selective testing policy, formulating proposals only for tests likely to prove technically successful and pave the way for economic progress.

SEPR also offers the support of a Research Center where the technical means are concentrated: scanning electronic microscope, microprobe...



IV/ Zirblast and Zirshot: a wide range of applications

Electrofused ceramic beads are now used in many sectors of industry, such as:

- Vessel construction: specially for stainless steel and aluminum components and assemblies for the textile, food, nuclear, chemical and other industries. The beads are used for:
  - cleaning and finishing of surfaces
  - stress-relieving of welds
  - shot-peening of reactor vessels to prevent and reduce the spread of cracks as well as stress corrosion
- Glass-making, tire-making and extrusion of lightweight alloys or plastics. Beads are used to clean molds, dies and tools.
- Foundry:
  - deburring of thin and fragile parts
  - cleaning of molds, core boxes and tools
  - finishing of parts made of metal alloys
  - treatment of hard-to-reach zones (i.e., engine block cooling circuits)
- Cryogenic deburring of plastic parts, compacting of plasma coatings, cleaning, surface preparation of mechanical parts, aluminum cylinder heads, surgical instruments, medical prosthesis, eyeglass frames.
- Automotive industry:
  - scale-removal: universal joints, welds, etc.
  - polishing or repair of surfaces: alloy wheels
  - refurbishment: alternators
  - shot peening: springs, pinion gears

V/ Ceramic beads for both air-blast and wheel-blast systems

Zirblast and Zirshot ceramic beads enhance the performance of each projection systems:

Wheel-blast systems

When introduced into the center, the media is first accelerated by an auxiliary turbine then distributed through a control cage to the main blades. The beads are then accelerated by centrifugal force, and move along the blades to the end, where they are hurled against the parts. Optimal performance of Zirblast and Zirshot ceramic beads is achieved using a low delivery velocity coupled with the right media flow rate, and the smallest bead size possible.

Benefits: the use of a high flow rate of small beads at a low projection velocity increases the number of impacts per unit of surface area (coverage), thereby improving the quality of the surface treatment while reducing the energy requirement.

Ceramic beads can be used with most existing wheel-blast systems, including relatively old models. The best performance can be achieved using recent models designed with tight tolerances, especially when using the smallest diameter beads.

Air-blast systems

Dry process with direct pressure systems
(sandblasting-type system)

The media is channeled through a pipe and then accelerated through a nozzle. There is a wide adjustment range for the media flow rate, which is fairly independent of the compressed air pressure.

Benefits: by increasing the nozzle and pipe diameters and reducing pressure to ensure a constant rate of air consumption, the bead flow rate is increased substantially, leading in turn to higher productivity. Wear is also reduced because the bead delivery velocity is lowered.

Dry process with venturi guns (Giffard suction effect)

After fluidization in an air stream, the beads are sucked up into a pipe at the nozzle inlet, then accelerated through the nozzle. There is little possibility of adjusting the media flow rate because it is directly correlated to the air injection pressure.

Benefits: the small size and smooth surface of SEPR ceramic media reduce wear of the air injector and nozzle components and allows an increase of the throughput.

Wet or semi-wet process, using venturi guns with or without force-feed pump or direct pressure systems

Wet processes work on a principle similar to that of dry air-blast systems, except that the media is mixed with water, either continuously or in a batch mode (metering water and media) for each blast cycle.

In these processes, optimal performance of Zirblast and Zirshot is achieved by increasing the concentration of beads in the water.

Wet processes allow for gentler treatment and generate far less dust than dry air-blast systems using fragile media. Zirblast or Zirshot beads in a dry air-blast process, however, enable the higher costs of wet processes to be avoided.

Benefits: Zirblast and Zirshot ceramic beads offer:

– enhanced productivity through rapid sedimentation and rinsing,

– low wear of force-feed pumps and mixing pumps, even using a high concentration of beads in water,

– no wetting agent, rust inhibitor or emulsifier is necessary, even for the smallest ceramic beads.

Recycling and cleaning systems

All recycling and cleaning systems are compatible with ceramic beads. The parameters and settings must be adjusted based on the relative density of ceramic beads, namely:

– air separators adjusted to reduced air flow velocity, wider air stream and enlarged expansion pot,

– no air inlet at the base of cyclone separators,

– spiral-type classifiers are not essential for peening applications,

– adaptations in the size, the vibration frequency and amplitude of sieves.

It is rarely necessary to provide a cast-iron casing for shot-peening cabinets; austenitic manganese steel plates in the most exposed areas are adequate. A polymer lining offers suitable protection for zones of indirect impact

VI/ Proof through testing

The SEPR showroom offers an extensive range of services. Current and potential users of Zirblast and Zirshot ceramic beads can contact:

- the sales manager, who initiates the test program and accompanies the customer to industrial implementation of the product,
- or the application engineer, who monitors testing, using the laboratory's analytical and monitoring resources.

The equipment at the showroom is designed to simulate industrial conditions as closely as possible. It includes:

- a multi-purpose wheel-blast machine,
- an air-blast installation complete with compressed air supply,
- a laboratory-scale gravity-feed suction system.

The showroom is also equipped to treat pre-production parts, to define the operating conditions for the ceramic beads or determine the tunning that will optimize production costs.

Characteristics

Ceramic beads are produced by high-temperature electro-fusion of oxides. Two grades are available:

– Zirshot meet the demanding standards of the aerospace industry. They are designed for shot peening, peen forming, and straightening applications. This grade is available in bead sizes from 100 to 1 180 µm,

– Zirblast are designed for all other impact surface treatment applications. This grade is available in bead sizes from 0 to 850 µm.

These blasting media are white in color, spherical in shape, and smooth in surface. They have a relative density of 3.8 and a Vickers hardness of 7 GPa (under 1 kgf).

Typically, their crystallographic analysis shows the following:

- Monoclinic zirconium oxide: 68%
- Vitreous phase: 32%

The bead internal structure consists of a compact assembly of a crystalline zirconia network tightly interlocked with the amorphous silica phase.

These materials are unaffected by moisture and do not form lumps; thus they flow easily. Thanks to their high-impact and wear resistance, they resist breakage. They are chemically inert and therefore will not contaminate the surface of the parts.

The organization of SEPR

The SEPR sales network counts with a large number of agents and distributors ready to serve customers and find solutions to their particular needs. It revolves around eleven worldwide branch offices that are directly linked to Saint-Gobain. SEPR's Ceramic Beads, Grains and Powders department has earned a reputation for its prompt, reliable supply.

Its Application-Products department has analytical and testing resources at the company's Research Center. In addition to providing after-sales service to users of ceramic beads, the department provides ongoing support to the entire sales network.

Manufacturing operations related to Zirblast and Zirshot beads are conducted in line with a strict quality assurance system and in compliance with SEPR technical specification No. DS SP. BE01 and DS SP. BD11.

In addition, the Zirshot line meets the following specifications of the international aeronautics industry:

– NF L 06 831

– SAE J1830

– AMS 2431 and 2431/7

– MIL-S-13165C

Zirshot is also approved by numerous players in the aerospace industry and by airline companies.

The Quality Control System in force at the Le Pontet plant has been ISO-9002 certified since 1994.

Aerial view of the plant: the Le Pontet plant in southern France is the largest production facility of SEPR. Its output spans a broad range of electrofused refractory products as well as ceramic beads, grains and powders.

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