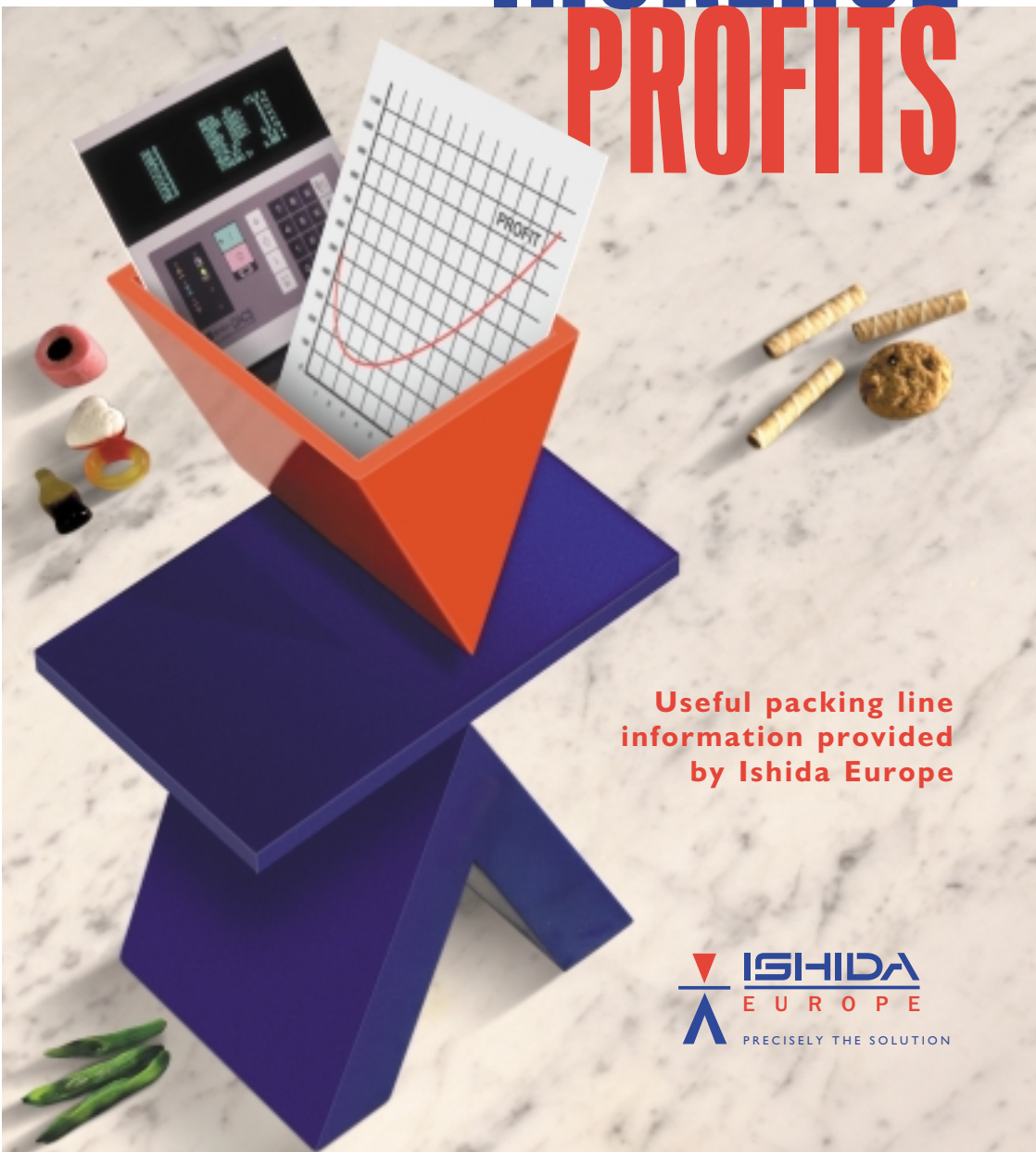
HOW AN ISHIDA CHECKWEIGHER CAN

# INCREASE PROFITS




Useful packing line information provided by Ishida Europe

ISHIDA EUROPE

PRECISELY THE SOLUTION

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# INTRODUCTION

**The purpose of this booklet is to show that an accurate and reliable in-line Checkweigher can do more for you than keep your pack weights within legal limits.**

**It can actually add money to your bottom line: money that would otherwise be wasted.**

The first point we deal with is the Average Weight system. If you use this system instead of the old Minimum Weight system, you can keep all your packs legal and above board in a much less wasteful way.

In the past, many companies produced packs to comply with the Minimum Weight regulations. If an Average Weight system is adopted, it is possible to produce packs above and below the nominal weight and at the same time operate within the law, thus saving a considerable amount of product that would otherwise be given away using the Minimum Weight system.

In addition, a good automatic checkweigher is a reliable source of sophisticated information about your product output: information which you can often feed back into the manufacturing process in a way that improves packing line profitability.

We have avoided using mathematical or statistical terms where possible. Experts in weights and measures will probably find that we have over-simplified matters. However, this information is aimed at those who would like to use checkweighers as a way of improving profitability. We hope they will find it both interesting and useful. Further reading material can be found at the end of the booklet, and if you would like to find out more about Ishida Europe's range of checkweighers, weigh-price-labellers and mulithead weighers, please contact us using the information on page 11.

# HOW THE AVERAGE WEIGHT SYSTEM REDUCES GIVEAWAY

## A summary of the two different systems you can follow to ensure they give fair weight

Packers may fill to either the Minimum Weight system, where every pack must contain at least the nominal weight of product, or to the Average Weight system. The latter requires that the average weight of packs in a batch must be at least the nominal weight, and also makes stipulations about tolerances (called Tolerable Negative Errors) and the percentage of packs which can be below the nominal weight.

Packers choosing to adopt the Average Weight system can reduce product giveaway to levels substantially below those possible with the Minimum Weight system.

To take full advantage of these savings, the use of checkweighers is necessary

- **To reject packs that would reduce the average of a batch below the nominal weight,**
- **To ensure that only 2.5% of packs are non-standard*,**
- **To reject all inadequate packs.**

*Percentage may vary depending on national legislation

## Three simple rules of Average Weight

Under the Average Weight system, a batch of packs must comply with three rules:

1. **The actual contents of a batch of packs shall not be less, on average, than the nominal quantity.**

2. **No more than 2.5% of packs (1 in 40) may be non-standard, i.e. have negative errors larger than the Tolerable Negative Error (TNE) specified for the nominal weight.**

3. **No package may be inadequate, i.e. have a negative error larger than twice the specified TNE.**

Some countries outside the EU using similar legislation employ the term Limit Of Error (LOE) rather than Tolerable Negative Error.

## Tolerable Negative Error

The Tolerable Negative Error - how much below average weight the pack is allowed to be and still remain legal - varies with the weight range of the pack. You can work out the TNE for your pack using the 'Ready Reckoner' table below.

## EUROPEAN TOLERABLE NEGATIVE ERROR 'READY RECKONER'

| Nominal quantity in grams or millilitres | Tolerable negative error | |
|---|---|---|
| | As a percentage of nominal quantity | grams or millilitres |
| From 5 to 50 | 9 | - |
| From 50 to 100 | - | 4.5 |
| From 100 to 200 | 4.5 | - |
| From 200 to 300 | - | 9 |
| From 300 to 500 | 3 | - |
| From 500 to 1,000 | - | 15 |
| From 1,000 to 10,000 | 1.5 | - |
| From 10,000 to 15,000 | - | 150 |
| Above 15,000 | 1 | - |

## The 'e' mark

Packages measured under the Average Weight system, and in the ranges 5g to 10kg or 5ml to 10 litres, may carry an 'e' mark. This is a guarantee, recognised throughout the EU, that the goods in the pack have been packed by weight or volume in accordance with the relevant EU Average Weight directive. It acts within the EU as a metrological passport for goods within the specified weight and volume ranges.

## Comparing your giveaway under the two systems

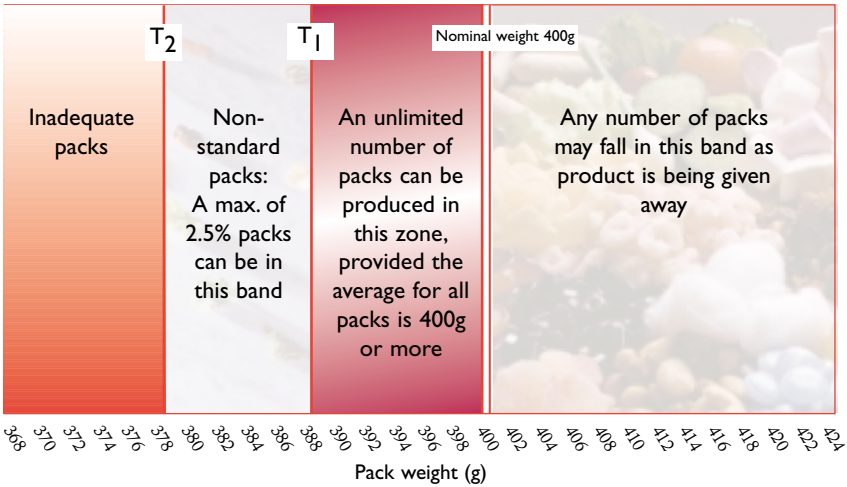
Let us take a 400g pack weight as an example, and roughly compare the giveaway you could expect using each system.

Using the 'Ready Reckoner' table on the left, one can see that the Tolerable Negative Error for a 400g pack is 3%, or 12g.

Applying the rules of the Average Weight system, one can then create Diagram A, which shows exactly how the rules will apply in this case.

$T_1$ is the nominal pack weight minus the TNE.
$T_2$ is the nominal pack weight minus twice the TNE.

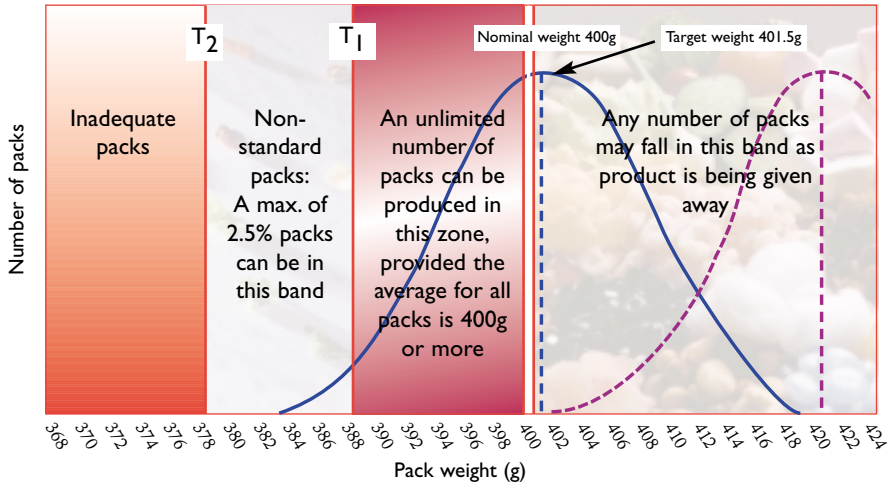
# DIAGRAM A




Because of many different variables, including temperature, humidity and changes in your manufacturing or packing machinery, pack weights tend to vary. If you weighed every pack in a production run, and plotted each weight against the number of packs of exactly the same weight, you would get a curve. In Diagram B, we have superimposed such a graph onto Diagram A. Some manufacturing and packing processes give flatter, more spread-out curves, some give sharper, taller ones. What they all have in common is this general shape, starting from nothing and rising to a maximum, then returning to zero. This symmetrical curve is known as a 'normal distribution'.

The maximum number of packs occurs at the 'mean' weight.

# DIAGRAM B




What you can see from this diagram is that if you were to set the checkweigher to a target weight of 401.5g, just above the nominal pack weight, the three rules of the Average Weight system listed above would be obeyed, and you would stay legal.

However, if you used the Minimum Weight system, all the packs would have to weigh above 400g, which would mean moving the curve to the right (dotted line). This would force you to set the target weight at about 419g.

Clearly, there would be a large penalty to pay in terms of extra giveaway. Equally, it makes sense to use the Average Weight system to ensure the legality of your packs. This also suggests that you should use an automatic checkweigher because it can rapidly carry out the calculations needed (working out when the allowable 2.5% quota between $T_1$ and $T_2$ is about to be exceeded) to keep you within legal limits.

## An impressive effect on the bottom line

In the above example, let us say that the reduction in giveaway on moving from the Minimum Weight system to the Average Weight system is likely to be about 10g per 400g pack, and 100,000 packs are produced in one day. The resultant saving is one tonne of product or 2,500 packs per day.

# IMPROVE YOUR RESULTS USING CHECKWEIGHER FEEDBACK

## The implications of a slimmer weight distribution curve

We have shown that if you can adjust the manufacturing or packing process to give a more consistent pack weight, you can reduce product giveaway by a substantial amount.

The solid curve we drew in Diagram B showed pack weights which did not vary more than about 20g above or below the target weight. Had there been greater variability, the curve would have been wider and flatter. In this case, it is clear that we would have had to shift the target weight to the right (increasing giveaway), in order to stop too many packs falling into the $T_1$-$T_2$ range.

By achieving a narrower range of weight values for any packing line output, we can move the target weight nearer to the nominal weight, and reduce giveaway.

## Where does pack weight variability come from?

The weight of product that enters a pack during the filling process can be affected by many factors. These include operator factors (natural human variability or error), and machinery factors (variations in the performance of belts, auger fillers, hoppers and metering equipment due to voltage spikes, temperature changes, air currents, humidity, air pressure, temperature, or the encroachment of dust or product).

A change in product density, caused by variations in humidity and temperature, will also affect the pack weight.

## Checkweighers provide information that can be used to reduce variation

Checkweighers gather an enormous amount of information about weight and weight variability, and can interface with people and equipment to provide useful feedback. We will look briefly at several specific situations where this has become common practice:

## Feedback to packing line operatives

Staff are packing ready meals by hand in a packing hall. Checkweigher results are displayed on a screen, with a warning signal when there is variation beyond certain limits. Operators are trained to react by increasing or decreasing specific meal components.

Such manual activity will have great variability (low, flat weight distribution curve). Product giveaway is naturally quite high, but this makes checkweigher feedback that much more effective in reducing the giveaway.

## Feedback to a volumetric filler

Frozen peas are commonly weighed on a volumetric cup filler. The volume of the cup is normally adjusted via a servo motor system. The Ishida checkweigher can be equipped with feedback control to interface with the servo motor to carry out subtle adjustments in the volume of the cups during production, thus ensuring the fill volume is controlled to achieve the desired target weight.

## Feedback to an auger filler

An auger is filling packs with coffee. If, as often happens, the bulk density of the product drifts with time above or below the permissible value, the checkweigher can be set up to adjust the auger rotation to within the desired limits. This helps to produce a narrower weight distribu-tion.

## Feedback to the baking process

If dough is checkweighed as it comes off the production line immediately after the divider, variations in weight due to the moisture content can be picked up. This information can be fed back to the dough mixer to alter the weight of the product.

## Quality also means profit

The above examples illustrate ways in which money can be saved by using checkweighers to keep pack weights within as tight a rein as possible. However, checkweigher feedback is also helping manufacturers to monitor their production processes so as to maintain product quality and consistency.

From the thickness of rubber gloves to the integrity of metal components, checkweighers are monitoring product quality in many different industries. Because of their ability to spot anything missing from a consumer pack (eg instruction leaflets, batteries, computer disks) they are also widely used to monitor pack integrity. This is a crucial role in ensuring customer satisfaction and repeat business.

## How can I find out if my process could benefit from checkweigher feedback?

It may be that some of the benefits of using checkweighers outlined here will immediately suggest to you ways of improving profitability or quality in your business.

Some methods of feedback, however, require specialised engineering knowledge. If you wish to look more closely at any part of your manufacturing or packing process with a view to using checkweigher feedback, please contact Ishida Europe using the details on the back of this booklet.

## Further reading material

Western European Legal Metrology Committee (WELMEC):www.welmec.org
International Organisation of Legal Metrology (OIML): www.oiml.org

# FAXBACK

## HOW A CHECKWEIGHER CAN INCREASE YOUR PROFITABILITY

Just tick your choice, photocopy this page and fax to

**+44 (0) 121 607 7740**

to discover the benefit of the Ishida Checkweigher

### PLEASE CALL ME TO DISCUSS:

- ☐ How I can cut down giveaway by using the Average Weight system
- ☐ How I can use checkweigher feedback to improve my production process
- ☐ How my company could benefit from using checkweighers, weigh price labellers or multihead weighers

Title _____ Initials _____

Surname _____

Position _____

Company _____

_____

Address _____

_____

_____

Town _____

Country _____

Postcode _____

Telephone _____

Fax _____

E-mail _____

So that we can best respond to your needs, please provide the following information:

Area of application:

- ☐ Snacks
- ☐ Confectionery
- ☐ Biscuits
- ☐ Bakery
- ☐ Breakfast cereals
- ☐ Pasta
- ☐ Frozen food
- ☐ Fresh food
- ☐ Salads
- ☐ Ready meals
- ☐ Pet foods
- ☐ Other

Please specify your product application:

_____

_____

Please confirm your investment plans for the following weighing and packing machinery:

| | 0-6 months | 7-12 months |
|---|---|---|
| Checkweigher | ☐ | ☐ |
| Multihead weigher | ☐ | ☐ |
| Linear weigher | ☐ | ☐ |
| Bagmaker | ☐ | ☐ |
| Weigh-price-labeller | ☐ | ☐ |
| Pack handling systems | ☐ | ☐ |
| Complete packing line (containing any of the above) | ☐ | ☐ |
| Does your company already use checkweighers? | YES ☐ | NO ☐ |

If yes, which manufacturer?

_____

_____

☐ Please tick this box only if you do not wish to receive any more mailings from Ishida Europe

# THE ISHIDA CHECKWEIGHER CAN ACTUALLY ADD MONEY TO YOUR BOTTOM LINE!

ISHIDA
EUROPE
PRECISELY THE SOLUTION


**Ishida Europe Limited**
11 Kettles Wood Drive
Woodgate Business Park
Birmingham B32 3DB
United Kingdom
Tel: +44 (0)121 607 7700
Fax: +44 (0)121 607 7666

**info@ishidaeurope.com**

**Ishida Czech Republic**
Tel: +420 317 844 059
Fax: +420 317 844 052
info@ishidaeurope.cz

**Ishida South Africa**
Tel: +27 (0)11 475 7725
Fax: +27 (0)11 679 1459
ishida@cybertrade.co.za

**Ishida France**
Tel: +33 (0)1 48 63 83 83
Fax: +33 (0)1 48 63 24 29
info@ishidaeurope.fr

**Ishida Sweden**
Tel: +46 (0)8 556 46 730
Fax: +46 (0)8 556 46 739
info@ishida.se

**Ishida Middle East**
Tel: +971 (0)6 5263 501
Fax: +971 (0)6 5263 502
ishida@emirates.net.ae

**Ishida Switzerland**
Tel: +41 (0)41 790 5115
Fax: +41 (0)41 790 3927
info@ishida.ch

**Ishida Netherlands**
Tel: +31 (0)499 39 3675
Fax: +31 (0)499 39 1887
info@ishida.nl