7 tough questions to ask

when buying a Volume Measuring instrument

Stable Micro Systems

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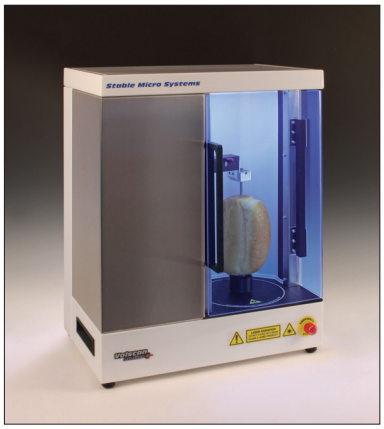


"... a precise and rapid method for the measurement of the volume of bread..."

Introduction

The *Volscan Profiler* is a precise and rapid method for the measurement of the volume, density and dimensional profiles of solid products in order to:

- Determine the effects of ingredients, formulation or processing variables on end product dimensions
- Characterise the structural integrity and quality of solid materials quickly and routinely from density measurement
- Determine the dimensional properties of your 'gold standard' product for future consistent quality control
- Assess dimensional changes during storage or transportation
- Substantiate your product claims
- Compare with competitive products
- Provide an objective quantifiable result which can be archived and retrieved for future viewing should you ever need to check back and compare with historical data.

TOUGH QUESTION # 1

What can a Laser-based Volume Measuring Instrument test that Displacement Methods can't?

Amongst the many displacement techniques each has a restriction for volume measurement. Fluid displacement techniques are not suitable for porous materials. Mercury displacement techniques represent a toxic risk to the environment and are therefore illegal in many countries. Gas displacement techniques usually measure very small samples or otherwise attract a high instrument price.

"... this method... is now considered primitive..."

Traditionally, volume measurements of baked products have been obtained by the technique of seed displacement, in which the amount of rape seed or pearl barley packing around the loaf in a standard container is measured. Whilst this method has been universally recognised for decades as indicative of baking quality, it is now considered primitive, inaccurate, tedious and laborious.

The following drawbacks which affect the efficiency, accuracy of the measurement and usability are commonly known in the baking industry:

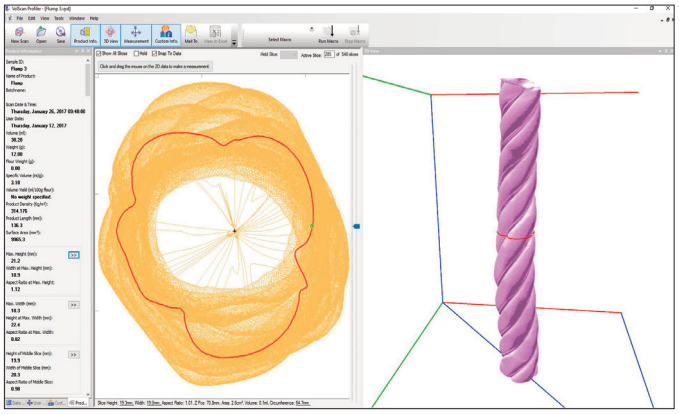
- Repeated calibration necessary
- Operator dependence
- Loss of seed due to spillage (and therefore seed all over lab floor)
- Adherence of seeds to the product or to static electricity
- Seed clumping due to moisture absorption
- Periodic sieving of the seed to remove food crumbs
- Potential crushing of freshly baked or soft products
- Inability to test small products (results are reported to be +/-40ml)
- Limitation of recording one measurement only (i.e. volume)
- Manual recording of results with no digital record

However, you might need to also ask yourself another question: Why settle for a measurement technique that gives only one value?

STABLE MICRO SYSTEMS' ANSWER # 1

The *Volscan Profiler* is a benchtop laser-based scanner that measures the volume, density and dimensional profiles of solid products.

This non-contact measurement system offers considerable advantages over contact and displacement techniques that purely measure volume. The rapid 3-dimensional digitisation of products enables the automatic



Volscan Report data provides 2D sectional and rotatable 3D views

calculation of several detailed dimension related parameters, the results of which may be mathematically manipulated for immediate use or future retrieval in a variety of data formats.

Software which accompanies the *Volscan Profiler* allows input of test settings and displays the finished test result as 2D and 3D profiles, whilst archiving all test data in spreadsheets and providing an optional report.

Besides offering rapid 3-dimensional digitisation of products, laser-based volume measurement has the ability to measure objects that, due to their texture, porosity or size, is not possible with displacement techniques. Soft, thin, or brittle products with vulnerable structure that could be easily altered by the compressive or wetting nature of displacement techniques are easily mounted in the instrument by a variety of support options.

"This non-contact measurement system offers considerable advantages..."

Whilst X-ray techniques are also available, they are expensive, present a health and safety issue and therefore require fully trained operators. The *Volscan Profiler* uses an eye-safe laser and therefore is the safest procedure for density determination. It also gives the most comprehensive set of dimension-based parameters available, with the largest measurement envelope in its class.

As a specific example; in modern bakeries, it is increasingly important to have a precise and rapid method for the measurement of the volume of bread loaves, enabling control and monitoring of bread-making conditions and manufacturing operations. If you have experienced the measurement of volume using seed displacement, you would likely have found it to be a calibration frustration and mess in your laboratory.

Manufacturers have a precise and fast method for the measurement of the volume of bakery products, in order to be able to control and monitor the breadmaking conditions and ingredient performance.

So let us sow a new seed for you - the Volscan Profiler: Non-contact, accurate, fast computer-controlled measurement of volume for baked products. Here's to a seedless lab floor!

TOUGH QUESTION # 2

What else will I be able to measure alongside Volume?

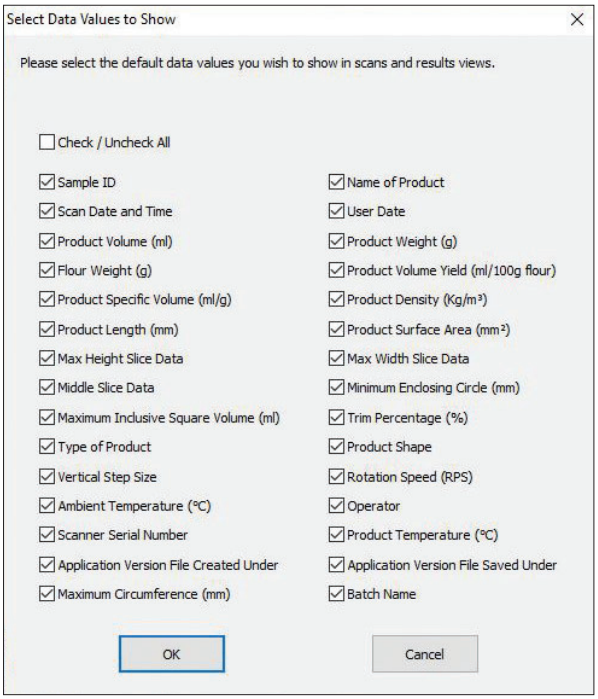
Laboratory time is valuable so operators will be keen to get the quickest and most comprehensive measurements from any testing that they perform rather than piece together a series of measurements from several different instruments.

"... a wider range of direct measurement parameters..."

With the movement into digital measuring systems, contact or displacement methods that offer the measurement of one parameter can be replaced by procedures that offer not only a wider range of direct measurement parameters but also the ability to manipulate these parameters into additional measurements offering a wider scope of decision making tools regarding the product's quality.

STABLE MICRO SYSTEMS' ANSWER # 2

Typical digital volume measurement includes the measurement of *product length, height and width* – after all, volume is a derivation of these dimensions. With the use of a loadcell as standard in the instrument, additional basic measurements of weight allow *Specific Volume* and *Density* measurements, which are also of interest, to be included.

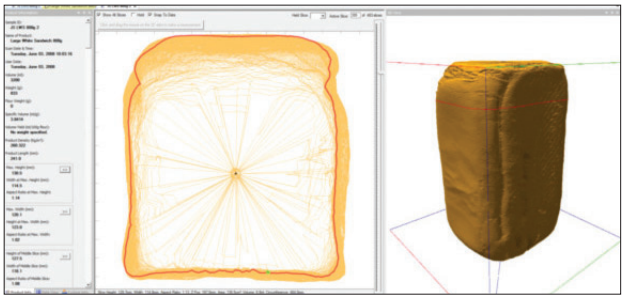


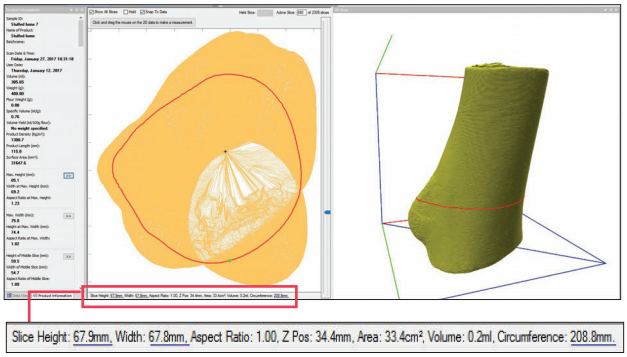
Optional displayed product information

You will, however, want your instrument to be as universal as possible, regardless of what your initial requirements are. After all, do you know what you might be asked to test next? So instead of just shopping for an instrument to meet your needs today, consider the additional measurement options that might be available to you. What if there were a whole host of optional calculations and parameters that could be collected simultaneously and automatically?

For every product scanned, the following information is automatically calculated and optional parameters are displayed alongside the 2D and 3D scans (see left).

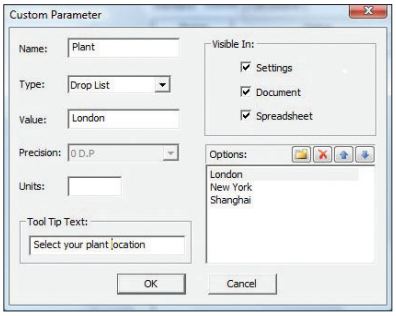
Due to the samples being scanned by the laser in a linear manner the mounted sample can be analysed in 'slices'. This means that every measurement step increment (chosen between 0.05 and 50mm) possesses data and

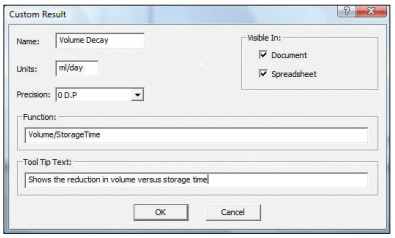




statistics of its own such as *circumference*, *average radius* and *minimal enclosing circle*. This provides more detailed dimensional analysis than any other similar measuring instrument.

For those manufacturers of sandwich loaves looking to verify whether their finished diagonally cut sandwiches will fit in the chosen packaging, the determination of *maximum height* and *width* will qualify their suitability to fit without difficulty. For manufacturers of baguettes and rolls, a further calculation – *'Minimum Enclosing Circle'* – is also now available to measure the minimum diameter of packaging that is required to contain the product without deformation. The smallest circle that can encompass all of the data points of the largest scanned slice is virtually fitted to the finished scanned product.





"... the software is constantly evolving to include features required by users..."

By customer request, we have also added the measurement of *Surface Area*, testament to the fact that the software is constantly evolving to include features required by users of this field of measurement.

Additional parameters and calculations can also be defined by the user if required. This provides the option of adding your own calculations and data references into the *Volscan* software to optimise the information you wish to include in reports.

The addition of all of these unique calculations extends the useful application of the *Volscan Profiler* and provides extra manufacturing decision tools not offered by any alternative or historically available volume measuring method. In fast-paced industries, rapid product measurement and provision of automatically calculated quality control pass or fail benchmarks is key to manufacturing intelligence and success.

No other instrument is as comprehensive in its measurement parameters as ours – we measure so much more than Volume...

TOUGH QUESTION # 3

How accurate is it?

When making any kind of measurement you'll want it to be as repeatable and accurate as possible and without any operator dependence.

After all, what's the point of measuring if your variation in results are so high? Likewise, your testing should not be dependent on who is performing the measurement or rely solely on visual and manual recording.

STABLE MICRO SYSTEMS' ANSWER # 3

At the 100th American Association of Cereal Chemists Conference (AACC) in Minneapolis in October 2015, the *Volscan Profiler* was awarded the certificate of approval as an AACCI Standard Method with reference 10.16.01.

This is good news for all operators in the cereal science and bakery product testing world who are encouraged to use (or have greater preference for) Methods that are approved by the AACC.

The Method was taken through a collaborative study with 9 other laboratories in 4 countries who followed the procedure and reported their results from the measurement of the same samples. The measurement of Volume, Length, Height and Width are all part of the Standard Method, making it the approved Method with more scope in parameters and breadth of bakery samples than any similar Method using competitive equipment.

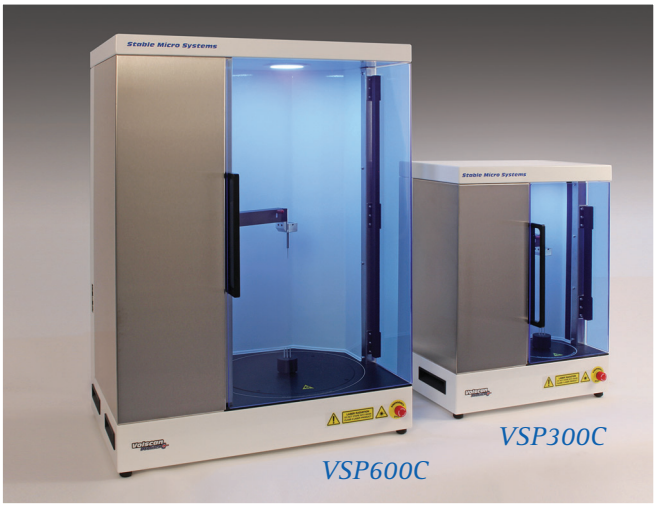
"... the approved method with more scope in parameters..."

"... accuracy can be further improved by reducing the step size..."

The *Volscan Profiler* has also reported results that are more accurate and repeatable than any other commercially available volume measuring instrument in this field. What's more, this accuracy can be further improved by reducing the step size for each measurement (optional from 0.05 – 50mm). The *Volscan Profiler* software is able to display the duration of each test will take (based on its length) and the operator can then adjust the test time according to their choice of speed or accuracy. Whilst a typical test can take 28 seconds, the accuracy can be increased further by scanning at smaller increments – the choice is yours.

If you would like to view a video of the Standard Method, you can access it at: http://bit.ly/L49LK0

The Volscan Profiler – proven to be the most accurate standard volume measuring instrument...



Volscan Profiler C

TOUGH QUESTION # 4

Are there unique features in the software that I can't get anywhere else?

Like the capabilities of the instrument, you'll want to make sure that the software is as feature-rich as possible for all of your future requirements, while being easy to use for both capturing and analysis of data.

As is the case with any specialised technical instrument, even the best in hardware design and engineering can be compromised if the accompanying software is not of the same high standard.

STABLE MICRO SYSTEMS' ANSWER # 4

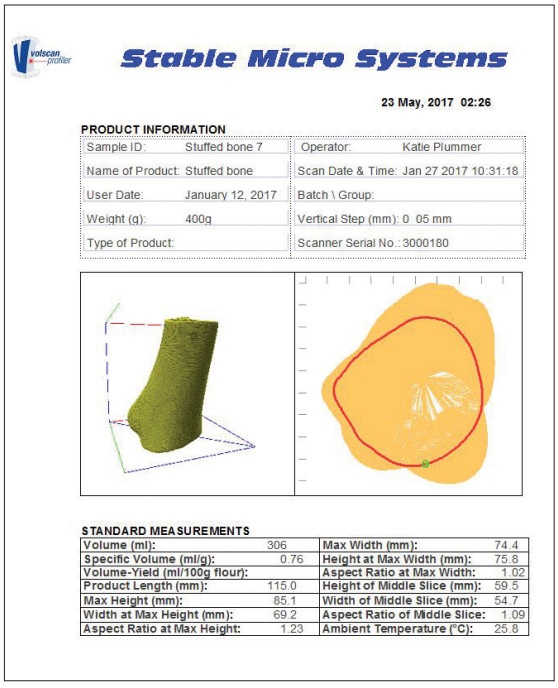
Since its launch in 2008, the *Volscan Profiler* and software have continued to progress to provide new features and customer requests that are not available elsewhere.

These features include:

- **Check and Verify your Volscan** – a measurement is only worth performing if it's accurate. This is why you'll want to have control of instrument calibration and the means of verifying that the instrument is measuring accurately by testing a *'Known Volume Verification'* ball. The instrument will verify that the ball correlates with the measurement values as provided by the manufacturer so that you can continue your product testing feeling confident that your instrument performance has been checked.

- **Presentation of your results** – a report template is available into which your data can be dropped and automatically positioned with test data fields or modified using full *Report Editing* tools. Alternatively, images and data can be copied and pasted into other applications.

- **Fully rotatable test files** – to appreciate the scan detail in every plane. The scanned data can be viewed in both 2D and 3D representations to allow comparisons with previous archived measurements. Within the 2D sectional view, additional manual measurements can be made on chosen intervals. 3D views of the product are rotatable in all planes providing flexibility of viewing for visual comparison and presentation.



Stable Micro Systems

23 May, 2017 02:26

PRODUCT INFORMATION

Sample ID:	Stuffed bone 7	Operator:	Katie Plummer
Name of Product:	Stuffed bone	Scan Date & Time:	Jan 27 2017 10:31:18
User Date:	January 12, 2017	Batch \ Group:	
Weight (g):	400g	Vertical Step (mm):	0 05 mm
Type of Product:		Scanner Serial No.:	3000180

STANDARD MEASUREMENTS

Volume (ml):	306	Max Width (mm):	74.4
Specific Volume (ml/g):	0.76	Height at Max Width (mm):	75.8
Volume-Yield (ml/100g flour):		Aspect Ratio at Max Width:	1.02
Product Length (mm):	115.0	Height of Middle Slice (mm):	59.5
Max Height (mm):	85.1	Width of Middle Slice (mm):	54.7
Width at Max Height (mm):	69.2	Aspect Ratio of Middle Slice:	1.09
Aspect Ratio at Max Height:	1.23	Ambient Temperature (°C):	25.8

Detailed Report output

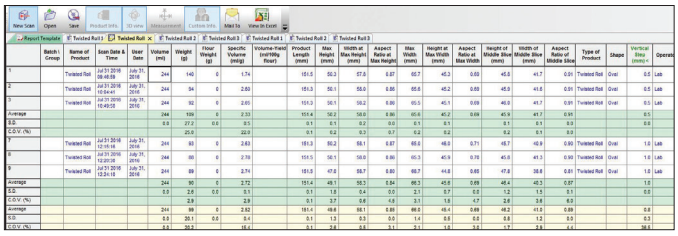
"... a means of testing multiple products simultaneously..."

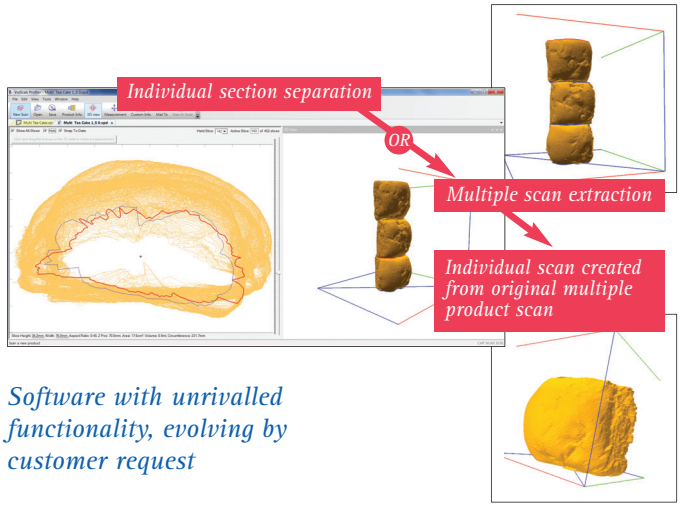
- **All of your data in one place** – provided by a built-in spreadsheet for data collection and statistical manipulation. There is no need to export data to another spreadsheet program, as the *Volscan Profiler* software has its own integral spreadsheet, but *Exporting to Excel* is also an available option if preferred.

- **Barcode Scanner compatability** – allowing quick product information entry and reducing user error. This device would attach via the USB port on the PC.

- **Choice of Rotation Speed** – for heavy soft samples, or delicate samples, the centrifugal force created during the rotation can distort the sample or cause it to fragment or wobble and therefore a slower rotational speed is recommended. The fast speed provides the quickest scan times, but can affect the integrity of some products and produce less accurate results.

- **Stacking products for faster testing** – by customer request, we implemented a means of testing multiple products simultaneously, followed by post-test analysis of the data of each sample piece. One such example is in the testing of multiple bread rolls, the objective being to save time, to give an average volume and weight and then create individual scan files of each roll.





Software with unrivalled functionality, evolving by customer request

The scan result shown here is of 3 rolls mounted on a skewer. The *Volscan Profiler* software has the ability to easily separate a multi-product scan into individual sections. Each section can be highlighted and extracted individually, or multiple scans created in a one-step operation. The data from each scan file is automatically placed into the spreadsheet which can be readily reported, exported or emailed.

TOUGH QUESTION # 5

What other products might I be able to test?

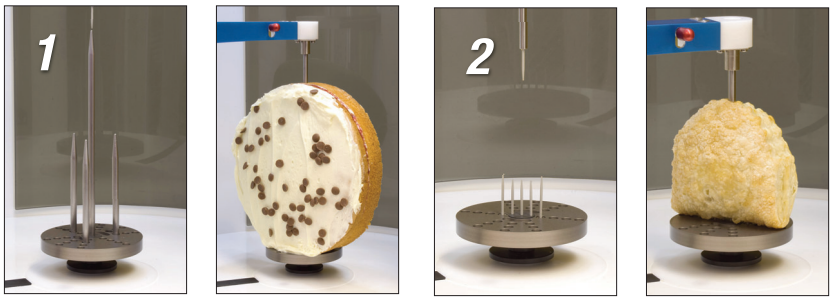
An instrument of this nature is a long-term investment. You'll therefore want to make sure that its application is as universal as possible.

Whilst your initial application requirements might be obvious you'll want to make sure that your instrument can be applied to as wide a range of products as possible. Make sure you get the most value-added, feature rich instrument for your money to take your laboratory needs well into the future!

STABLE MICRO SYSTEMS' ANSWER # 5

As the *Volscan Profiler* provides the largest sample testing envelope[1] in comparison to other laser volume measuring instruments, the scope of potential test samples extends much wider.

The choice and configuration of spikes and skewers (3 examples shown below) for product support depend on the dimensions and texture (e.g. brittleness, softness), weight, centre of gravity and contact area with the base. The aim is to provide vertical stability without damaging the sample structure and thereby allowing an accurate measurement of its dimensions and volume to be recorded during the test.



Support with disposable inserts

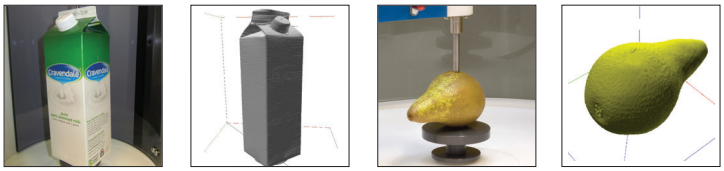
For customers who are looking for ways to support solid materials, or types of products, that cannot be supported by an array of spikes they can choose to have an additional alternative product support which accommodates circular disposable inserts magnetically (left). These provide the means to 'adhere' their sample to the insert and allow for quick removal and replacement between tests. Disposable inserts are provided in batches of 50 and may or may not be reusable, according to the chosen adhesive for sample anchoring.

[1]*Maximum product height 600mm; maximum product diameter 350mm*

"... the accurate measurement of density is important."

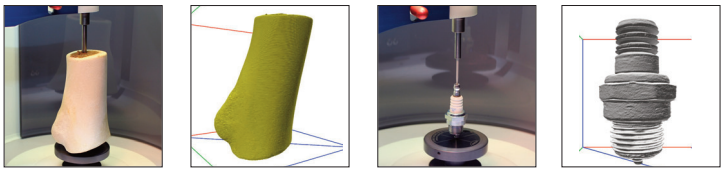
The measurement of density is necessary in the manufacture of many of today's products. It is an extremely valuable and reliable tool to characterise the structure and quality of solid materials quickly and routinely, such as glass, plastics, ceramics, foams, minerals, cements, resins, food products and many more. Density measurements guide the formulation process and influence the overall quality of manufactured products.

A change in density can be the result of an altered material composition or the presence of a defect or void. It is often beneficial, for performance or cost saving reasons, to reduce the weight of products whilst maintaining the overall physical size of the product. The density of porous materials is affected by the quantity and size of pores. In fact, manufacturers often attempt to develop materials that are partially porous but still fulfil their technical function; however, this porosity can often affect other material qualities such as integral strength and therefore the accurate measurement of density is important. In such products as home insulating materials, the presence of closed air bubbles is desirable.



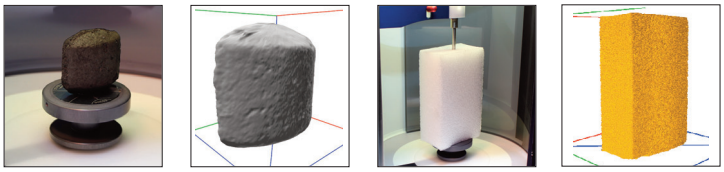
Packaging

Fruit



Bone

Machine Parts



Minerals

Foam

On the other hand, automobile and furnace filters require an open cellular structure. However, in products such as ceramic, concrete, frost resistant roof tiles and laminate structures, prevention of porosity is crucial to their structural integrity. Manufacturers can inspect both closed and open cells and the presence of unwanted voids in a product by measuring their density. If a decrease in density from a reference value is spotted, this can indicate a void within the product. An increase in density, on the other hand, may indicate that a process – such as a polymer approaching its crystalline state – is optimised.

Making sure you get the most from your testing investment with a Universal approach

The Volscan Profiler can give you valuable information to help you bring more dimensionally controlled products to the market whatever the test sample.

TOUGH QUESTION # 6

Can I easily share and compare my data with colleagues in other locations?

You're probably either the only person in the lab in a small company, or part of a team within a national or international corporation.

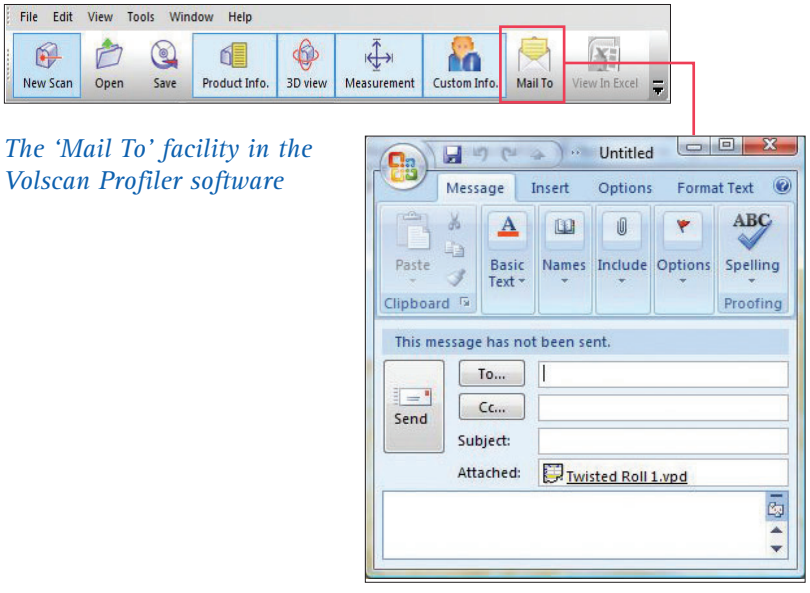
"...you'll need to report your data..."

Either way you'll at some point need to report your data, share your results or compare your volume/dimension measuring data with other testing locations. The ability to send your data in a wide range of formats to others without the volume measuring software or receive data of all ages to compare with your own will be important to you. You'll also either want a quick way of emailing a scan or report or have options available to you to display, manipulate and design layouts for your data to be presented or archived in a certain format.

STABLE MICRO SYSTEMS' ANSWER # 6

Volscan Profiler software has data sharing, sending, comparing and displaying as fundamental issues of its use.

We always assume that at some point you will want to share and distribute your historical data for comparison purposes. We've inserted *'Mail To'* buttons wherever possible and provided a wide range of file formats for data (.jpg, .bmp), spreadsheets (.xml, .html, .tab) and reports (.pdf, .rtf) so that others who may not have *Volscan Profiler* software have other options available to view your data.



The 'Mail To' facility in the Volscan Profiler software

- Mail To – results can be quickly emailed by clicking on the *Mail To* button which automatically opens up a message window in Outlook and attaches the active window.

TOUGH QUESTION # 7

Once I've bought a Volscan Profiler, what support is available and how much will it cost?

So your *Volscan Profiler* arrives, and you're eagerly waiting to employ it to test your samples.

If you've never used a *Volscan Profiler* before, you'll need help getting started, having someone to guide you through features of the instrument and possibilities within the software. You might need help from experts to make sure you develop the most repeatable method for your product, with a clear understanding of how to analyse your results and meaningfully relate them to the questions they are trying to answer.

STABLE MICRO SYSTEMS' ANSWER # 7

From the moment you open the box, we're ready to help you optimise your first experience.

Our *Getting Started Guide* is there to take you through initial installation, calibration and test set-up with tips on how to mount your test samples. This A3 guide can be displayed on the wall above the instrument for other users as a quick step-by-step reminder of how to obtain good data.

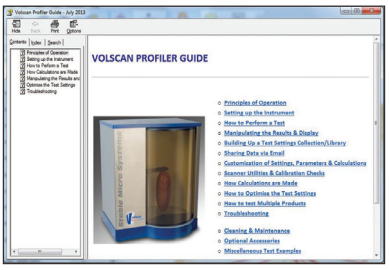
The included manual should explain all of the features of the instrument and its software. We know that these things quickly go missing in laboratories so, if you lose it, let us email you a new one.

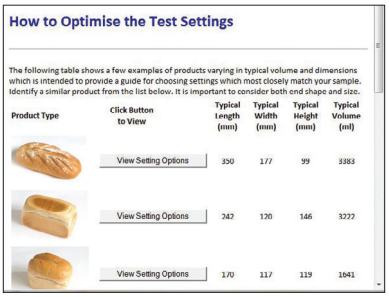
Alternatively, the contents of the manual are built into the *Help* section of the software in a way you won't see anywhere else. This integrated *Getting Started Guide* gives a wealth of examples and shows the change in accuracy as step size is altered.

"... we strive to provide our users with continual support..."

Our promise to you is – **FREE Technical Support** throughout the life of your instrument! It doesn't get much better than that. We don't just manufacture volume measuring instruments; we strive to provide our users with continual support to enhance their instrument understanding and get the most universal use from their new tool.

What if you need help developing a method for your product? What if, in the distant future, you need to assess a newly developed product that clearly requires a different method? Just contact us, we'll be delighted to help you develop your new protocol and analysis project. All of our Distributors across the world have been trained to provide top-class customer support. Our online Testing Advice Service helps you get the





"We make every effort to keep you informed."

most from your *Volscan Profiler* by enabling direct contact to our in-house application laboratory where all of our Application Development takes place and from which useful test advice can be given confidentially.

Maybe you're a Volume/Density Measurement expert already and would just like to stay connected to us to keep abreast of new developments in the field of texture analysis that could be of interest to you. No problem, we extend our information branches from our Twitter feed, LinkedIn group, Texture Analysis YouTube Channel and our monthly newsletter. We make every effort to keep you informed.

Note on Software Updates and Future-Proofing:

If you've ever bought software before, you'll probably be aware that whatever version you buy today may be superseded by another version in the future. You will be wondering if future versions will be at any cost to you and whether you will need to buy any additional features – for example, for more data analysis options.

Regardless of what software package you initially choose, we can assure you of unmatched continuously enhanced software, available to download free of charge from our website. If you're on our newsletter mailing list, we'll email you automatically to tell you there's a new version available to download. Updates include any small bugs that are found, new features that have been suggested by our users and additional application notes written for your interest.

Oh, and did we mention – it's ALL FREE OF CHARGE!

You'll also need to make sure that your existing software will last you well into the future as new PC technologies and operating systems forge ahead.

Stable Micro Systems can guarantee that the *Volscan Profiler* software is operational in Windows operating systems from Vista through to Version 10. This is important to consider as, when your laboratory computer goes down and a new one is installed, you're likely to have a newer Windows operating system. We're checking the future is fully-functional for you all of the time!

Providing customer support 'free of charge' throughout the lifetime of the instrument. It's our pleasure!

Conclusion

Whatever your requirements, whether in product development or quality assurance, you need to achieve the best possible value for your budget.

The availability of in-depth education, specialised test design services and free testing advice is particularly important. Despite apparently cheaper alternatives, there is no real substitute for many years of scientific study, engineering development and ground-breaking software authoring.

In short, Stable Micro Systems' *Volscan Profiler*, *Plus* Texture Analysers and *Exponent* software offer you a blend of capability, expandability and value for money which is quite simply unmatched anywhere in the world.

The Author

Jo Smewing *has worked for Stable Micro Systems since 1994. She has managed the application laboratory, where she has developed specific texture analysis methods for the food industry.*

Now, as Business Development Director, she heads the development team of the company, which involves co-ordination of electronic, software and mechanical engineers in the generation of new products.

Jo regularly writes magazine features across a range of industries including food, pharmaceuticals, cosmetics and adhesives and has published several papers based on texture analysis.

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