Overcoming the challenges inherent in effective quality assurance for modern oral pouches

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1.0 Introduction

- Oral pouch products are growing in popularity as convenient and less harmful alternatives to cigarettes.
- The global oral tobacco market size was valued at USD 2.41 billion in 2019 and is expected to grow at a compound annual growth rate of 5.5 % from 2020 to 2027. There are currently 10M+ users of pouched oral tobacco.
- Many tobacco players are investing heavily in equipping themselves to produce several variants of oral pouch type products
- Current status of the QA testing of the Oral tobacco pouches:
  - Regulatory landscape is not consistent globally
  - Partial ISO standard and CORESTA recommended methods available
  - Manual testing process
  - Multiple test devices
  - Manual data gathering and reporting

Traditional Oral Tobacco

White Oral tobacco

Nicotine pod

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2.0 Problem statement

The study objective was to develop methodologies that provide practical tools for line side QA of modern oral pouch manufacture to drive manufacturing consistency of the making process

3.1 Weight changes
3.2 Tensile test comparisons
3.3 Moisture measurements and changes

To overcome measurement variability, a robotic measurement tool was created that allowed measurement of key parameters. Time based phenomena concerned with moisture loss could be investigated as could an alternative to CORESTA recommended methods for determining pouch seal strength.

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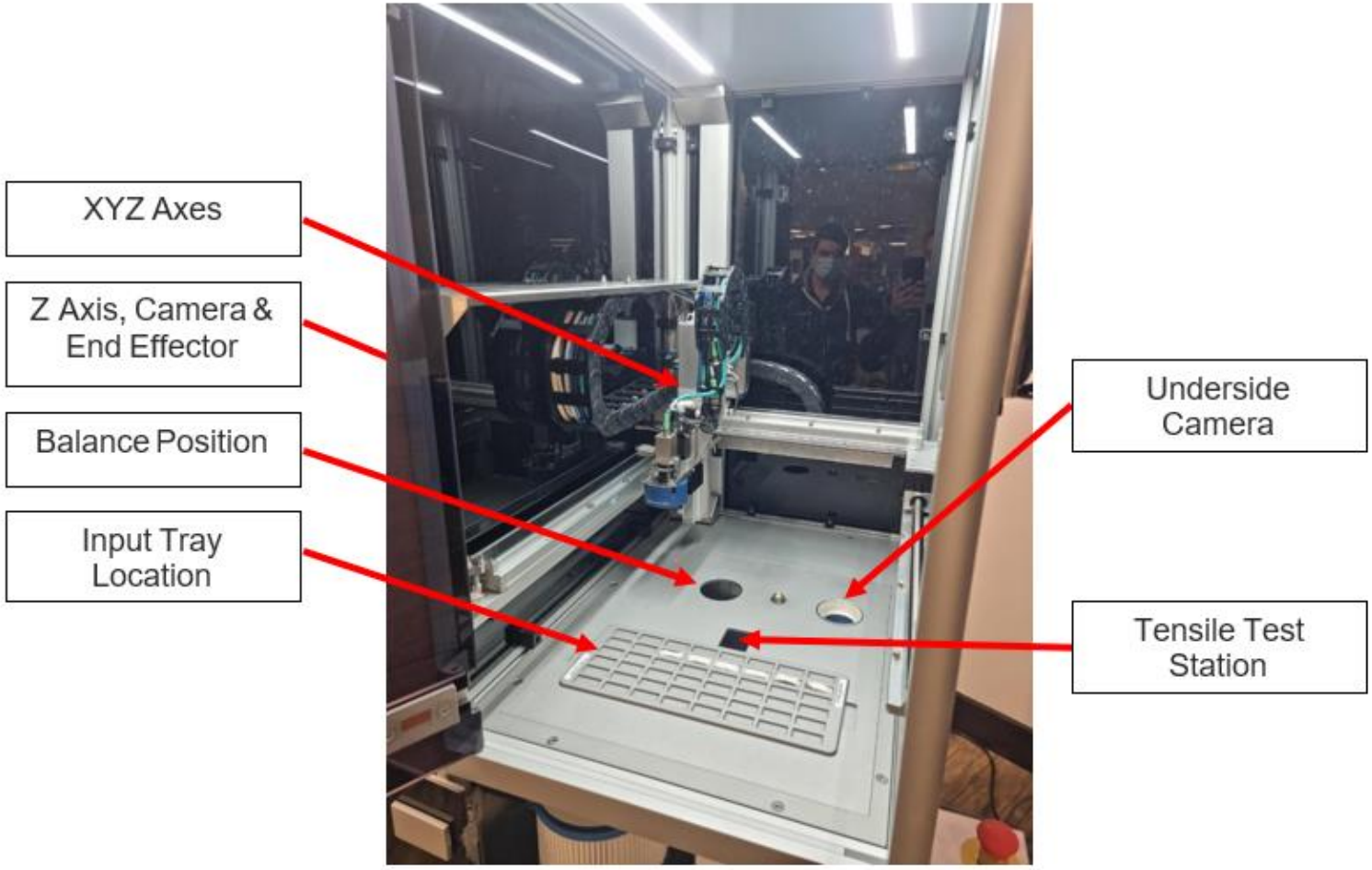
3.0 Experimental and results



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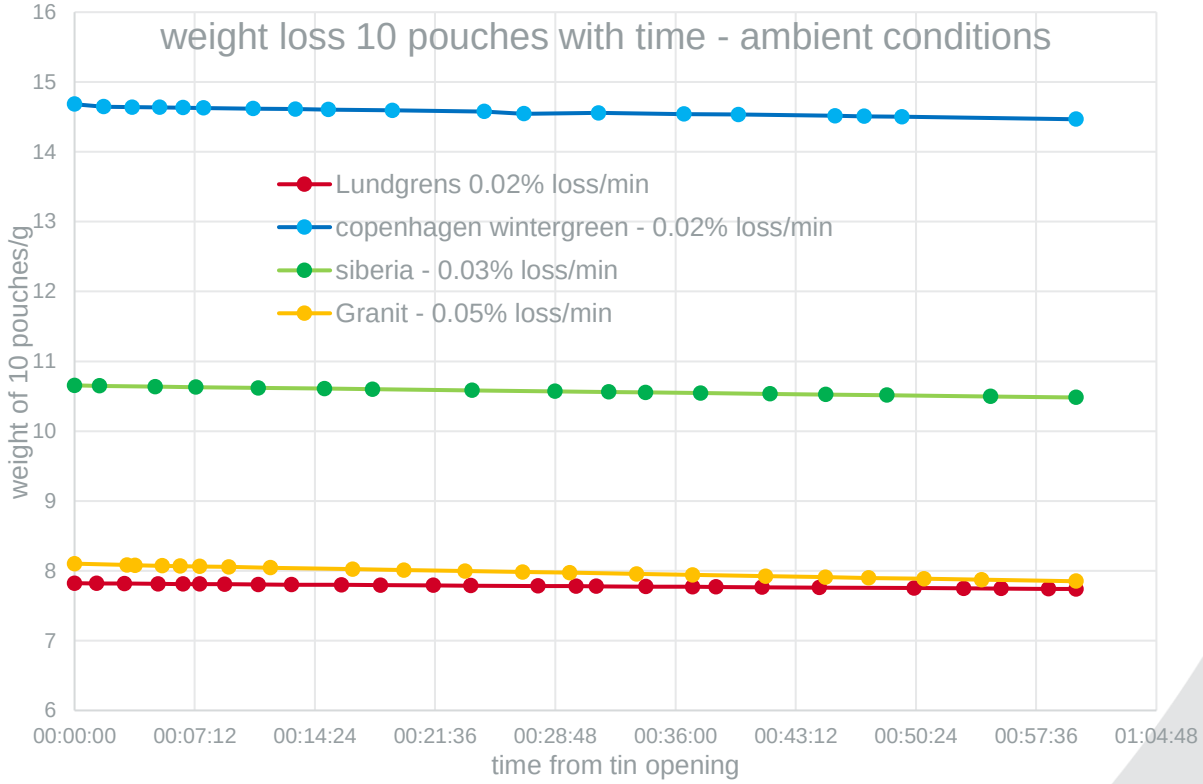
3.1 Changes in weight

Measuring the weight of individual pouches gives the ability to monitor and effectively control the manufacturing process.

A confounding problem with snus testing for content weight is that snus pouches have high humectant and moisture content and 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.



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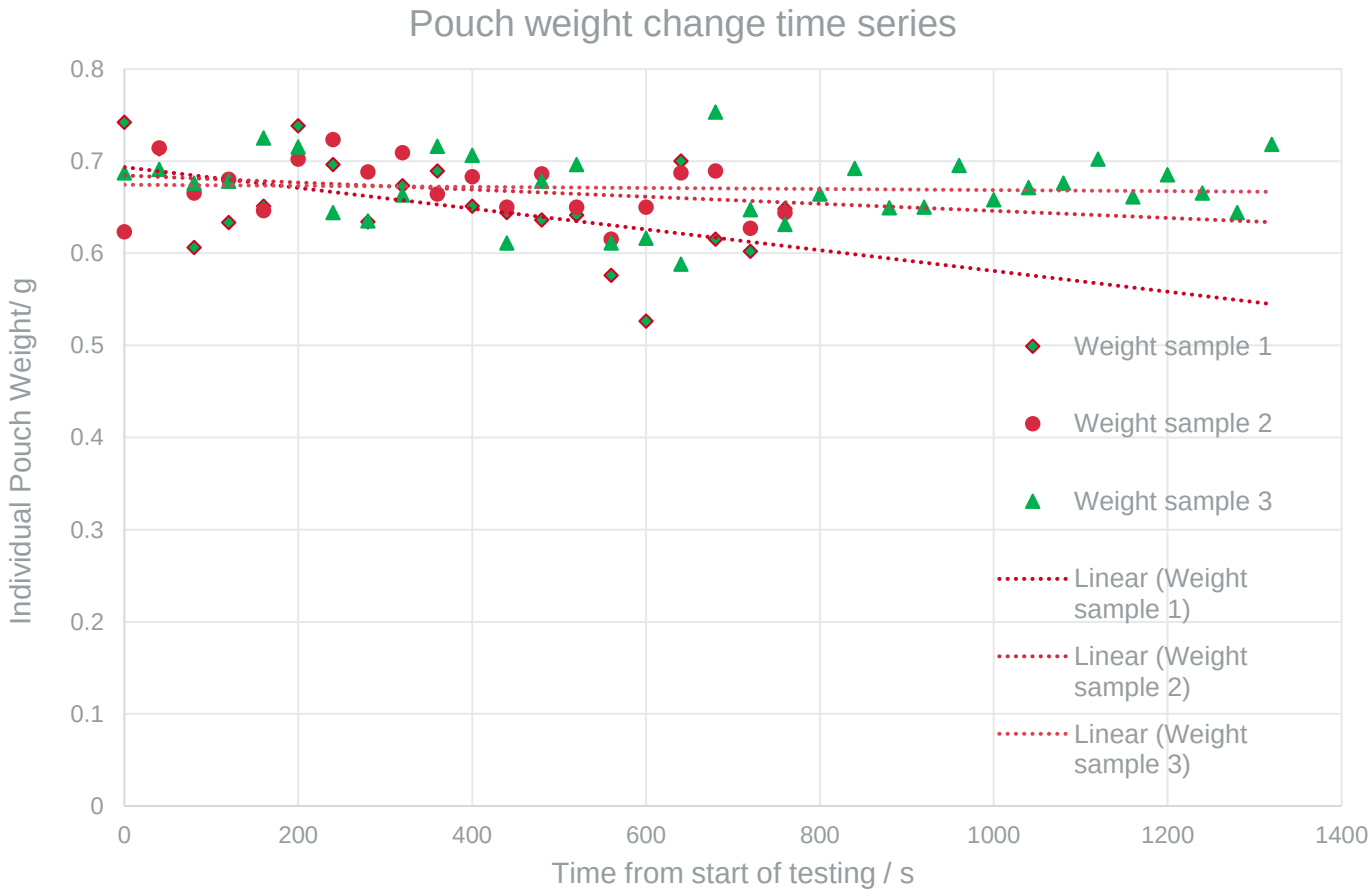
3.1 Changes in weight



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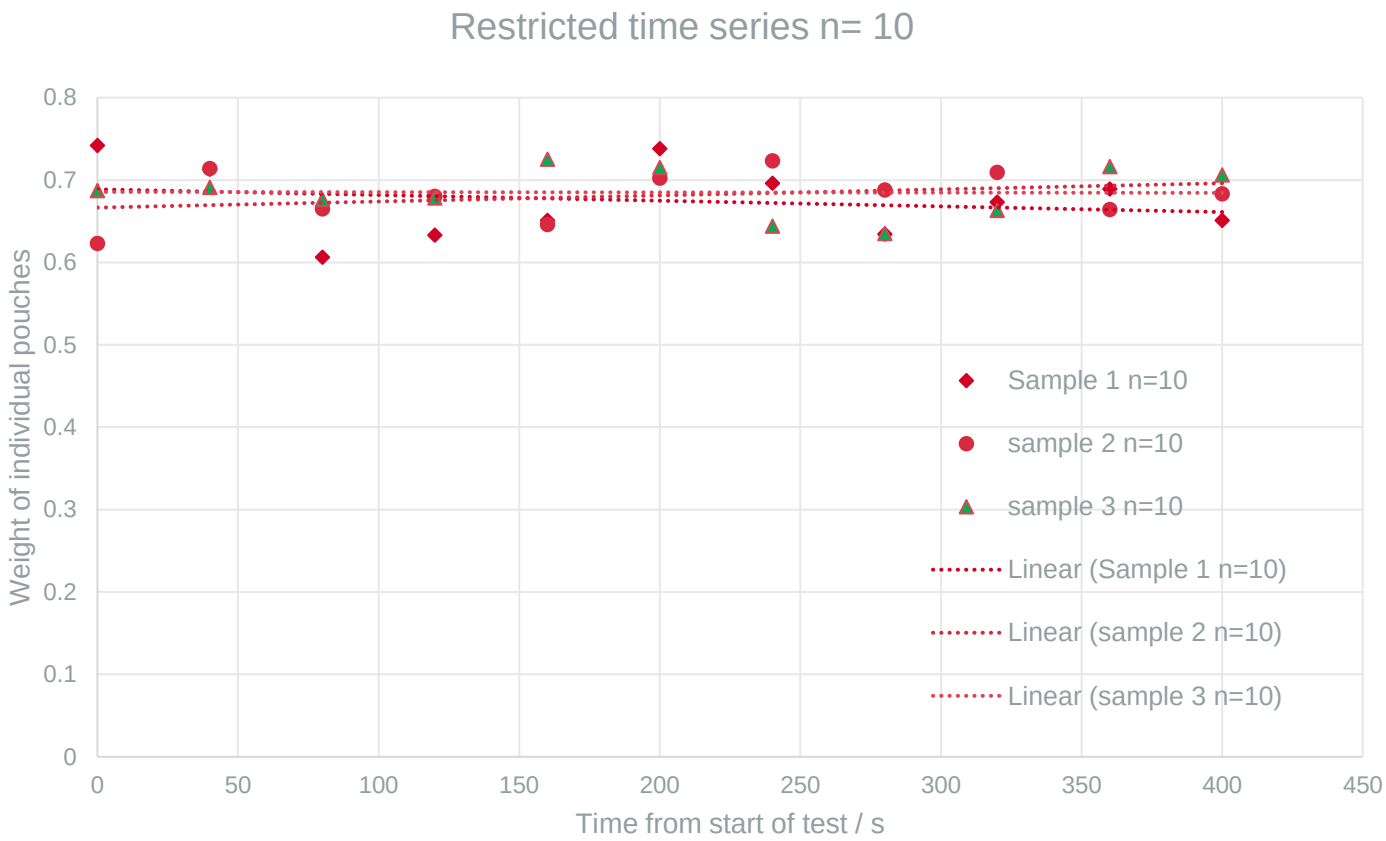
3.1 Changes in weight



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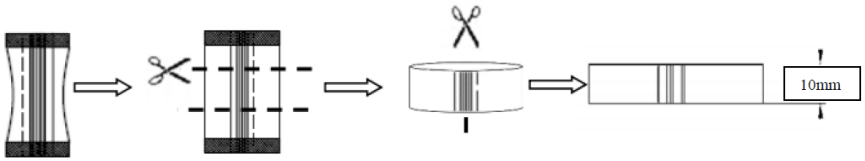
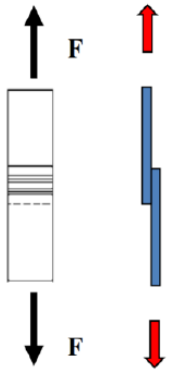
3.2 Tensile test methodology

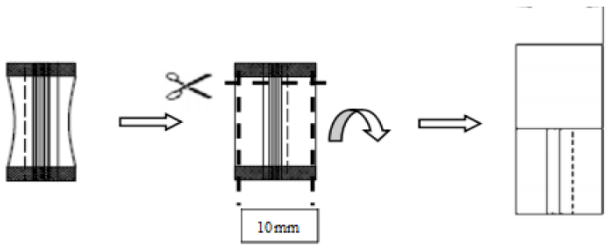
Longitudinal Seam Sample



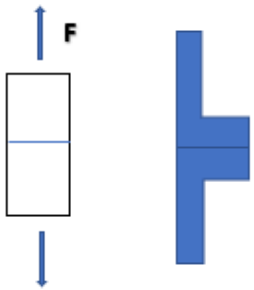
Shearing Strain



Cross Seam Sample



Peel Strain



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3.2 Tensile Strength

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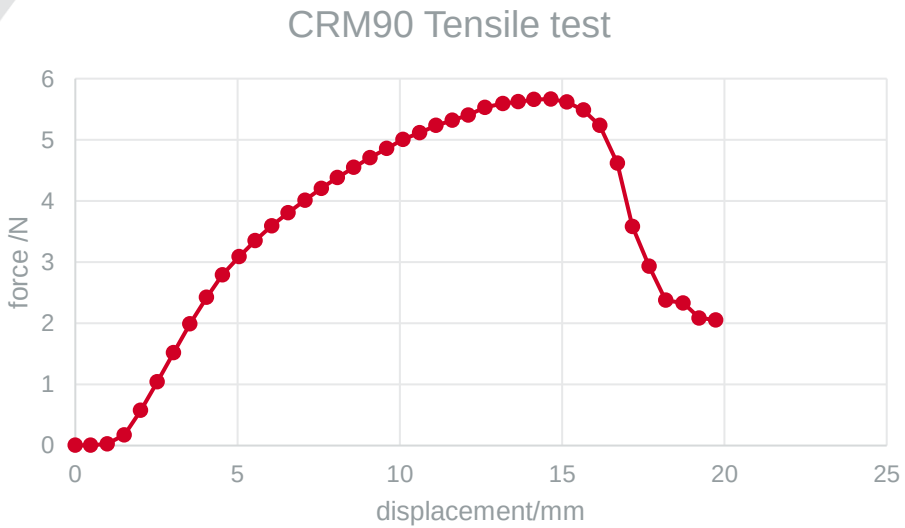
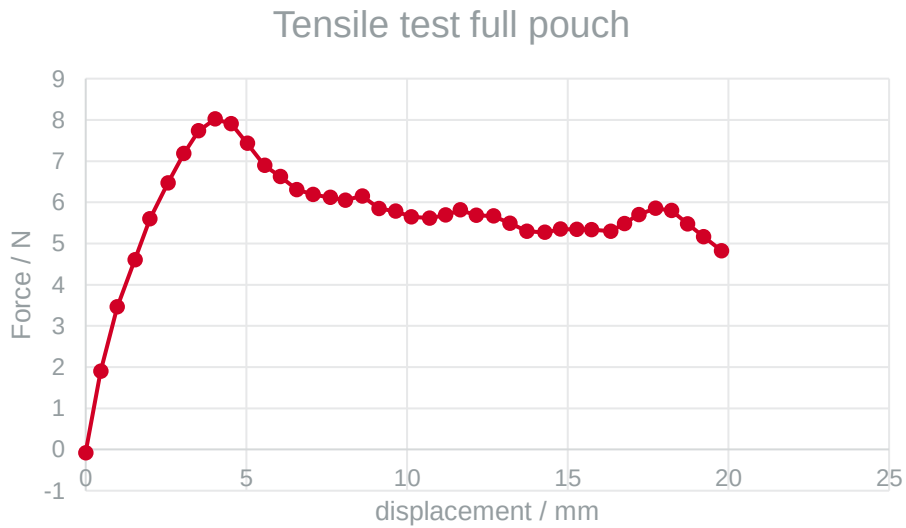
3.2 Comparison of full pouch with CRM





	Number of samples	Mean force at failure	Standard deviation	COV
Prepared sample CRM90	18	4.21N	0.388	0.0921
Full pouch run	34	4.148N	0.453	0.109

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3.3 Moisture measurements

The moisture content of modern oral products is a key quality parameter during manufacture. Simple mass balance using an oven is an option for determining moisture content as is Karl Fisher type extraction and titration. However these methods are slow.

An alternative would be to use microwave moisture measurement. This is not a viable method as the high levels of moisture in pouched products requires that the device is working in a region that is insensitive to change in moisture content.

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3.3 Linearity

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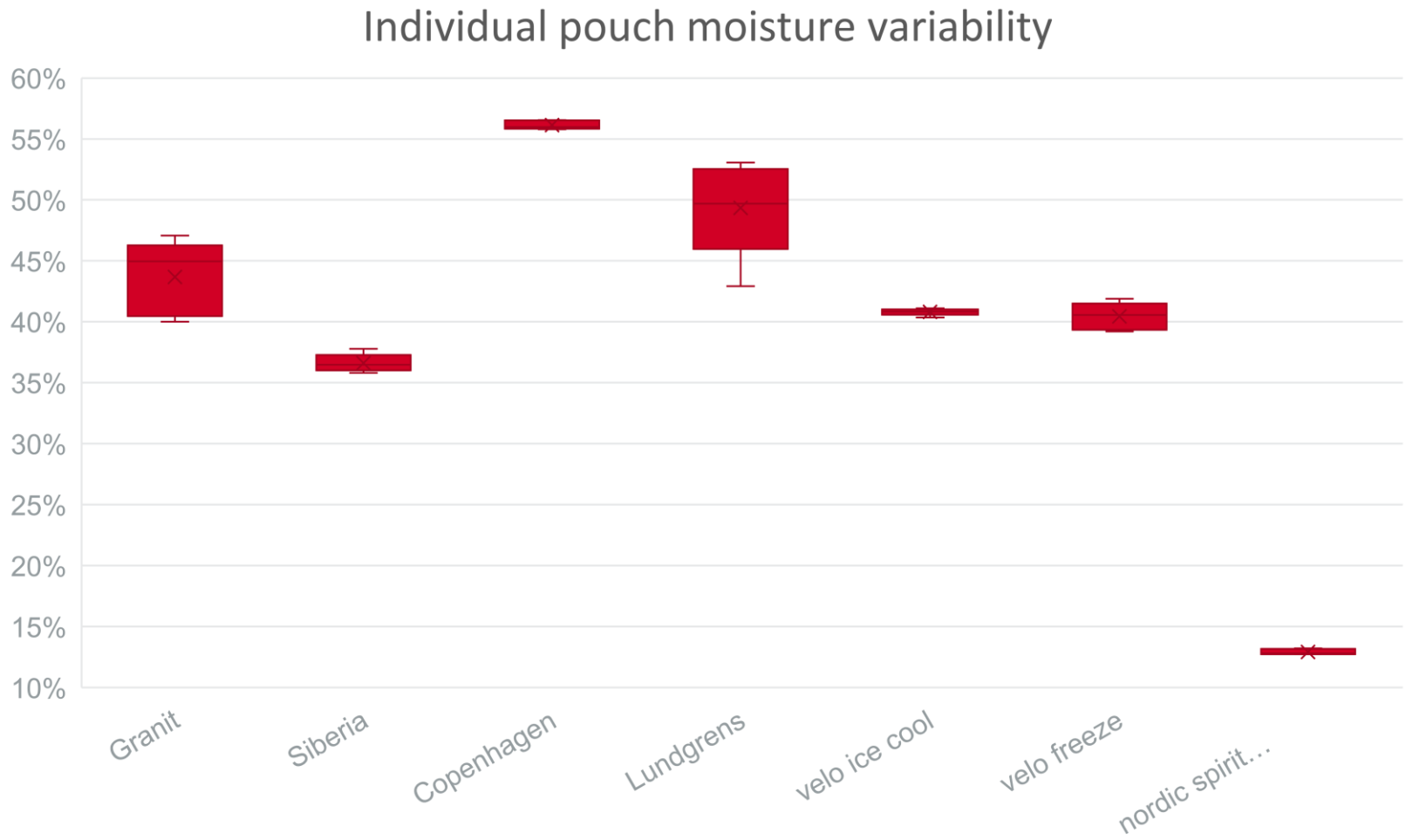
3.3 Brand variation



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4.0 Concluding remarks

- High humectant content contributes significantly to changes in test pouch weight
- Changes and speed of change in dependant upon brand and environmental conditions
- Individual weight and pouch moisture measurements can be made *if* small batch sizes are used ~ 10 pouches
- Equivalence has been shown between CRM90 tensile strength measurement and “whole pouch” tensile testing
- A resistive / capacitive method of moisture measurements shows promise for “wet” pouch measurement
- The use of a robotic handling system allows individual weight, moisture and tensile tests to be performed within a 40 second cycle enabling line side pouch batch testing to be performed for QA purposes.

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