Plastic blasting and deflashing media in shot blasting treatment

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Introduction

Shot blasting is a leading method among modern methods of surface treatment. It is generally used for surface treatment of different objects, constructions and installations prior to anti-corrosive coating. It is also used for removal of old protective coatings, removal of corrosion, obtaining the desired surface texture, injection mould treatment, deflashing workpieces from moulding machine, etc. The development of new manufacturing methods forces also the dynamic development of shot blasting.

The development of shot blasting covers both the development of machines known as shot blasters and media used in this treatment called blasting media. Modern shot blasting uses a variety of media. They can be divided into metal, mineral, plastic, agricultural and special media [1]. Currently the plastic blasting media are developing most dynamically. Their application, especially in domestic industry, is insufficient.

Introduction of plastic blasting media for shot blasting was a result of seeking mild blasting media that could remove layers from the surface without affecting its structure. Blasting medoa must have been selected to ensure that they were harder than removed layer, but softer than surface. The important reason behind this search was striving to eliminate tedious chemical methods for removal of old paint coatings from fragile aluminium or composite surfaces. It was most important for aviation industry, where surface treatment methods known as "Plastic Media Blasting" were developed.

Other important factor forcing the development of blasting methods that use plastic media and introduction of their new varieties to industry is the dynamic development of plastic and rubber industry. Moulds require cleansing, while stamped pieces requires deflashing using methods that eliminate manual work.

Types of plastic media

Plastic blasting media may be divided based on their manufacturing process, type of plastic used or their applications. Based on the manufacturing process they can be divided into two groups. First group, Plastic Blasting Media, contains media manufactured by grinding that are further classified based on their size into particle classes of various plastics, mostly represented by duroplasts. Second group, Deflashing Media, consists of thermoplastic resins formed into regular blocks, mostly cylinders, cubes or balls of different sizes. Each of these groups has different range of applications.

Media manufactured by grinding of intermediate products are collection of irregularly shaped particles that are mostly used for surface cleaning of products emerging in plastic and rubber processing as well as removal of old paint coatings and adhesives. Regularly shaped media are mostly used for deflashing of plastic and rubber work pieces after their moulding and removing from the moulds. Within the shots of formed particles there is a special variety of shots used for cryogenic treatment of elastomers, mainly rubber.

Irregularly shaped media

Particles are produced from the new polymers (material in form of sheets or blocks) manufactured especially as intermediate product or waste product from manufacture of such plastic products as buttons, dinnerware, electrical products, packages, etc.

Eight types of plastic blasting media are currently used in industry. They are commonly marked by consecutive Roman numerals from I to VIII divided as follows:

Type I – polyester media
Type II – UF (urea-formaldehyde) media
Type III – melamine media
Type IV – phenol formaldehyde media
Type V – acrylic media
Type VI – polyallyl diglycol carbonate media
Type VII – starch-g-acrylic media
Type VIII – amino resin nanoparticles reinforced with fibers media

The requirements for above mentioned plastic blasting media are specified in US standard MIL–P–85891A with later amendments [2]. These requirements focus on application of blasting media for removal of old paint coatings, which is an important issue in aviation industry.

The basic criterion for blasting media assessment is their material identification. Resins used for blasting media manufacturing cannot contain any additives (except pigment), including inorganic fillers. Only anti-static additives can be and in some cases are required to be used.

The chemical purity of resins shall be confirmed by IR spectroscopy tests. The spectrogram of examined medium shall be consistent with the spectrogram of pure plastic. Reference IR spectra can be found in MIL-P-85891A standard. Figure 1 shows example IR spectrum for melamine media (type III), while Figure 2 – acrylic media (type V).

IR spectroscopy registers values of specific vibrations and based on them it is possible to identify functional groups of organic compounds. This method allows to confirm type of plastic and its chemical purity.

A common requirement for all blasting media is that they contain only traces of chlorine, other requirements related to chemical purity are presented in Table 1.

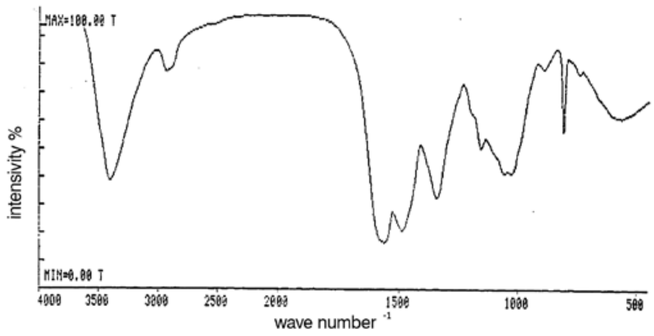

Fig. 1. IR spectrum of melamine media (type III) [2]

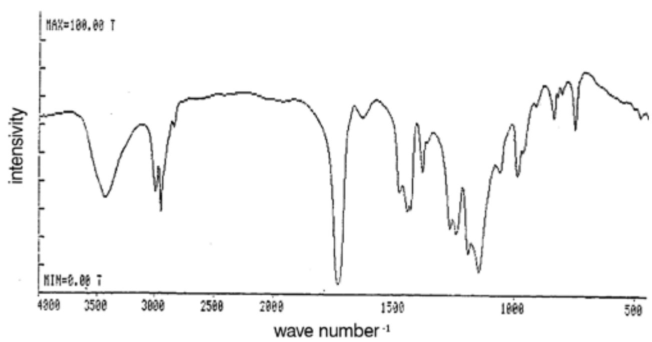

Fig. 2 IR spectrum of acrylic media (typ V) [2]

Table 1

Maximum ash and iron content (% weight) for individual types of blasting media[2]

Parameter	Type I	Type II	Type III	Type IV	Type V	Type VI	Type VII	Type VIII
Ash	1.0	2.0	2.0	2.0	0.5	0.5	1.0	2.0
Iron	0.05	0.10	0.10	0.10	0.05	0.05	0.05	0.05

Polyester media (type I) are produced from polyester resin, i.e. product of radical copolymerization of monomer with unsaturated polyester resin [3]. As monomer styrene is usually used, while as unsaturated polyester resin – product of polycondensation of maleic and phthalic anhydride with addition of glycol. In the final product polyester chains are bridged by styrene. Cured polyester resin is a product of 1.15-1.25 g/cm^3 density and 34-42 of Barcol hardness scale.

Urea media (type II) are produced from UF (urea-formaldehyde) resins classified as aminoplasts. They are product of condensation of urea with formaldehyde from formalin. They are cross-linked in acidic environment under high temperature producing colourless plastic of 1.47-1.52 g/cm^3 density and 54-62 of Barcol hardness scale.

Melamine media (type III) are produced from melamine-formaldehyde resins and are classified, like type II, as aminoplasts. They are products of polycondensation of formaldehyde and melamine. Final product is a plastic of 1.47-1.52 g/cm^3 density and 64-72 Barcol hardness. Melamine media are the hardest plastic blasting media.

Phenol-formaldehyde media (type IV) are produced from phenol-formaldehyde resins classified as phenoplasts. It is one of best known plastics widely used in industry. It is produced by pressing liquid resols and novolac powders in mixture with urotropine and subsequent thermal curing. Obtained product has density of 1.47-1.52 g/cm^3 and Barcol hardness of 54-62.

Acrylic media (type V) are produced from thermoplastic poly(methyl methacrylate) PMMA, i.e. product of methyl methacrylate polymerization. This is the only thermoplastic plastic among plastics used for blasting media in this group. Its glass transition temperature is 105°C. Below this temperature polymer is rigid, brittle and glass-like. Acrylic medium has density of 1.10-1.20 g/cm^3 and Barcol hardness of 46-54. They are widely used media in shot blasting removal of old paint coatings.

Polyallyl diglycol carbonate media (type VI) are produced from plastics known as PADC or CR39. It is a product of polymerization of allyl carbonate with diethylene glycol. Presence of allyl groups group causes cross-linking of polymer resulting in duroplast. Final product, is relatively soft plastic of 20-30 Barcol hardness and 1.28-1.39 g/cm^3 density.

Starch-g-acrylic media (type VII) are hybrid media, copolymers of acrylic plastic and starch. It is a plastic developed specially for removal of paint coatings from fragile metal and composite surfaces. It is fully biodegradable and is protected under USA patent no. 5780619 of 1996 [4]. They are relatively soft media of 65-90 Shor D hardness and 1.38-1.43 gm/cm^3 density.

Fiber-reinforced amino resins media (type VIII) are produced from composite obtained from amino resin nanoparticles, cellulose fibers and acrylic resin [5]. These media are produced using nanomaterial technology methods. For the production of particles the plastic of 54-60 Barcol hardness and 1.36-146 g/cm^3 density is used.

Type I and type VI are among the softest and mildest media, while melamine medium (type III) is most aggressive. Most popular and most widely used is urea medium (type II) – its share in plastic media is estimated to be 60%. Figure 1 shows the appearance and the shape of this media particles.

Fig. 1. Urea media (type II)

Characteristic of blasting media with irregular particles

For technical applications media with irregular particles can be found as different particle fractions in particle dimension range from 100 to 2000 μm. This dimension range has been divided into 9 particle fractions, from which the thickest are coded as 12/16 (1700-1200 μm), while finest 60/80 (250-180 μm). The requirements for granulation of individual particles fractions of plastic media are presented in Table 2.

These requirements were presented as maximum permissible values (by % weight), that shall retain or pass through standard screens during lab tests for evaluation of granulation of given particle fraction. Practically, not only the blasting media fraction code is given, but also range of basic fraction size distribution.

The densities of discussed above 8 types of plastic blasting media in comparison with other blasting media are low and comparable with agricultural blasting media. This important property of blasting media indicates weight of single particle and therefore kinetic energy of blasting media in shot blaster. For the same speed of particles

Table 2

Requirements concerning particle size distribution (maximum values, by % weight) [2]

US standard screen size	Mesh size in μm	12/16 1700-1200μm		12/20 1700-850μm		16/20 1200-850μm		20/30 850-600μm		20/40 850-420μm		20/50 850-300μm		30/40 600-420μm		40/60 420-250μm		60/80 250-180μm	
		Retain	Pass	Retain	Pass	Retain	Pass	Retain	Pass	Retain	Pass	Retain	Pass	Retain	Pass	Retain	Pass	Retain	Pass
10	2000	0.1	–	0.1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
12	1680	5.0	–	5.0	–	0.1	–	–	–	–	–	–	–	–	–	–	–	–	–
16	1190	–	20	–	–	15	–	0.1	–	0.1	–	0.1	–	–	–	–	–	–	–
20	853	–	5.0	–	20	–	20	15	–	15	–	15	–	–	–	–	–	–	–
25	710	–	–	–	–	–	–	–	–	–	–	–	–	0.1	–	–	–	–	–
30	590	–	–	–	5.0	–	5.0	–	20	–	60	–	75	15	–	–	–	–	–
35	500	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.1	–	–	–
40	420	–	–	–	–	–	–	–	0.5	–	20	–	–	–	20	5.0	–	–	–
50	297	–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	0.1	–
60	250	–	–	–	–	–	–	–	–	–	5.0	–	–	–	5.0	–	20	5.0	–
80	177	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	20
100	149	–	1.0	–	1.0	–	1.0	–	2.0	–	2.0	–	2.0	–	3.0	–	5.0	–	5.0

hitting the treated surface the factor that determines its energy is the weight of single particle. Therefore, plastic blasting media are suitable for mild, non-aggressive shot blasting.

Bulk density of given particle fraction of media depends on particle shapes and density. This is important qualitative parameter that is used as a basic criterion for evaluation of blasting media quality, including plastic blasting media. Table 3 presents bulk densities of all 8 type of plastic blasting media with irregular particles.

The values of bulk densities for these blasting media are in a range of 0.62-0.92. They are therefore relatively light blasting media.

Table 3

Bulk densities (g/cm³) of plastic blasting media

Typee of media	Bulk densities range
Type I	0.69-0.77
Type II	0.78-0.92
Type III	0.78-0.92
Type IV	0.78-0.92
Type V	0.69-0.77
Type VI	0.62-0.75
Type VII	0.64-0.77
Type VII	0.62-0.72

Product range development and applications of media with irregular particles

The interest in plastic blasting media has increased dynamically in early 1980s. It was especially true for American aviation industry [6], where various plastics were evaluated as viable media for removal of old paint coating from fuselages and aviation components and defined as an alternative to chemical methods for old paint removal. At the time only media of type I (polyester), II (urea) and III (melamine) were available. As a result of this research in 1988 other media were applied in industry, i.e. type IV (phenol-formaldehyde) and type V (acrylic). At this time it was determined that using type II media for paint coating removal causes undesirable effects for aluminium surfaces by increasing number of fatigue cracks. Application of acrylic media did not cause similar effects, but the treatment was less efficient. Polyester media (type I) are rarely used for removal of old paint coatings because it is a softest medium and due to that its effectiveness is insufficient.

In 1990, two more media were introduced for blasting treatment: type VI (polyallyl diglycol carbonate) and type VII (starch-g-acrylic). In next years these two media were covered by MIL-P-85891 A standard.

Type VII is of special interest for removal of old paint coatings. It was introduced to aviation industry by leading aviation manufacturers. It is fully biodegradable product, what is important role environmentally.

The latest achievement in the field of development of optimum blasting media for removal of paint coatings are blasting media that are product of modern nanotechnology, described as type VIII. Their manufacturer, US Technology Corporation [5] named them Magic. They were introduced in aviation industry for removal of paint coatings from composite, carbon fibres, graphite and thin aluminium surfaces. Modern applications of this group of blasting media are mainly:

- removal of paint coatings from fuselages
- removal of paints coatings from aluminium, wood and glass fiber-reinforced boat hulls
- deburring and deflashing of work pieces without influencing their surface and structure
- deflashing optical sensors from resin flashes occurring during the manufacturing process
- deflashing the surface of electronic elements and preparation of surface for printed circuits
- deflashing of moulds in plastic, rubber and glass industry without the risk of damaging edges of moulds
- removal of deposits from layered structures reinforced with carbon and glass fiber
- removal of deposits from motor surfaces
- removal of adhesive residues from glued elements without.

Plastic deflashing media with regularly shaped particles

Plastic media with regularly formed shapes are mostly particles in form of cylinders, cubes and balls. They are formed from thermoplastic plastics. Polyamide and polycarbonate media are commonly used, while polyoxometalate and polystyrene media are used in limited applications [7]. Table 4 presents properties of these media.

Table 4

Selected properties of deflashing media with formed shapes of particles

Parameter	Polyamide 6 PA	Polycarbonate PC	Polyoxometlate POM	Polystyrene PS
Melting point, °C	215	225	165	190
Density, g/cm³	1.14	1.20	1.40	1.05
Hardness, MPa	60	95	85	75

Polyamide media, PA are products obtained from polyamides, also known as nylon. Their chains are built from monomers containing characteristic moiety –CO-NH-. Polyamide 6 is widely used for manufacturing of blast cleaning media, it is product of polycondensation or anionic polymerization of caprolactam. The obtained product is polycaprolactam. Polyamides are very crystallisable and this is additionally increased by the tendency to form hydrogen bonds between oxygen and nitrogen atoms of two different amide groups. Due to that they are rather hard, abrasion resistant and not brittle. PA have high impact resistance (75 kJ/m²). PA are used for deflashing in form of cylinders or cubes of natural or red colour (Fig. 2). They contain anti-static additive introduced during moulding stage. Thus polyamide media are composed of pure polyamide 6, anti-static additive and optionally less than 1% weight of red pigment.

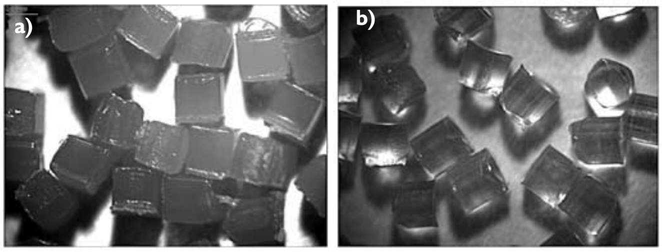

Fig. 2. Polyamide media PA: a) 1 mm red cubical; b) 1 mm natural colour cylindrical

Polycarbonate media, PC, are produced from thermoplastic plastics obtained by polycondensation of phosgene with BPA or other phenols or glycols. They are polyesters of carbonic acid. Final product has high impact resistance (60 kJ/m²), high hardness and thermal stability in broad temperature range from -100°C do +135°C. Its melting point is 225°C. Polycarbonate media contain benzene-based anti-static additive. They are used in deflashin in form of cylinders or cubes, as naturally transparent or blue coloured particles (Fig. 3).

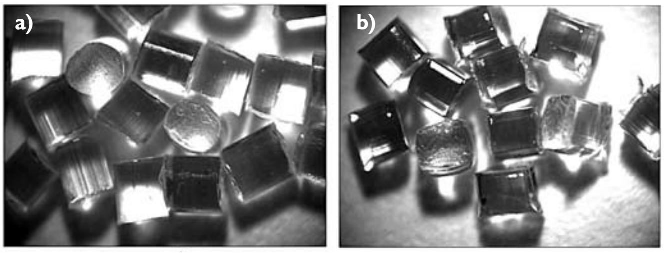

Fig. 3. Polycarbonate media PC in form of 1 mm cylinders (a) and cubes (b)

Polyoxometalate media, POM are blasting media produced from plastic also known as polyacetal or polyformaldehyde. They are obtained by polymerization of formaldehyde or trioxane (cyclic trimer of formaldehyde). Their mechanic properties depend on their crystallinity. High crystallinity (70-75%) increases hardness and mechanical resistance. These media have high impact resistance (75 kJ/m^2). Like other media, they contain anti-static additive (amine-based). They are usually used in form of orange coloured cylinders (Fig. 4).

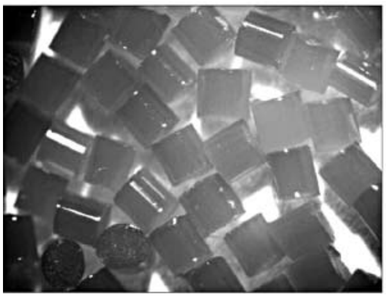

Fig. 4. Polyoxometalate media POM in cylindrical form (0.85 mm)

Polystyrene media PS are formed as very fine spherical particles made of product of styrene polymerization with divinylbenzene that is colourless and slightly transparent polymer of very low density. It can be used in temperature range from -40°C to +75°C.

Geometrical characteristics of formed deflashing media

Normally this type of media are formed as cylinders or cubes, only polystyrene media can be found in form of fine spheres. As a principle, formed cylinders should have equal diameter and height (length). Individual manufacturers very often use different systems of division based on the size of individual particles. The basic range of 0.5 – 2.0 mm is divided into 5–6 different sizes, as shown in Table 5.

Table 5

Standard particle sizes of formed media in mm

Cubical			Cylindrical		
Media no.	Edge length	diagonal	Media no.	Cylinder side	diagonal
0.50	0.50	0.88	20	0.50 x 0.50	0.72
0.75	0.75	1.32	30	0.76 x 0.76	1.07
1.00	1.05	1.67	45	1.14 x 1.14	1.61
1.25	1.25	2.10	60	1.50 x 1.50	2.15
1.50	1.50	2.64	80	2.00 x 2.00	2.87
2.00	2.00	3.50			

The choice between cylindrical and cubical media depends primarily on the need to obtain specific efficiency of treatment. Cylindrical media, of the same nominal size as cubical ones, have much lower total length of cutting edges and smaller mass of single particle. Therefore, these media hit treated surface with respectively lower kinetic energy and it results in lesser efficiency of work piece treatment. Figure 5 presents length of cutting edges of particles with nominal size of 0.75 mm that are most commonly used.

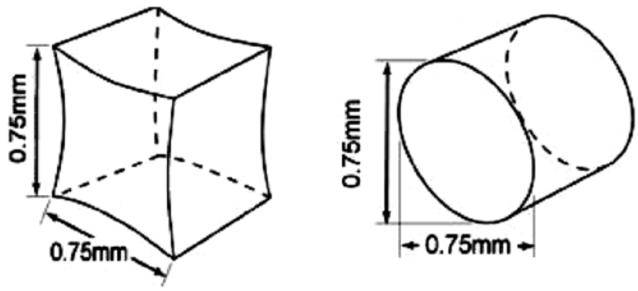

Fig. 5. Polycarbonate (PC) media cubical (a) and cylindrical (b): a) total length of cutting edges, 9.00 mm, weight of single particle 5.06 mg, b) total length of cutting edges, 4.7 mm, weight of single particle 3.98 mg

Polystyrene media are smallest spherical particles for the treatment of fine work pieces. They are offered by various manufacturers in specified particle size ranges with maximum diameter of 1.7 mm. Table 6 presents full collection of currently offered spherical polystyrene media.

The bulk density of particles of given size depends on their density and shape. In case of formed blasting media with the same form of particles, bulk density depends only on material density. Table 7 presents values of bulk densities of selected cylindrical media. Formed blasting media are also characterized by very low bulk densities. This is due to the low density of these plastic materials.

Table 6

Geometrical parameters of spherical polystyrene media

Media name	Mesh size	Particle size range, mm
PS-00	12/18	1.68-0.99
PS-1	18/30	0.99-0.61
PS-2	30/45	0.61-0.36
PS-2.5	35/45	0.50-0.36
PS-3	45/100	0.35-0.15
PS-4	60/100	0.25-0.15

Table 7

Bulk densities (g/cm^3) of selected cylindrical plastic media

Media name	Particle sieze, mm	Bulk density
Polyamide PA	0.50	0.605
	0.95	0.575
Polycarbonate PC	0.50	0.630
	1.00	0.650
Polyoxometalate POM	0.85	0.675

Application of regularly shaped media in deflashing treatment

Polyamide media PA are perfect for deflashing of urea, phenol-formaldehyde and melamine moulded pieces. Figure 6 presents example of plastic work piece on polyamide media used for their deflashing.

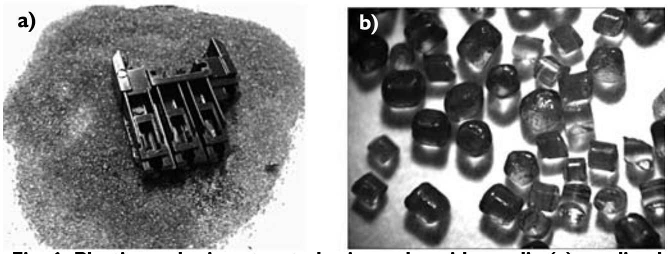

Fig. 6. Plastic work piece treated using polyamide media (a), ovalized media after treatment (b)

Deflashing media used for the treatment were cylindrical, while particles in the mixture were gradually getting ovalized. The ovalization is way in which blasting media are consumed in subsequent cycles of shot blasting and results in gradual loss of sharp edges and decrease of cutting capacity.

Polyoxometalate media POM are harder and more aggressive and thus they are used in applications where additional impact resistance and higher cutting capacity is required. Due to that POM media are used for deflashing of glass fiber-reinforced composites.

Polycarbonate media PC are characterized by highest hardness and impact resistance. Initially they were introduced as deflashing media for aluminium casts. Currently, the use of PC for standard deflashing is limited, as they are very expensive. Main application of PC media is cryogenic deflashin.

Oval polyester media PB are used for deflashing of fragile electronics and rubber work pieces.

Cryogenic deflashing media

Cryogenic deburring is a method for removal of waste residues of flashes from pressed elastomer work pieces after taking them out from the mould. This method of treatment is based on specific, especially for elastomer, dependence of their elasticity from their temperature [8]. Knowledge of glass transition temperature (Tg) and brittle temperature (Tb) for each material is crucial. Glass transition point Tg is a temperature in which elastomer undergoes transition from high-elastic state to mechanical elastic-brittle state or to forced elastic state. Below Tg elastomers are hard, brittle and all macromolecules keep their relative position. Chains are immobilized – they do not show any movement. In such situation it is said that elastomer is in glassy state. Upon further cooling brittle temperature Tb is reached and the elastomer undergoes transition into mechanic brittle state.

Cryogenic deflashing is process during which elastomer work pieces with flashes are cooled below glass transition temperature for given elastomer. Thus, treated work piece, and especially its external parts become brittle and relatively easy to remove.

Glass transition temperatures for selected types of rubber are presented below [8]:

- natural rubber (NR) -75°C
- ethylene propylene diene monomer rubber(EPDM) -55°C
- styrene-butadiene rubber (SBR) -40°C
- nitrile butadiene rubber (NBR) -30°C.

The cooling of work pieces in the chamber of processing drum shall be performed till the temperature is lower than above mentioned values of Tg. Liquid nitrogen is usually used as the cooling agent in modern cryogenic deflashing machines. Rotating drum of cryogenic deflasher provides uniform exposure of details to liquid nitrogen and their proper cooling, as well as efficient operation of deflashing media. For this application polycarbonate deflashing media are used.

Low operating temperatures in cryogenic chamber present polycarbonate blasting media with high requirements concerning their impact resistance durability.

Manufacturers of cryogenic deflashing media use latest achievements of plastic material science and modify polycarbonates by cross-linking them using various additives or copolymerazing them with other chemical compounds. Figure 7 presents the influence of polycarbonates modifications on their durability as a function of operating temperature as used by PDC [7]. Standard polycarbonate deflashing media (1) in temperature of -80°C practically ceases to be useful as deflashing media. Durability of two cryogenic varieties of polycarbonate (2) and (3) above -60°C is the same, but with further temperature decrease polycarbonate modified with silicon (3) shows much greater durability. This deflashing media is quite durable down to -40°C.

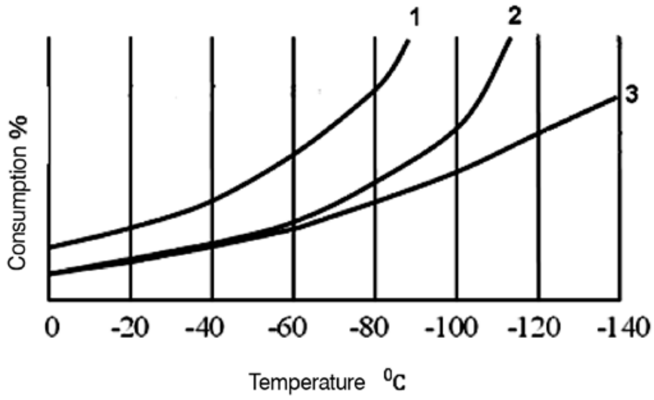

Fig. 7. Consumption of polycarbonate deflashing media as a functions cryogenic deflashing temperature: 1 – standard polycarbonate, 2 – modified polycarbonate, 3 – silicon-modified polycarbonate

Improvement of impact resistance (and thus durability) of polycarbonate blasting media in temperatures used in cryogenic shot blasting can be also achieved by using blasting media made of polycarbonate and fluopolymer (such as PTFE - polytetrafluoroethylene) copolymers. The comparison of selected properties of this product, named by PDC Dieblast Green blasting media (Fig. 8), with the properties of cryogenic polycarbonate are presented in Table 8.

Fig. 8. Dieblast Green cryogenic polycarbonate media (1.5 mm)

Table 8

Functional properties of cryogenic polycarbonate media [7]

Parameter	Temperature, °C	Cryogenic PC	Dieblast Green
Impact resistance, kJ/m^2	+23	60	65
	-30	20	43
Consumption factor, %	-40	3.7	2.6
	-80	4.9	3.8
	-100	7.2	5.8
Abrasion resistance, mg	+23	10	10
	-30	9	6

Polycarbonate media have dominated cryogenic deflashing of work pieces. Some of the manufacturers [7] recommend also for this type of treatment special varieties of polyamide media. In any case, by application of liquid nitrogen, the temperature in treatment chamber decreases to -45°C and -130°C range. Treated work pieces are rotated in deflashing machine basket with velocity from 5 to 50 rpm and are deflashed using media consisting of particles with dimensions from 0.4 to 1.6 mm.

The temperature, the rotational speed of basket containing work pieces, the size of media particles and the time of the treatment may be adjusted in quite a wide range, depending on work pieces size, their geometry, flashes size, as well as material from which treated work pieces are produced. During this treatment sharp edges of work pieces are not rounded, while deflashing medium might penetrate cavities of work pieces and deflash them.

The variety of work pieces might be treated using cryogenic deflashing, mainly work pieces made of silicone, rubber (including chloroprene rubber and polyurethanes), LCPs (liquid crystal polymers) and some zinc alloy casts.

Summary

Plastic blasting and deflashing media that are currently available for users offer major possibilities of obtaining desired treatment effect. These relatively new media have properties adjusted to the requirements of modern manufacturing technologies of many technical products. Much greater interest in these media by Polish users can be expected.

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dokończenie ze strony 1226

Medana rozbudowuje park maszynowy

Medana Pharma SA – lider w produkcji leków pediatrycznych i preparatów witaminowych – rozbudowuje park maszynowy i infrastrukturę w zakładzie w Sieradzu. Zakup nowoczesnej linii do produkcji miękkich kapsułek żelatynowych pozwoli zwiększyć efektywność produkcji o 130% w skali roku. Wartość przedsięwzięcia wyniosła ponad 4,3 mln EUR i w całości została sfinansowana ze środków własnych. Firma zwiększa także zatrudnienie. *(kk)*

(http://www.polpharma.pl/, 31.10.2013)

KONKURSY, NAGRODY, WYRÓŻNIENIA

Odznaczenie dla Macieja Adamkiewicza

Prezes Grupy Adamed, Maciej Adamkiewicz, został odznaczony prezydenckim Złotym Krzyżem Zasługi za nadzwyczajne zasługi dla państwa oraz obywateli. Uroczyste nadanie odznaczeń odbyło się 16 listopada br. w Świętokrzyskim Urzędzie Wojewódzkim w Kielcach. W imieniu Prezydenta RP, Bronisława Komorowskiego, z rąk Grzegorza Dziubka, Wicewojewody Świętokrzyskiego, Krzyże Zasługi otrzymało łącznie 21 osób. *(kk)*

(http://www.adamed.com.pl, 18.11.2013)

Pracodawca – organizator pracy bezpiecznej

Rafineria Nafty Jedlicze SA została laureatem konkursu Państwowej Inspekcji Pracy pn. „Pracodawca – organizator pracy bezpiecznej". Spółka zdobyła III miejsce w kategorii zakładów pracy zatrudniających powyżej 251 pracowników. Konkurs odbywał się pod patronatem Marszałka Województwa Podkarpackiego i Okręgowego Inspektora Pracy w Rzeszowie. *(kk)*

(http://www.rnjsa.com.pl, 14.11.2013)

SPOTKANIA

Polish Chemical Forum & Awards Gala

26 listopada 2013 r. odbyła się konferencja połączona z wręczeniem nagród dla liderów polskiej chemii Polish Chemical Forum & Awards Gala. Forum otworzył Minister Skarbu Państwa Włodzimierz Karpiński, a następnie odbyły się trzy panele: aktywność państwa a rozwój polskiego przemysłu chemicznego, punkty zapalne w polskiej chemii, konsolidacja polskiej chemii – i co dalej?. W wieczornej części wydarzenia wręczono statuetki Polish Chemical Awards 2013, mi.in. Zakładom Azotowym Puławy SA, Synthosowi SA oraz fimie Pofarb Grupa Chemiczna. Szczegółowa relacja ze spotkania ukaże się w noworocznym wydaniu CHEMIKA. Zapraszamy. (*em*)

Nafta/Chemia 2013

4 grudnia 2013 r. po raz kolejny przedstawiciele branży chemicznej i petrochemicznej. Jednym z głównych tematów było podpisane 3 grudnia br. porozumienie LOTOSU z Grupą Azoty w sprawie powołania spółki celowej i wykonania pełnego studium wykonalności inwestycji petrochemicznej w Gdańsku, Włodzimierz Karpiński zapewnił, że Skarb Państwa jako akcjonariusz będzie wspierał wszelkie inicjatywy budujące wartość firm z sektora naftowo-chemicznego, szczególnie jeśli mają one potencjał bycia kołem zamachowym całej polskiej gospodarki. Podczas konferencji dyskutowano o zagrożeniach dla polskiego przemysłu chemicznego w związku z prowadzonymi rozmowami UE z USA i Kanadą nad nowymi regulacjami dotyczących handlu, bumem łupkowym w Stanach Zjednoczonych, czy dywersyfikacją dostaw paliw. (*em*)

(źródło: http://chemia.wnp.pl/, 4 .grudnia 2013 r.)