Modern Oral pouch weight measurement stability as measured using the Cerulean Orion System

Cerulean, Milton Keynes, UK

Introduction

The testing of modern oral pouch quality is becoming of increasing interest to the industry. Being able to accurately assess the weight of product within a modern oral pouch is critical to ensure that the consumer is getting the experience that is intended. Measuring the weight of individual pouches gives the ability to monitor and effectively control the manufacturing process.

A confounding problem with modern oral pouch testing for content weight is that the pouches have high humectant and moisture content. So from point of manufacture the pouches change in moisture content on being exposed to the atmosphere, the rate of change being dependant on the atmospheric temperature and humidity. Consequently fast weight measurement at the point of manufacture is for process control is clearly desirable clearly desirable.

The **Cerulean Orion** test station delivers this ability.

Figure 1: The Cerulean Orion modern oral pouch Test station

The **Orion** test station is an integrated test station specifically made for the testing of snus pouches. The multi-axis robotic system moves pouches to various test points such as the high precision balance, and the tensile test station.
Calibration is provided through a series of dedicated calibration pieces that delivers high precision measurements of weight and physical dimensions.

Experimental

Commercially available white snus were sourced for a weight consistency test. The pouches were loaded onto the **Orion** carrier trays immediately after being removed from their tins and a full battery of tests performed. Two batches of 20 pouches were initially tested and then a third test with 34 pouches was performed. The time for each test cycle is approximately 40 seconds, this may vary upon the number of test selected on the fully configurable Cerulean **Orion** test station.

The means, standard deviation and COV for the batches are shown in the attached table.

	Sample N	Average Weight	Standard Deviation	COV
Batch 1	20	0.6507	0.0533	0.08194
Batch 2	20	0.6698	0.0311	0.04644
Batch 3	34	0.6705	0.0365	0.05447

The distribution within samples and the distribution between samples is good showing a tight control of pouch fill weight.

However a concern exists that the weight of the pouches under test is decreasing whilst exposed to the atmosphere when waiting to be tested.

A weight series measurement graph was plotted with the individual pouch weight obtained. As can be seen there is a possible slight decrease in weight with time (note during the experiment ambient RH% was below 40%) for the selected pouches. The trend lines have a low R^2 value indicating a poor fit to a linear regression curve.

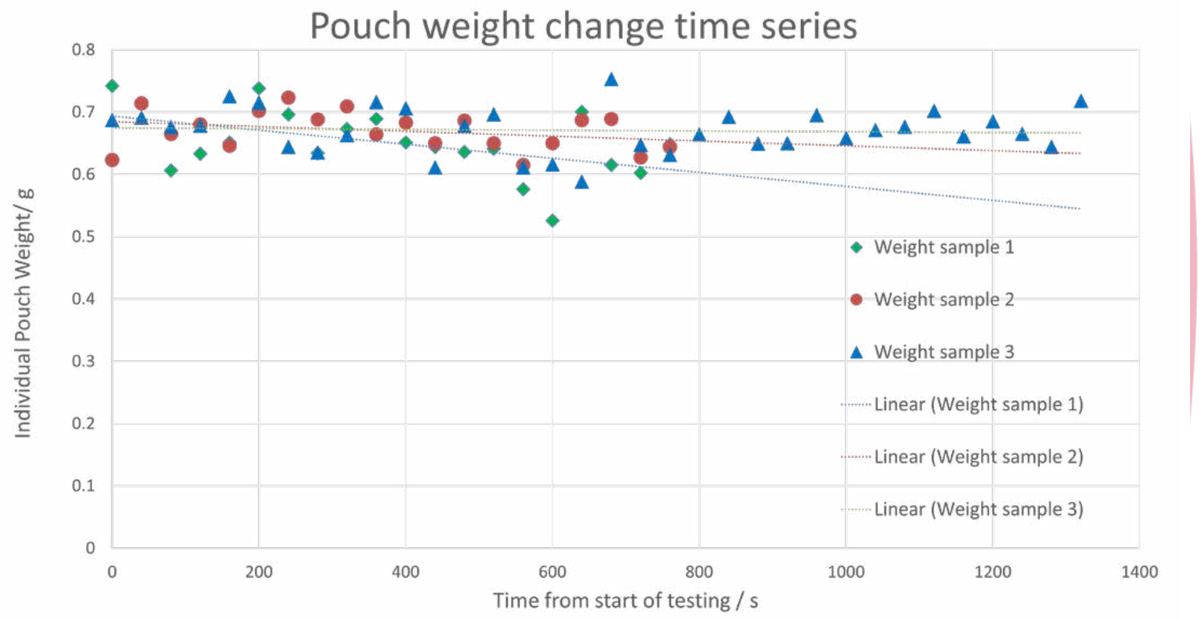

Figure 2: Time domain plot of pouch individual weight as measured by the Cerulean Orion test station for three batches of nominally identical white snus pouches

To ensure that ambient conditions are not influencing the measurement of pouch weight it would be prudent to restrict the number of pouches used in a QC environment, where these measurements are being used to control or adjust the manufacturing process, to 10 or fewer pouches. This is illustrated by plotting a time series graph of the first 10 pouches measured. Here a linear regression fit shows little or no strong trend indicating that in the approximate 6 minutes that the pouches were exposed to ambient conditions there was insufficient moisture lost from the pouches to be of statistical significance when compared to the random scatter of pouch fill.

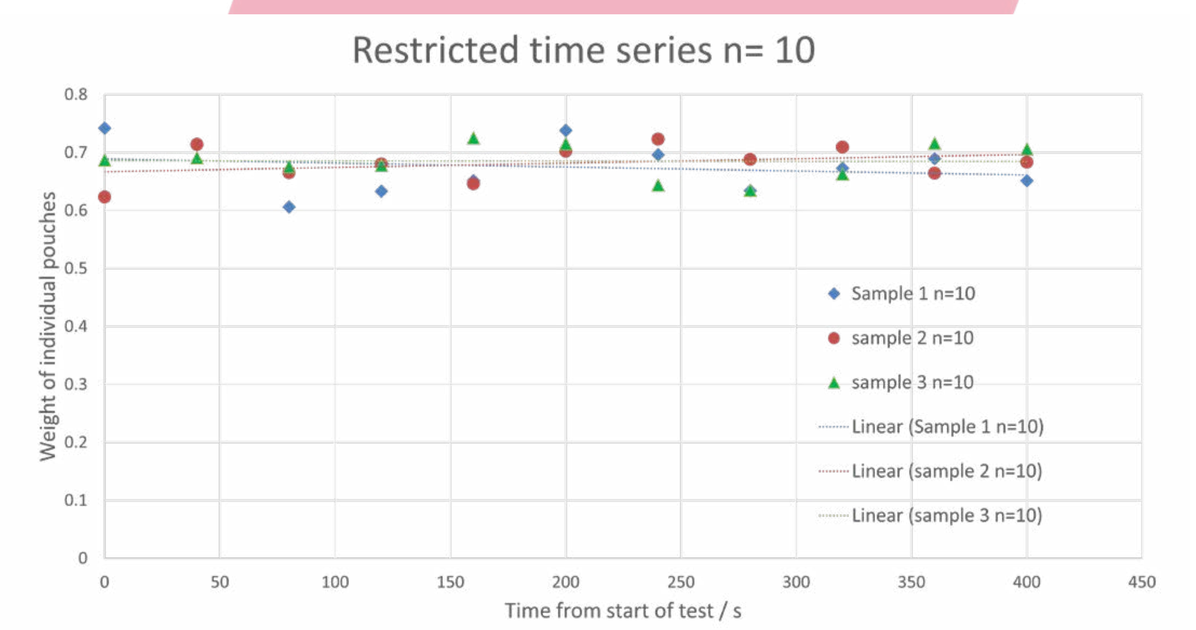

Figure 3: Restricted Time domain plot of pouch individual weight (n=10) as measured by the Cerulean Orion test station

Conclusion

The **Orion** uses a high precision balance system to measure pouch weight. The cycle time for measurement of each pouch in **Orion** is approximately 40 seconds depending upon the measurements selected. For large batches of pouches this can result in 15 minutes or more elapsing between first and last pouch weight measurements.

It has been established through experiment that although there may be some small reduction in mass of the pouches through an extended test through loss of moisture this is extremely small and difficult to distinguish from the “natural” variation in pouch weight . Therefore for most cases this can be ignored. The mean weight of small (~10) batches of pouches if measured immediately after sampling can be considered a true representation of the mean of the continuous manufacturing process.

See other Cerulean whitepapers here:

See our website here:

Technical recommendations and sales support can be obtained from sales@cerulean.com or visit the Cerulean website at for further information and appropriate datasheets.

CERULEAN
a coesia company