

GLOBAL COLORS SOLUTIONS

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MESSAGE

FROM THE CHAIRMAN

At Global Colors we look forward to K as a great opportunity to meet our business partners from different countries as well as to discover new technologies and trends in the plastics world.

At the same time, K gives us the possibility to present to our customers our new developments and our aspirations for the future.

The past 3 years have been an exciting period for our Group. We have grown our capacity from 50.000 MT to over 70.000 MT. We have increased our R&D capabilities and introduced numerous new products.

Among the most important developments we should mention:

- The mega compounder for black masterbatches in Crete, Greece.
- The mega compounder for white & filler masterbatches in Romania.
- The capacity increase at our plant in Russia.
- The development of a range of Liquid Colors by Romcolor, Romania.
- Our new range of Flame Retardant masterbatches for various applications.
- The introduction of SAP ERP system at our affiliates in Romania, Poland, Turkey & Russia.

We view ourselves primarily as a partner for our customers, our role being to advise on the most appropriate pigment & additive combinations that will permit them to improve the visual appeal or enhance the properties of their products and make them more profitable.

Our target for the next 3 year period is to continue expanding our capacity, strengthening our knowledge, widening our product offering and further improving our competitiveness, flexibility and responsiveness to customer needs.

We wish to thank our clients, our suppliers and our employees for their confidence in our Group and to assure them that we work relentlessly to be worth of this confidence!

Yours faithfully,

Yannis Lebidakis
Chairman of the Board



THE GLOBAL COLORS GROUP CONTINUOUSLY EXPANDS ITS PRODUCTION BASE

Global Colors is one of the leading masterbatch suppliers in Europe with a production capacity exceeding 70,000 MT in 7 manufacturing facilities. Our goal is to offer uniform solutions to plastics processors across different regions, along with localized service and technical support. All our Group companies share the same technology, know-how, quality standards, economies of scale, financial resources, range of products and new developments. Decentralized management and marketing ensure a high level of responsiveness to customer requirements combined with fast and flexible decision making.

To cope with increased demand and ensure fast supply to our customers, we continuously expand our capacities with new investments:

In 2016, Plastika Kritis has installed in

Greece a mega-compounder to increase our production of black masterbatches. Our target is to maintain our position as one of the top 5 producers of black in Europe, with products that combine competitive cost with outstanding dispersion and covering power.

Very recently, Romcolor has started-up a mega-compounder for the production of white and filler masterbatches. This enables Romcolor to enhance its economies of scale and to be even more responsive to its customers' needs. The line is equipped with an industrial robot for packing-palletizing, while its daily capacity is the largest in our group. Romcolor is also investing in Liquid Colors, production of which is expected to start in October after 2 years of development work and successful trials. At the same time, it is increasing its capacity and flexibility

adding another line for color masterbatches, including products in micro-pellet form for PVC pipes, sheets and other applications.

Our plant in St Petersburg, Russia has also expanded its capacity with the installation of a new compounder for white and filler masterbatches. In addition to this, at the beginning of 2017 a new twin extrusion line will be ready to operate and will be dedicate to additive masterbatches.

In Poland, Global Colors Polska has increased its flexibility with a production line specially designed for small batches.

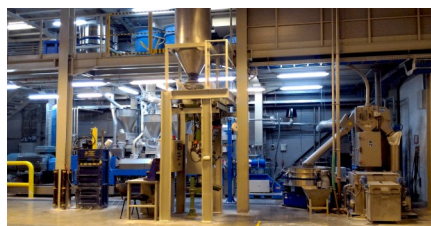
Our investment plan guarantees that all our production plants stay at the cutting edge of technology and constantly improve their ability to respond in the best possible way to the needs of our clientele.



Picture 1, 2 and 3: The Romcolor's mega-compounder for whites and fillers uses silos for the polymers feeding (left). The line is equipped with state of the art upstream and downstream equipment (middle) and its packaging is supported by an industrial robot (right).



Picture 4: Plastika Kritis has significantly increased its black masterbatch capacity with the new mega-compounder.



Picture 5: The new compounder makes Global Colors zao a leading producer of white and filler masterbatches in Russia.



Picture 6: The modern production line for color masterbatches makes Global Colors Polska even faster in small batches production.

NEW OXO-DEGRADABLE MASTERBATCH FTD 523, SUITABLE FOR USE IN SHOPPING BAGS



Plastika Kritis has launched its new oxo-degradable masterbatch, called Kritilen® FTD523. It is mainly proposed for use in polyethylene carrier or shopping bags (e.g. for supermarkets). It is added at addition rates 1%-2% in the end product recipe and, under the influence of oxygen, heat and light, degrades the polymer chain of the plastic bag.

This masterbatch contains selected pro-degradants, which contribute in the reduction of the polymer molecular weight, introducing oxygen into its structure. This process transforms the polymer chain from long strands to much smaller lengths. By reducing the chain length of the polymer the material loses its physical strength and elongation properties making it brittle and less 'plastic'. Then, these low molecular weight fractures can, under certain environmental conditions, be converted by bacteria into biomass, CO₂ and H₂O in an aerobic environment, or in the case of an anaero-

bic environment, into CH₄.

Plastika Kritis has tested, before commercialization, this product in both its lab and also an external specialized institute. Films of 20mic, containing a mixture of HDPE and LLDPE with 1% FTD523 and 10% Filler 5804 (80% calcium carbonate in a polyethylene carrier), were produced and evaluated. The test protocol applied in the external institute included the following:

- Mechanical properties of non exposed samples
- Oven aging at 40°, 60° and 80° C according to BS8472:2011
- UV exposure based on ISO4892-3
- Mechanical properties of exposed samples

In order to declare a film as degradable, its retained mechanical properties (e.g. elongation) after UV and heat aging must be <5% of the initial properties before exposure. After the above tests, the film samples were

degraded (<5% of retained elongation) under the following conditions:

- Heat aging at 40°C: After 97 days
- Heat aging at 60°C: After 10 days
- Heat aging at 80°C: After less than 10 days
- UV aging: After 168hr (approximately corresponding to 3.5 months of real life in Central Europe)

The raw materials used in the formulation of FTD523 comply with the requirements of Regulation 10/2011/EC and subsequent amendments. They also comply with the relevant paragraphs of FDA chapter 21 parts 175-178. Detailed food contact Declaration is available upon request.

As the degree and speed of degradation is dependent on the antioxidant package contained in the basic polymer of the end application, the product thickness, the ambient temperature and humidity and the degree to which the end product is exposed to UV radiation, it is suggested that the customer should verify the suitability of the product and determine the appropriate let-down ratio under the actual conditions of applications.

A UNIQUE PRODUCT LINE FOR TRANSLUCENT COLORS USED IN HOUSEWARE

Plastika Kritis is the preferred masterbatch supplier of many manufacturers of houseware items. These manufacturers design and produce among others, polypropylene products for house use, such as tableware, small boxes for food, storage boxes, hangers for cloths, etc. Furthermore, they have developed long-term partnerships with top Greek or international supermarket chains and many retail stores in Germany, Greece, Cyprus and the Balkans (Albania, Skopje, Serbia).

All of these manufacturers of plastic houseware products try to differentiate by launching brilliant, translucent and modern design items. Plastika Kritis has collaborated with a major producers of such goods, in the development of unique color masterbatches that will color the new product

line. Initially, the customer was using colorants in powder form, in order to color these products. Plastika Kritis has contacted the design department of this customer and explained the advantages of replacing powder colorants with masterbatches. As a next step, Plastika Kritis has developed a product line of brilliant and translucent color masterbatches such as Yellow 11114, Orange 21601, Violet 35746, Violet 35748, Violet 35758, Blue 40944, Green 50672 etc, which were tested and approved.

The Plastika Kritis color specialists are able to develop and offer such tailor-made color proposals that allow end manufacturers to differentiate from their competitors.



Picture 7: Fancy semi-transparent Kritilen® colors give value to modern style houseware items

SPECIAL FRAGRANCE MASTERBATCHES FIGHT MALODORS IN GARBAGE BAGS

Plastic bags are part of our daily life. They are used all around the house. They are convenient but also a source of bacteria and bad odors.

A common practice, in order to avoid these undesired odors, is to incorporate fragrances in plastic bags. As expected, the most convenient way to do so is the use of masterbatches.

Global Colors has already a wide range of fragrance masterbatches such as strawberry, lemon, vanilla, rose, white floral, lavender, green apple lilac, apple cinnamon, white musk etc. These scents are incorporated into a polyolefin carrier and are

suitable for use in plastic garbage or shopping bags, either for masking the undesired odors or for imparting a pleasant aroma in the bag.

Furthermore, Global Colors, being in close collaboration with its suppliers, has developed masterbatches which counteract malodors by chemically interacting and deactivating the substances that cause the malodors. Depending on this malodor origin (bathroom, kitchen or pet malodours), Global Colors can offer specifically designed fragrance masterbatches.

Kritilen® 1411 Forest OC and 1412 Lavender OC

contain active ingredients, which incorporate these specific fragrances in the end product and also reduce odor through chemical binding of the chemical substances creating the odor and by inhibiting the growth of the bad odor causing bacteria. Global Colors can also develop different fragrance masterbatches having the OC (odor control) action. These masterbatches are proposed for use in garbage bags.

Kritilen® 1409 Citronella INS was developed in order to repel insects from plastic end products. It is particularly recommended for garbage



Picture 8: Malodors are reduced with the use of special Global Colors fragrance masterbatches in garbage bags

bags, whose content attracts mosquitos or other insects during the summertime.

By repelling mosquitos, adding Kritilen® 1409 Citronella INS in garbage bags, the risk of transmitting the Zika virus to humans by these mosquitos is significantly reduced.

FUNCTIONAL KRITILEN® FILLER 5809 IMPROVES THE QUALITY OF PLASTIC DISHES

Plastic dishes made of polystyrene are popular products in parties, picnics, dining in office etc.

As these products are disposable, they must be price affordable. On the other hand, they must retain a minimum level of mechanical properties, for example they must be rigid enough but not brittle. Manufacturers of such products, use a co-extrusion structure, adding a lot of calcium carbonate in the middle layer.

By adding this filler, they reduce the cost and create a rigid dish. However, excessive addition of calcium carbonate will have a negative result, as plates will tend to break much easier and their quality will deteriorate.

In order to help the plastic dish producers to improve the quality of their product, while keeping a low formulation cost, Plastika Kritis has developed Kritilen® Filler 5809. This specialty filler

masterbatch contains a high loading of a low particle size calcium carbonate and a mixture of special carriers that balance rigidity and elasticity, so that the plastic dish has the optimum techno-economical performance.

High addition rates of Filler 5809 can be achieved, e.g. up to 30%, making this masterbatch as the ideal additive for the production of polystyrene disposable dishes.



Picture 9: Filler 5809 imparts significant improvements in plastic dish recipes

GLOBAL COLORS HAS A COMPLETE RANGE OF MASTERBATCHES FOR BOPP FILMS

Global Colors offers a complete product line of masterbatches used in the production of BOPP films. They contain additives, combinations of additives or pigments of proven value, at concentration levels that suite each formulation, properties and final product or process requirements, perfectly dispersed in an appropriate carrier resin.

The basic masterbatches consisting this product line are:

1. SL/AT PP1003 and SL/AT PP1004: SL/AT PP1003 is a combined slip and antistatic masterbatch, based on a PP homopolymer BOPP grade, designed to be used in the core layer of BOPP films, in order to achieve excellent slip and antistatic properties in moderate climate conditions. It is proposed for use at 2% - 3% in the middle film layer. It contains a selected grade of refined erucamide slip agent, glycerol ester and amine antistatic. SL/AT PP1004 is a more concentrated version offering slip and antistatic properties for colder climates.
2. SL PP968: It is a slip masterbatch, proposed for use at 2%-3% in BOPP film middle layer. It contains a selected grade of refined erucamide slip agent and is based on a BOPP compatible PP homopolymer carrier.
3. PP AT912: It is an antistatic masterbatch proposed for use at 2% - 3% in BOPP film middle layer. It contains a selected grade of amine antistatic agent and is based in a BOPP compatible PP homopolymer carrier.
4. AB PP9575: It is an antiblocking masterbatch, proposed for use at 2% - 3% in BOPP film skin layers. It is based in PP homopolymer carrier (suitable for use in BOPP applications) and contains a selected grade of low particle size synthetic silica. The addition of AB PP9575 prevents blocking during wind-up, regulates the slip and anti-static properties of films and allows a smooth unwinding and slitting of the reels.
5. White PP953, PP961 and PPF979: All of them are milky white masterbatches based in a PP homopolymer carrier. The TiO₂ excellent dispersion into the polypropylene carrier makes them an optimum choice for BOPP films. They contain 50%, 60% and 70% of TiO₂, respectively. They are proposed for use at 10% - 15% in the core film layer.
6. Pearl PP9721: It contains a specially selected mineral in PP homopolymer carrier, which imparts a pearlescent effect in the BOPP film. It ensures an excellent dispersion without affecting the mechanical properties of the end product. It is proposed for use at 10% - 15% in middle layer.

The Global Colors companies also offer special BOPP masterbatches based in PP-copo carriers, proposed for use in heat sealed or metallized films. Upon customer demand, Global Colors can develop tailor-made solutions for BOPP film manufacturers. Such solutions involve the use of certain additives or combination of additives, which can be dispersed in adequate polymeric carriers.

“Plastika Kritis also offers special BOPP masterbatches based in PP-copo carriers, proposed for use in heat sealed or metallized films. Upon customer demand, Global Colors can develop tailor-made solutions for BOPP film manufacturers. Such solutions involve the use of certain additives or combination of additives, which can be dispersed in adequate polymeric carriers.”



Picture 10: Global Colors offers an excellent masterbatch range for BOPP films.

THE NEW PLASTIKA KRITIS WEB SITE IS ALREADY ON-LINE

The new Plastika Kritis internet site (www.plastikakritis.com) is now launched! It is a modern design site presenting the Plastika Kritis main product lines (masterbatches, films for agricultural applications, geomembranes and plastic pipes). Product documentation can be downloaded and access to technical newsletters is also available for the visitors.

It also includes information about Global Colors, the masterbatch activity of the Plastika Kritis Group, and focuses on each Group company. The new site has also a section for investors and a link to the company's e-business function.

Overall, the new site provides the visitor with an overview about the Plastika Kritis corporation and essential data related to products.



Picture 11: The home page of the new Plastika Kritis web site

COLOR INTENSITY AND LOW RECIPE COST ARE ACHIEVED WITH BLACK 450 AND BLACK 4010

Plastika Kritis has developed new polyethylene based black masterbatches with high color intensity and exceptional properties.

First, it is Black 450, which contains 50% of a special HAF carbon black,

perfectly dispersed in its carrier matrix. It can be used for a variety of end applications such as films, injection molding or even the coloration of recycled plastics.

Moreover, Black 4010 is the cost efficient version

of Black 450. It contains the same type of carbon black in a polyethylene carrier but its recipe is designed in such a way that it can be cheaper and slightly weaker in color strength. This product is ideal for geomembranes, films or thick sections.

“Plastika Kritis has developed new polyethylene based black masterbatches with high color intensity and exceptional properties.”

SPECIAL EFFECT COLOR MASTERBATCHES ADD VALUE TO PLASTICS

Global Colors creates color masterbatches that add value and differentiate end products. Optimized formulations match the right shades and assure compliance with regulatory and standards requirements.

A diverse product portfolio includes, among others, brilliant special effect

color masterbatches for the injection or blow molding industry. Glitters, pearlescent or metallic effect pigments, colored fibers etc can be added to plastics, in order to create a unique color perception.

The end processor can either select standard shades from the Global

Colors extensive archive or collaborate with the Global Colors experienced colorists, in order to develop customized solutions that fit exactly to their specific needs.

All the Global Colors labs have access to the latest pigment developments and can propose modern and vibrant color effects.

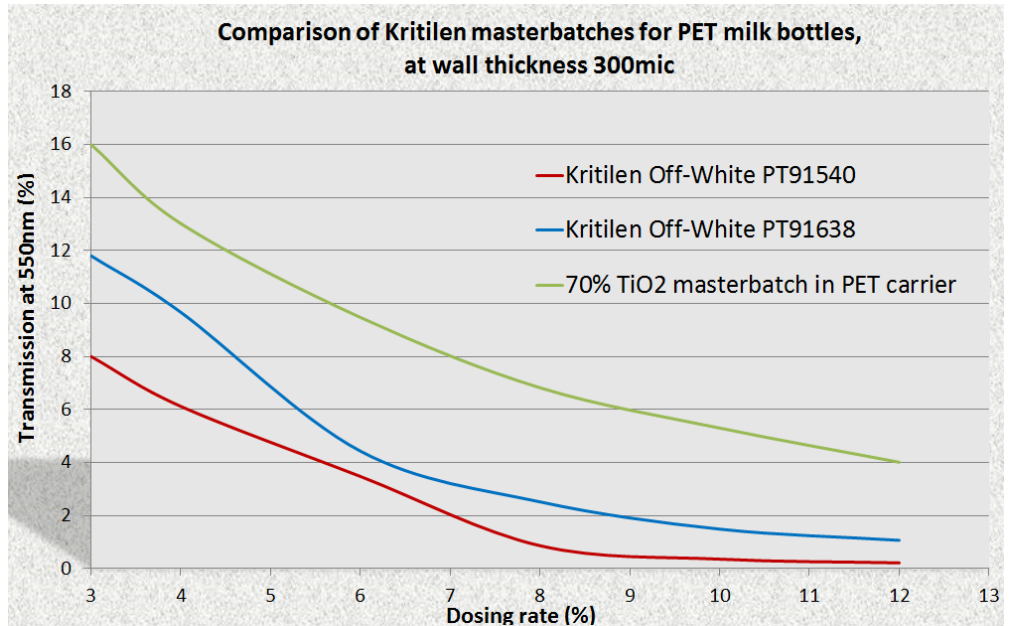


Picture 12: The Global Colors special effect masterbatches can create unique colors in plastic articles.

SPECIAL WHITE MASTERBATCHES PROTECT BOTTLED MILK QUALITY

Milk is a valuable and popular drink in Europe, where across the continent seven out of ten Europeans drink it regularly. But the packaging of milk is challenging because the product is very sensitive and easily destroyed by light, microbes and air. There have been used many packaging solutions for this sensitive product, such as multilayer HDPE bottles and carton packs for ESL (Extended Self Life) and UHT (Ultra High Temperature) milk, in order to decrease the production cost.

In warm climate countries like Spain, UHT milk is preferred due to high costs of refrigerated transportation and "inefficient cool cabinets". UHT is less popular in Northern Europe and Scandinavia, particularly in Denmark, Finland, Norway, Sweden, the United Kingdom and Ireland. It is also less popular in Greece, where fresh pasteurized milk is the most popular type of milk. In Greece though, ESL and UHT milk gains more and more market share. A recent development in milk packaging is the use of mono-layer PET bottles, which have helped the dairy to present an innovative, appealing and environmentally-friendly packaging. The combination of PET and UHT technology has provided a long shelf life. PET has significant advantages compared with other milk bottling materials.



Picture 13: Transmittance curves at 550nm at wall thickness of 300mic—Comparison of PET based Kritilen® Off-White PT91540 and PT91638 (blue and red curve respectively) versus a 70% TiO₂ PET based masterbatch (green curve).

It offers better protection from odors than HDPE. Special PET grades and additives allowed the production of a lighter, resilient and more cost effective than the traditional 1-litre HDPE bottle for UHT milk.

Nevertheless, this was not possible to accomplish until recently, because no functional light barriers existed for mono-layer PET. Light causes photo-oxidation of riboflavins (B2 and B12 vitamins) and secondary auto-oxidation of milk fats. As a result, the nutritional value and the organoleptic properties (odor and taste) of the milk deteriorate. It must be noted that even slight changes in odor and taste are not acceptable by the consumers. Recent studies have proved that the most

harmful wavelengths are between 380nm and 550nm, but for optimum conservation, it is also important to hold light penetration between 500nm and 700nm below 2%.

Plastika Kritis offers a special product line for the coloration of PET white milk bottles, consisting of the following masterbatches:

- **Kritilen® Off-White PT91540:** This masterbatch provides the necessary light barrier according to the requirements mentioned above, for UHT mono-layer milk bottles at an addition rate of 7% - 8% (see Picture 16). These addition rates assure that the light transmittance at 550nm is below 2% and, thus riboflavins and milk fats are protected. Off-

White PT91540 is also recommended to be used for ESL PET milk bottles at an addition rate of 3% - 4%.

- **Kritilen® Off-White PT91638:** It can be used for both UHT (at addition rates 9%-10%) and ESP (at addition rates 5% - 6%) PET milk bottles. It imparts a slightly different undertone than PT91540 to milk bottle.

Due to their special design, these masterbatches perform much better when used for the coloration of white PET bottle versus a typical 70% TiO₂ masterbatch based on a PET carrier, at the same addition rate. Especially, at addition rates of 7% - 8%, PT91540 gives slightly lower transmittance than other well-known competition products.

GLOBAL COLORS is an international Group serving the plastics industry with high quality color and additive concentrates. It ensures competitive solutions and localized service with a number of modern production plants in strategic locations.

All Group companies share the same technology, know-how, quality standards, economies of scale, financial resources, range of products and new developments.

Decentralized management and marketing ensure a high level of responsiveness to customer requirements, combined with fast and flexible decision making.

The Group's annual production capacity exceeds 70.000 MT.



Members of GLOBAL COLORS group are:

- PLASTIKA KRITIS S.A.,Greece • ROMCOLOR 2000 S.A.,Romania • SENKROMA S.A., Turkey
- GLOBAL COLORS POLSKA S.A., Poland • GLOBAL COLORS z.a.o., Russia



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