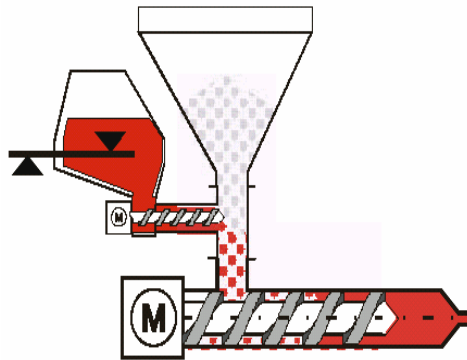




**Patented ColorSave® technology - one step ahead in Precise Masterbatch Metering, for injection molding machines**



ColorSave 1000 dosing unit

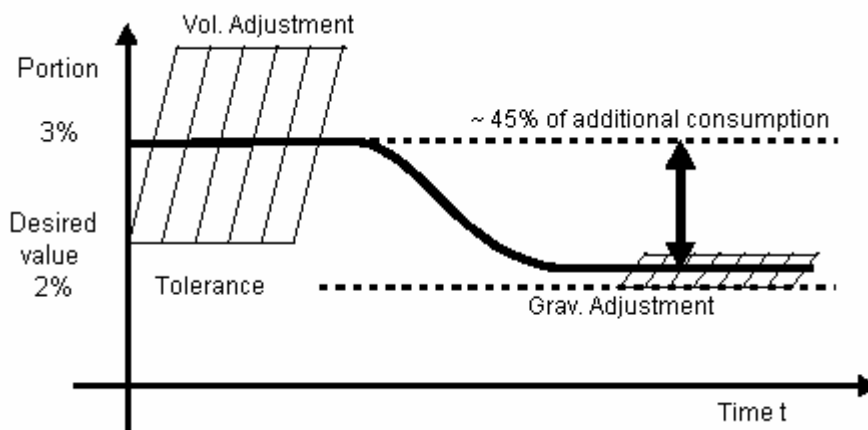


Precise, economical masterbatch dosing



ColorSave 1000 operation panel

# Huge Potential Savings With ColorSave 1000



Potential for lowering the desired value by reducing the tolerance with the ColorSave 1000

# Huge Potential Savings with ColorSave 1000

The patented modular ColorSave technology enables you to save a very significant percentage of your masterbatch and additives consumption.



Single ColorSave 1000



Quadruple ColorSave plus virgin weighing hopper \*

\* The option of weighing the virgin material or mixture of virgin materials by the loss-in-weight hopper is unique to injection molding machines, enabling you to determine the weight of the injection molded parts from cycle to cycle and thus to evaluate product quality.

## Savings

Practical experience by our customers reveals and confirms:

- ❑ Lower masterbatch and additives consumption
- ❑ Improved quality
- ❑ Extremely simple operation

Our experience, based on many successful installations in the plastic industries in Israel, Europe and the United States, indicates a huge potential saving with the **ColorSave 1000**.

This experience shows that switching from a volumetric masterbatch feeder to a gravimetric **ColorSave 1000** feeder mounted directly at the machine throat can result in a 33%-50% savings in the masterbatch/additive consumption.

This is a direct result of higher accuracy and lower tolerances range of the ColorSave 1000 in comparison to volumetric feeders. As a lower working set-point (%) can be used, a significant saving in masterbatch consumption is achieved.

For a batch-blender mounted on the machine throat, the saving is about 10%-15%. This a direct result of improving the dosing and preventing the separation of masterbatch that is typical to batch-blenders that are mounted at the throat of the processing machine, mainly due to mixing of materials of very different nature and bulk.

In comparison to a mounted batch-blender, the **ColorSave 1000** is more compact and is easier to optimize, to maintain, and to clean when switching from color to color.

In addition, the **ColorSave 1000** is equipped with an integral venturi loader and thus does not require installation of hopper loaders that are connected to long pipelines (except when used for dosing regrind material).

Integration of a **ColorSave 1000** unit (s) with a remote or central batch-blender, so that the mixture of the virgin materials is fed by the remote batch-blender and the masterbatch is metered and distributed into the core of the main flow at the machine throat by the **ColorSave 1000**, reduces the masterbatch consumption by 25%-35%.

This is a direct result of improving the dosing and preventing separation of the masterbatch from the main material, while the material is being conveyed from the remote blender to the injection machine.

**Another advantage is the potential saving of costs due to the possibility of reducing the total number of remote batch-blenders required.**

### **Potential customers for the ColorSave 1000 systems**

**For a better understanding of the potential masterbatch saving, please refer to the following tables, which describe typical examples. Every customer may easily adapt these typical examples to their specific case and conditions.**

**Table 1: Case A - Switching from volumetric feeder to ColorSave 1000**

| Material consumption (Typical) |         | Masterbatch consumption (Typical) | Consumed masterbatch Cost | Saving by switching to ColorSave | Payback time on the investment |
|--------------------------------|---------|-----------------------------------|---------------------------|----------------------------------|--------------------------------|
| Ton/day                        | Kg/hour | Kg/day                            | EUR / Day                 | EUR / Day                        | Months/years                   |
| 0.25                           | 12.0    | 5.0                               | 20.0                      | 6.7                              | 25.0 (2.1 years)               |
| 0.5                            | 21.0    | 10.0                              | 40.0                      | 13.4                             | 12.5 (1.05 year)               |
| 1.2                            | 50.0    | 24.0                              | 96.0                      | 32.0                             | 5.2 (0.44 year)                |
| 2.4                            | 100.0   | 48.0                              | 192.0                     | 64.0                             | 2.6 (0.22 year)                |
| 5.0                            | 200.0   | 100.0                             | 400.0                     | 133.0                            | 1.3 (0.10 year)                |
|                                |         | (1)                               | (2)                       | (3)                              | (4)                            |

**Table 2: Case B - Integrating ColorSave 1000 with central batch-blender**

| Material consumption (Typical) |         | Masterbatch consumption (Typical) | Consumed masterbatch Cost | Saving by switching to ColorSave | Payback time on the investment |
|--------------------------------|---------|-----------------------------------|---------------------------|----------------------------------|--------------------------------|
| Ton/day                        | Kg/hour | Kg/day                            | EUR / Day                 | EUR / Day                        | Months/years                   |
| 0.25                           | 12.0    | 5.0                               | 20.0                      | 5.0                              | 33.6 (2.8 years)               |
| 0.5                            | 21.0    | 10.0                              | 40.0                      | 10.0                             | 16.8 (1.40 years)              |
| 1.2                            | 50.0    | 24.0                              | 96.0                      | 24.0                             | 7.0 (0.58 years)               |
| 2.4                            | 100.0   | 48.0                              | 192.0                     | 48.0                             | 3.5 (0.29 years)               |
| 5.0                            | 200.0   | 100.0                             | 400.0                     | 100.0                            | 1.7 (0.14 years)               |
|                                |         | (1)                               | (2)                       | (3)                              | (4)                            |

**Notes on tables 1 and 2:**

1. Based on 2% average masterbatch percentage (typical)
2. Based on 4.0 EUR/kg average masterbatch price (typical)
3. Based on:  
33% saving by switching to **ColorSave 1000** (typical)  
25% saving by integrating **ColorSave 1000** with a batch-blender (typical)
4. Based on end-user list price of 4,200 EUR for **ColorSave 1000** (Iron steel version) and 25 working days/month

**The above data show that:**

- Customers with a masterbatch consumption of over 10 kg/day (0.42 kg/h) per machine will return their investment in less than one year when switching from an existing volumetric feeder to the **ColorSave 1000**. Under certain circumstances, when the consumption is very high, the return could be within a few weeks.
- The same conclusion holds also when integrating a **ColorSave 1000** with a batch-blender. However, the return on the investment is slower (over 14.0 kg/day of masterbatch for payback of less than one year).
- The above calculations are based on the assumption that the **ColorSave 1000** feeder replaces an existing volumetric one. In cases where the customer is considering buying a new injection machine, with either a volumetric feeder or a **ColorSave** feeder, only the difference in the cost should be taken in account. Assuming that the cost of a volumetric feeder is about 50% of that of the **ColorSave 1000**, all the payback periods displayed above are reduced by half.
- Using the **ColorSave 1000** could be worthwhile even for customers whose masterbatch consumption is much lower – in many cases the saving might be much higher than 33% in the case of replacing a volumetric feeder or higher than 25% when integrating with a remote or central batch blender. Furthermore, they will benefit from the overall advantages of the ColorSave:
  - *accuracy*
  - *repeatability*
  - *zero set-up time*
  - *data collection software*

# Comparative Masterbatch Saving Test – Case Study

We have learned from our experience that most potential customers are unaware of the enormous waste of masterbatch/additive due to the use of volumetric masterbatch feeders with their injection-molding machines.

*The main advantage of the ColorSave 1000, due to its unique control features, is its ability to overcome and prevent this waste.*

The following is a description of a comparative test that was conducted at one of Israel's leading plastic factories. It shows a potential saving in masterbatch costs of 65% (or 650,000 EUR per year for 40 molding-injection machines), just by changing from existing volumetric feeders to the **ColorSave 1000** systems.

Note that these results are based on a partial sample only, and according to our general experience, the average total masterbatch saving is usually in the range of 35%-50%.

## 1) Case general data

- Plant size — medium (about 40 injection-molding machines)
- Line of products — storage boxes and containers
- Molded parts weight — medium (0.25-1.5 kg), 2 shots/minute
- Total annual masterbatch consumption — about 200,000 kg/year
- Average masterbatch cost: 4 – 6 EUR/kg
- 
- Number of machines involved in the test: 3 – 2 with volumetric feeders and 1 with a **ColorSave 1000** feeder
- Duration of the test — 3 hours (not including installation prior to the test)
- Management of test — raw material manager

## 2) Test survey

The test was conducted in 2 phases

### **Phase A: Comparison of desired dosing (%) with actual measured dosing (%)**

- a. The 3 machines were set to the desired masterbatch dosage (%)
- b. The machines were running for 2 hours
- c. The total masterbatch quantity consumed by each machine during the test was measured by weighing the quantity of the masterbatch in the containers (or sacks) and the hoppers, at the beginning and the end of the test
- d. The actual average dosing percentage (%) of each machine was calculated by dividing the total consumed kg of masterbatch by the molded part weight (kg), and the total injection shots (N) during the test

## Phase A Test Results:

| Injection. machine no. | Feeder type | Molded part weight | Desired set percentage | Actual measured percentage | Excess dosing (waste) | Annual extra expenses (*) |
|------------------------|-------------|--------------------|------------------------|----------------------------|-----------------------|---------------------------|
| 1                      | Volumetric  | 440gr              | 1.4 %                  | 2.75 %                     | 96.4 %                | 25,500 EUR                |
| 2                      | Volumetric  | 350gr              | 1.5 %                  | 1.87 %                     | 24.6 %                | 5,600 EUR                 |
| 3                      | ColorSave   | 370gr              | 2.3 %                  | 2.31 %                     | 0.4 %                 | 160 EUR                   |

(\*) Based on 300 working days per year and masterbatch average price of 2.5 US\$/pound

## Phase B: Reduction of desired dosing % from present value to a lower one

The purpose of this test was to check if and to what level the present set-up of desired % could be reduced, without degrading in the product quality. The dosing set-up % was gradually reduced, together with continuous quality control of the produced parts.

**Remark:** This test can only be performed with the gravimetric **ColorSave** feeder, as the volumetric feeders are not accurate enough and are too sensitive to any random change in the process parameters, and therefore require constant maintenance of an adequate “safety factor” to ensure the right minimum required dosage under all circumstances.

## Phase B test results:

| Injection. machine no | Feeder type | Molded part weight | Initial set percentage | Final set percentage | Reduction in percentage | Annual cost saving (*) |
|-----------------------|-------------|--------------------|------------------------|----------------------|-------------------------|------------------------|
| 3                     | ColorSave   | 370gr              | 2.3                    | 1.6                  | -30.4 %                 | 11,100 EUR             |

(\*) Based on 300 working days per year and masterbatch average price of 5 EUR/kg

## 3) Summary

From the above-mentioned data we can conclude the following results:

- a. An average saving in masterbatch consumption of at least 35% was achieved by switching from the volumetric systems to the ColorSave 1000, without reducing the dosing percentage.
- b. Additional saving of about 30% was achieved by using the ColorSave unique control features to reduce masterbatch set percentage.
- c. Assuming that the rest of the machines behave similarly, total anticipated saving in masterbatch cost by replacing all the existing volumetric feeders to ColorSave 1000 systems, could reach as much as 65%, or 650,000 EUR per year, in this case.

We would like to emphasize again that these results are based on a partial sample only, and according our general experience, the average total masterbatch saving is usually in the range of 35%-50%.

# **ColorSave 1000 gravimetric masterbatch/additive feeder: An efficient complementary device for remote gravimetric batch-blender feeders**

Quite often our customers inquire about the advantage of using the **ColorSave 1000** gravimetric masterbatch/additive feeder when they already have a gravimetric batch-blender feeder, either apart from or at the machine throat.

For a batch-blender mounted on the machine throat, the saving is about 10%-15%. This is a direct result of improving the dosing and preventing the separation of masterbatch that is typical to batch-blenders that are mounted at the throat of the processing machine, mainly due to mixing of materials of very different nature and bulk.

In comparison to a mounted batch-blender, the **ColorSave 1000** is more compact and is easier to optimize, to maintain, and to clean when switching from color to color.

In addition, the **ColorSave 1000** is equipped with an integral venturi loader and thus does not require installation of hopper loaders that are connected to long pipelines (except when used for dosing regrind material).

*Installation of a ColorSave 1000 gravimetric feeder at the throat of the injection (or extrusion) machine, in conjunction with a remote gravimetric batch-blender system, yields considerable savings (25%-35%) in masterbatch consumption, as well as other advantages:*

- **Improved homogeneity of the masterbatch dispersion**

Since the various components that are blended by the batch-blender have different specifications (bulk density, particles geometry, etc.) there is always some separation of the components, which is further increased by the vibration of the injection (or extrusion) machine when installed on the machine throat. Therefore the mixture is not completely homogeneous. This is especially true of the masterbatch/additives component, which is usually heavier, and tends to sink to the bottom of the mixing chamber.

When the batch-blender is not installed on the machine throat, but is located on the floor, the non-homogeneity is even worse, due to the long conveyance and loading route of the material, from the batch-blender to the machine.

*Separate dosage and feeding of the masterbatch with a ColorSave system installed directly at the throat of the machine significantly improves homogeneity.*

- **Improved accuracy of the masterbatch dosing**

When the batch-blender is used for weighing and dosing both main material and the masterbatch, its load-cell is adjusted to higher material volumes. Naturally, its accuracy in weighing and dosing the small quantities of the masterbatch is relatively low, especially in the case of high-capacity batch-blenders.

*Using the ColorSave 1000 as a separate gravimetric feeder, for the masterbatch/additive only, results in much higher accuracy.*

- **Saving in masterbatch/additive consumption**

In order to overcome problems of low homogeneity and accuracy when dosing the masterbatch, especially with a remote gravimetric batch-blender, operators need to dose masterbatch percentage much higher than the minimum theoretical value required, resulting in significant waste of expensive masterbatch/additive.

*Experience has shown that feeding the masterbatch separately with ColorSave 1000 results in considerable savings - as much as 25%-35% on masterbatch consumption - without sacrificing product yield and quality.*

- **Simple optimizing of the masterbatch/additive dosing percentage**

**Optimizing** the masterbatch percentage in a gravimetric batch-blender is a prolonged and complicated process, resulting in a waste of time and materials.

**Changing** the masterbatch type in the batch-blender requires tedious and time-consuming work to empty and clean the complex blending system and the loading and conveying tubes.

*Using ColorSave 1000 for feeding the masterbatch makes the job much easier, faster and simpler. Operators/quality controllers can optimize masterbatch percentage simply by modifying one-tenth of the masterbatch percentage at a time.*

- **Reducing the number of required batch-blenders systems**

Using the batch-blenders for dosing the masterbatch requires installing a separate batch-blender for each injection or extrusion machine, or at least for each group of machines that are using the same masterbatch type and concentration at the same time.

*Using a ColorSave 1000 feeder on each machine for feeding the masterbatch may reduce the total number of batch-blenders required. This may achieve a significant saving in equipment cost, as well as in production floor space.*

## **Summery**

Using a **ColorSave 1000** for masterbatch feeding together with a remote batch-blender for main materials feeding has significant advantages:

- **25%-35% savings** in masterbatch/additive consumption
- **Improved homogeneity** of the masterbatch dispersion
- **Improved accuracy** of the masterbatch dosing
- **Easy and simple optimization** of masterbatch percentage, changing masterbatch types
- **Reduction** of the number of required batch-blenders systems
- **Economy** of floor space in the production area

**The result is that more and more plastic manufacturers are realizing that it is extremely cost-effective and worthwhile for them to purchase the innovative ColorSave 1000 masterbatch feeders and install them as complementary equipment to the remote batch-blender feeding systems of their injection-molding or extrusion machines.**