Ishida and the Multihead Weigher
Multihead weighing technology, originally brought to market by Ishida, has revolutionised the food industry. Through ongoing advances in speed and productivity, Ishida has remained the uncontested brand leader, with over 30,000 multihead weighers installed and a 60% market share worldwide.

This brochure outlines how major advances as well as day-to-day improvements have enabled one company to remain at the forefront of the field for many years.

It touches on the history of multihead weighing, and summarises the sometimes surprising ways in which this technology can help tackle the challenges facing modern manufacturers and packers.

Finally, it shows how the success of the multihead weigher has driven important advances in related areas for Ishida and its customers.

Welcome to the home of the multihead weigher

The principle of multihead weighing

The multihead weigher feeds product into its array of weigh hoppers. The weigher’s computer then determines which combination of hoppers will most closely match the target weight. These hoppers then release their contents into the packaging machine, via the discharge chute.
Multihead weighing: why Ishida will always have more to offer you

The resources needed to develop the technology
Ishida is a €500m company, employing 2400 people worldwide. Privately owned, it has a deep commitment to long-term customer relationships.

Ishida spends many millions of Euros on research and development each year and maintains state-of-the-art facilities for this work in Japan, Europe and elsewhere. New developments in physics, electronics, computing and engineering are closely followed and there is frequent collaboration with universities and other research institutions.

A bank of experience that gets bigger every day
There are many thousands of Ishida multiheads helping to generate profit for our customers across the world. An exceptional level of day-to-day contact with customers, plus internal systems that allow knowledge to be rapidly shared within Ishida, mean that information on what works in one application spreads rapidly to R&D personnel in other countries and also to customer-facing staff involved with other applications.

A very special commitment to the combination weighing approach
Ishida was first to bring the multihead weigher to market and has consistently led innovation ever since, a fact reflected in the over 2000 patents held to date. The technology has delivered important increases in speed and accuracy to the food industry, and we believe there are many more advances to come. Ingrained in the company culture is a strong determination to ensure that every Ishida weigher is the most advanced in its class. This resolve extends also to the tailored distribution systems that channel products from weigher to pack. Beyond this, it includes the interfaces which enable weighers to provide maximum response and deliver comprehensive data within the overall context of lines, plants and manufacturing networks.
Sensitive, reliable load cells are a core part of multihead weighing success. Ishida designs and manufactures its own load cells to assure total control over quality. Delivering full synergy with your other equipment and systems

As a standard with major food manufacturers across the world, Ishida multihead weighers are designed to interface with many other machines to give you full control from the weigher or from any other part of the line. They can be configured to respond to simple or sophisticated signalling from upstream or downstream equipment, such as infeed systems, bagmakers or tray sealers, or to transmit important control signals themselves. The Windows® platform on which their interface is based enables smooth flow of production data within the factory and to remote centres.

A strong reputation for reliability

Ishida multihead weighers have a record of fast payback followed by years of reliable, accurate operation even in difficult plant conditions. This reliability is widely recognised to be based on design and engineering excellence.

Exceptional service, support and training

Ishida’s striving for technological excellence does not stop at the point of sale. All Ishida customers benefit from a dedicated support team, and a choice of service contracts. In 99% of cases, spare parts can be delivered within 24 hours, owing to our comprehensive network of sales companies, distributors and agents. We offer fast, effective training on multihead weighers of all types, either on-site or at our purpose-built facility in the UK.

Multihead weighing: why Ishida will always have more to offer you (continued)

Below are just some of the weigher characteristics that can be varied to meet your exact needs

<table>
<thead>
<tr>
<th>Weigher characteristic</th>
<th>Available variants</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of weigh heads</td>
<td>From 10 to 24 heads</td>
<td>More heads generally mean more speed, accuracy and product mixing capability.</td>
</tr>
<tr>
<td>Head arrangement</td>
<td>Circular, linear or linear Fresh Food models</td>
<td>Standard circular arrangement suits most products. Linear arrangements can be used for installations where size is a problem and Linear Fresh Food for very sticky products.</td>
</tr>
<tr>
<td>Product path geometry</td>
<td>Main body, dispersion system and discharge chute can be angled (standard, gentle slope, steep slope). A variety of inserts, linings and poles can be used to reduce product travel speed.</td>
<td>Accommodates different balances of throughput speed and product fragility.</td>
</tr>
<tr>
<td>Booster hoppers</td>
<td>With or without an array of booster hoppers</td>
<td>Booster hoppers increase speed and accuracy by providing more combinations for each weight calculation.</td>
</tr>
<tr>
<td>Hopper size</td>
<td>0.5 to 7 litres</td>
<td>Enables Ishida multiheads to weigh anything from tiny valuable seeds to whole bags of snacks.</td>
</tr>
<tr>
<td>Hopper open/close method</td>
<td>Double or single, standard or 'scraper' gates</td>
<td>Choice depends on how readily the product falls from the hopper.</td>
</tr>
<tr>
<td>Feeder geometry</td>
<td>Many variants, ranging from simple to waterfall shapes</td>
<td>Can accommodate products ranging from hard confectionery to long, fragile saltsticks.</td>
</tr>
<tr>
<td>Contact surfaces</td>
<td>The choice includes smooth stainless steel, hex embossed, C4 and rippled plastics</td>
<td>Anti-cling properties available where needed. All surfaces offer inertness, durability and easy cleaning.</td>
</tr>
<tr>
<td>Mixture weighing capability</td>
<td>From 2-mix to 8-mix</td>
<td>Where precise control of mixture composition makes economic sense.</td>
</tr>
<tr>
<td>Count facility</td>
<td>Optional software can be added to convert the weighing machine into an accurate counter</td>
<td>Where one specific ingredient has to be counted into the pack the machine can count and also check the final pack weight.</td>
</tr>
<tr>
<td>Anti Floor Vibration (AFV)</td>
<td>With or without Ishida’s proprietary system which compensates for local vibration and dramatically increases weighing speed</td>
<td>Particularly helpful with fast flowing products where high speed and accuracy bring most competitive advantage.</td>
</tr>
</tbody>
</table>

A greater likelihood of finding exactly the machine you need

Ishida has by far the most extensive range of multihead weighers suited to food and non-food applications. They range from entry-level to high-specification models, with some idea of the available choice given in the table below.

A keynote of Ishida multihead weigher development is the ‘best in class’ approach. Whether you want your machine to give you a major competitive edge in sheer speed and accuracy, or the best combination of both within a given price range, or speed combined with gentle handling, you’ll find an Ishida weigher to offer you precisely what you need.
Multihead milestones: the unfolding of a great technology

1968 A problem with peppers
Growers on the Japanese island of Shikoku seek to automate the packing of green peppers. They take this tricky problem (very wide variation in size) to Ishida, an innovative company that has been in weights and measures since 1893.

1972 The first multihead weigher
Ishida, after four years of development and testing, creates the ACW-M-1, bringing a speed and accuracy unmatched by even the most skilled manual packers.

1980 The multihead gets a new heart
Ishida improves accuracy and speed by introducing load cells specially designed for multihead weighing.

1981-84 Entering the Information Age
Ishida designs weigher RCUs (remote control units) to improve packing line operation and co-ordination, and pioneers the integration of weighers into overall factory automation. Multihead weighers with easily detachable contact parts (for easy cleaning) are introduced.

1988 Mixing up a storm
A machine that can mix four separate ingredients at once is introduced by Ishida. Hopper opening and closing becomes smoother and more controlled, so Ishida introduces stepper motors into the design, replacing many pneumatic systems.

1990 Pushing the accuracy envelope
Doubling Ishida head cell development takes accuracy to 0.01g.

1993 The factory shakes, but the weigher stays accurate
Anti Floor Vibration, a system that compensates for ambient vibration, and therefore keeps accuracy high, is a feature of Ishida’s DZ range. It becomes especially important for high-speed applications, such as snacks and confectionery. Also new from Ishida are Digital Signal Processing and Digital Filtration.

1996 Streamlining weigher operation
Refinements include a reduction in springs and links, and the introduction of needle bearings within the drive mechanism so that hopper action is more smoothly controlled.

1999 Made for each other
For the snacks industry, where line efficiency and productivity are paramount, Ishida produces the first fully integrated bagmaker and multihead from a single supplier.

2000-01 Weighers that will talk to anyone
Ishida’s weighers now offer widely familiar platforms, such as Windows®, and can interface with local or wide area networks using Ethernet. This greatly aids data sharing and control from remote locations.

2003 Automating the impossible
By combining the best of automation with an element of manual supervision, Ishida’s Fresh Food Weigher opens up whole new areas such as fresh produce, fresh meat and poultry to the benefits of multihead weighing.

2005 Opening the gate to a new world of speed and accuracy
Ishida upgrades combination calculation technology by making use of a field-programmable gate array. Many more combinations can be processed, all in one fifth of the time, allowing for more infallible accuracy checks. Manufacturers see SD (standard deviation) fall, and profits rise as yields of packed product improve.

2007 Another boost for snacks
A new, advanced version of the Ishida Total Packaging System (ITPS) is launched, bringing the recent advances in multihead technology to the highly competitive world of snack food packing.
As the recognised leader in multihead weighing, Ishida has continued to improve and refine the technology through a unique synergy of innovative engineering and worldwide applications experience. The R-Series offers an excellent example.

Faster weighing for higher productivity

Multihead weighers work by calculating the combination of hoppers (each containing a known amount of product) which can release a combined weighment closest to the desired target weight. The Ishida R-Series is the first to include a processing unit, based on the field programmable gate array, capable of making combination calculations in one fifth the time taken by conventional weighers. As a result, this new generation of weighers is very fast, with a 14-head machine, for example, able to exceed speeds of 200 wpm.

Greater accuracy results in higher yields

The R-Series is an important step forward in accuracy, since a weigher can generate many more acceptable combinations, enabling it to choose one which is significantly more accurate. It even has time to re-check its chosen combination, for greater reliability. This accuracy-enhanced is further enhanced by developments in Ishida’s proprietary AFV (Anti Floor Vibration) technology, which takes vibration in the immediate environment of the weigher into account when processing signals from the weigh heads.

As a result, tests have shown (and experience in operation has now confirmed) that standard deviation (SD) is generally significantly reduced. Manufacturers and packers are seeing yields of packed product increase, typically by 0.5%.
Eliminating the inefficiency of missed cycles

The increased calculation power enables an R-Series weigher to select, apart from the chosen combination, alternative, standby combinations which are also highly accurate.

The benefit of this is seen when a sudden localised temperature change or unexpected vibration results in the chosen combination being outside the acceptable weight range. In this circumstance, conventional weighers either use the ‘wrong’ combination or simply skip a cycle, causing a loss of efficiency. The R-Series weigher, however, has time to substitute one of its highly accurate standby combinations, and the weighing and packing process continues smoothly.

Better control of product flow

R-Series also makes use of Ishida’s new Automatic Feeder Drive (AFD) system. This automatically optimises feeder vibration, helping to counteract any instabilities in the infeed of product to the top of the weigher and improving overall product flow.

Empowering operators

Improved software and graphics, displayed with great clarity, make life simpler for the operator. Intuitive, multilanguage operation and comprehensive guidance and help (including a ‘Start-up Assistant’ and tutorials and manuals accessible on-screen) assist him or her in learning quickly to maximise productivity. A camera mounted over the top of the weigher provides the operator with an extremely convenient way of monitoring the infeed situation via the remote control unit (RCU).

More information made more widely available

Daily production efficiency and output consistency are just two of the many information outputs available from R-Series weighers.

This information-rich environment is not just at the disposal of the local operator and line manager. Thanks to the Windows XP® platform embraced by Ishida, it is available factory-wide and at remote locations, with authorised managers able to examine performance across the operation, right down to each individual weighing head. Similarly, upgrade software and data such as presets can flow freely through an Ethernet system or, alternatively, be uploaded via a compact card.

Less time spent on changeovers

One touch of the RCU screen is enough to activate preset values, preparing an R-Series weigher to run a different pack size or product. A built-in camera enables all likely packs to be photographed and stored for future recognition, a facility which can speed changeover decisions while virtually eliminating mistakes.

The body and contact parts are designed to reduce the build up of debris and to make cleaning faster and easier.

The R-Series: Ishida’s latest contribution to multihead weigher development (continued)
Simple, fast filling of bags
Get the best speeds in your industry when packing ‘fast’ products such as confectionery and snacks. The Ishida ITPS system, for example, offers the world’s only fully integrated, single-source weigher/bagmaker combination.

State of the art mixing
Weigh mixes of up to eight components with great accuracy and speed. Our technology readily adapts for optimum performance and economics, whether all components are of equal value or just a few high-value components are crucial to your profitability.

How your business can benefit from modern multihead weigher versatility

Placing into trays
Ishida’s bespoke engineering of distribution systems offers you fast weighing into trays, with prevention of bouncing or splashing. With products of two or more components (such as ready-meals), each component can be accurately weighed and placed exactly where it’s needed, for a perfect pack presentation.

Keeping reluctant products moving
Products such as leaf salads (which are very efficient at absorbing vibration) and cheese (which tends to stick to contact surfaces) now present few problems. Ishida technology designed to keep them moving smoothly includes advanced AFD, an automatic control system that maintains consistent feed to the weigher. And there’s also PWM (Pulse Width Modulation) which brings new power and flexibility to weigher vibratory systems.

Fragile and awkward products
Use Ishida’s uniquely deep and varied experience of difficult-to-handle materials to get the maximum speed and accuracy for your product. We have weighers and the corresponding distribution systems, to handle fragile, long, bulky and wet or sticky products. In size, these range from large poultry pieces, via easily bruised potatoes to tiny valuable plant seeds requiring the world’s smallest multihead weigher.

Weighers that switch, or even move
Where space and economics dictate, a single weigher can switch its output between two or more different packing lines (e.g. bags and trays). Mobile weighers can physically re-locate from one line to another as needed.
How multihead weigher development has broadened Ishida’s offering

Since its arrival in the marketplace, the multihead weigher and Ishida’s focus on customer needs have combined to produce a continuous drive into new areas.

The desire to bring the hygiene, speed and accuracy of multihead weighing to many ‘difficult’ products has spurred the development of, for example, gentle handling weighers, salad weighers and the Fresh Food Weigher which is transforming the packing of sticky meats and fresh produce.

Determined that bagmaker speed must not limit line performance, and in order to maximise overall efficiency, Ishida has developed a range of bagmakers specifically for the snack foods industry.

The development of so many tailor-made weigher-to-pack distribution systems has given Ishida a vast and growing range of expertise in this area, as well as spinning off a sophisticated approach to topping pizzas and other products.

The need to offer tray packing expertise to parallel the company’s advances in bagged products led Ishida to acquire and develop traysealing expertise, to the point where its recent QX-1100 range is second to none in speed, versatility and pack quality.

Finally, in order to install often complex lines and plants, to ensure the necessary quality across each installation and to optimise control and information flow Ishida has also long been involved in the areas of project management, ancillary equipment (including elevators and gantrywork) and interface development.

Applications we can help with

The range of applications in which we have accumulated useful experience is so broad that we will in all probability have covered at least some aspects of any weighing or packing problem that you face. The table that follows briefly summarises this experience.
A working relationship with Ishida

Ishida offers you a genuine understanding of the business world in which you operate. This results in realistic advice and in service and support which display proper urgency in getting the job done on time and in full.

Innovative, solutions-oriented thinking is tempered by a wide range of applications experience, and directed by a true commitment to your objectives.

We'd like to share your challenges

We hope this brochure has given you an increased understanding of Ishida's central role in the creation and ongoing development of the multihed weigher, and also of the many other ways in which our company can play a part in the success of your business.

Whether you are an existing customer, or are getting to know Ishida for the first time, we hope it will encourage you to make contact (please see details overleaf) with a view to exploring packing line opportunities and challenges, both present and future.