

## TEST PRINCIPLE

Evaluating the hardness or “cake strength” of a facial powder using a 2 mm Cylinder Probe.

## BACKGROUND

The most popular form of facial powders today is in compressed compacts. The texture, shade and perfume are the three key characteristics of a facial powder that are important to a manufacturer and the most obvious features to a customer.

The basic ingredient in compressed powder by volume is talc, a natural hydrous magnesium silicate making up to 70% or more of the powder. Talc provides the powder with a ‘slip’ and silky feel, making it soft and easy to apply. The additional use of binders and other raw ingredients provide colour, scent, and stability to the compressed powder by preventing it from crumbling, cracking and dusting during transport and in use.

The texture of the facial powder needs to be consistent from purchase to purchase. The selection of ingredients and their respective quantities is therefore important and will affect powder hardness and the ease with which the powder packs together (caking).

The penetration test evaluates these properties by measuring the hardness or “cake strength” of the compressed powder using a cylindrical probe attached to the CT3 Texture Analyser.

## METHOD

**EQUIPMENT** CT3 with 4.5kg load cell  
2mm Cylinder Probe (TA 39)  
Round Base Table (TA-RT-KIT)  
Texture Pro CT Software

## SETTINGS

Test Type:	Compression
Pre-Test Speed:	0.5 mm/s
Test Speed:	1.0 mm/s
Post-Test Speed:	4.5 mm/s
Target Type:	Distance
Target Value:	2 mm
Trigger Force:	5 g

Note: It is recommended that the pre-test speed be the same as or less than the test speed for accurate trigger detection; for example, 1mm/s test speed will require  $\leq 1$  mm/s pre-test speed.

The penetration distance can be modified; however, the target distance chosen should be such that the probe does not touch the base of the container. Otherwise, the instrument will be overloaded and there may be variability in results.



## PROCEDURE

1. Attach the round base table to the base of the instrument and loosely tighten with the thumbscrews to enable some degree of mobility for the alignment stage.
2. Attach the cylinder probe to the load cell
3. Lower the cylinder probe to a few millimetres above the sample surface and align the sample centrally under the cylinder probe.
4. The thumbscrews of the base table can now be tightened.
5. Start the penetration test.
6. Ensure the cylinder probe is wiped clean afterwards using a dry cloth to remove all adhering powder prior to the next sample test.

## RESULTS

A typical Texture Pro CT software plot measuring the hardness of a facial powder.

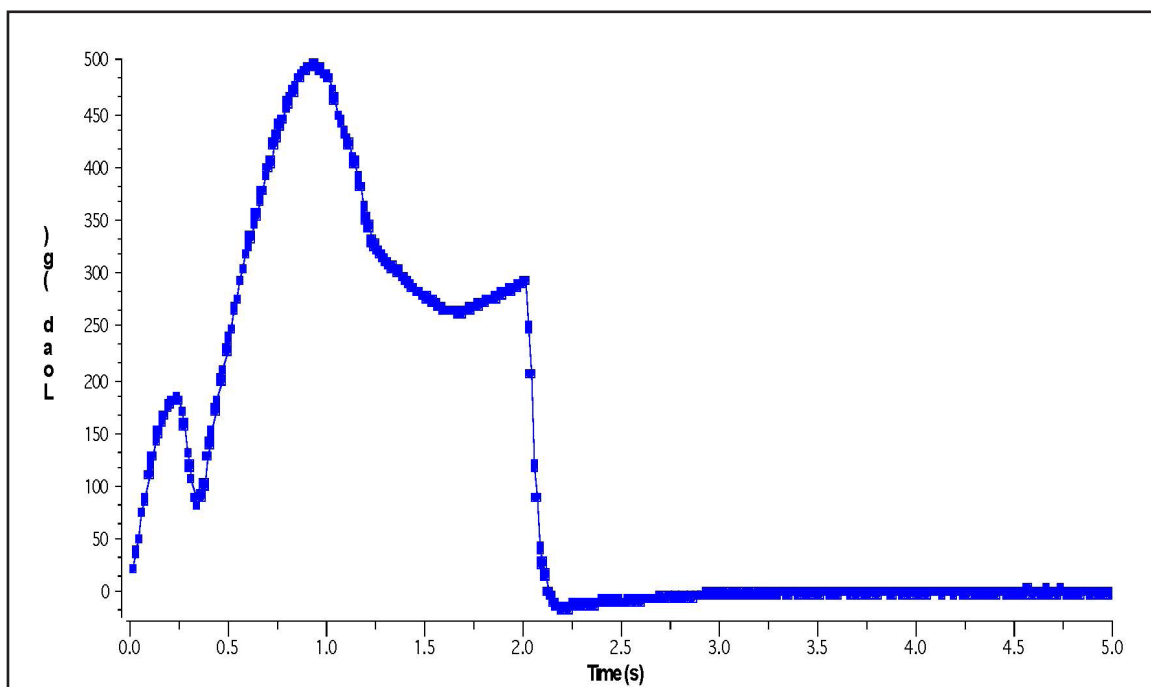


Figure 1

Figure 1: Graph shows the hardness of a facial powder using a 2 mm cylinder probe tested at 21C.

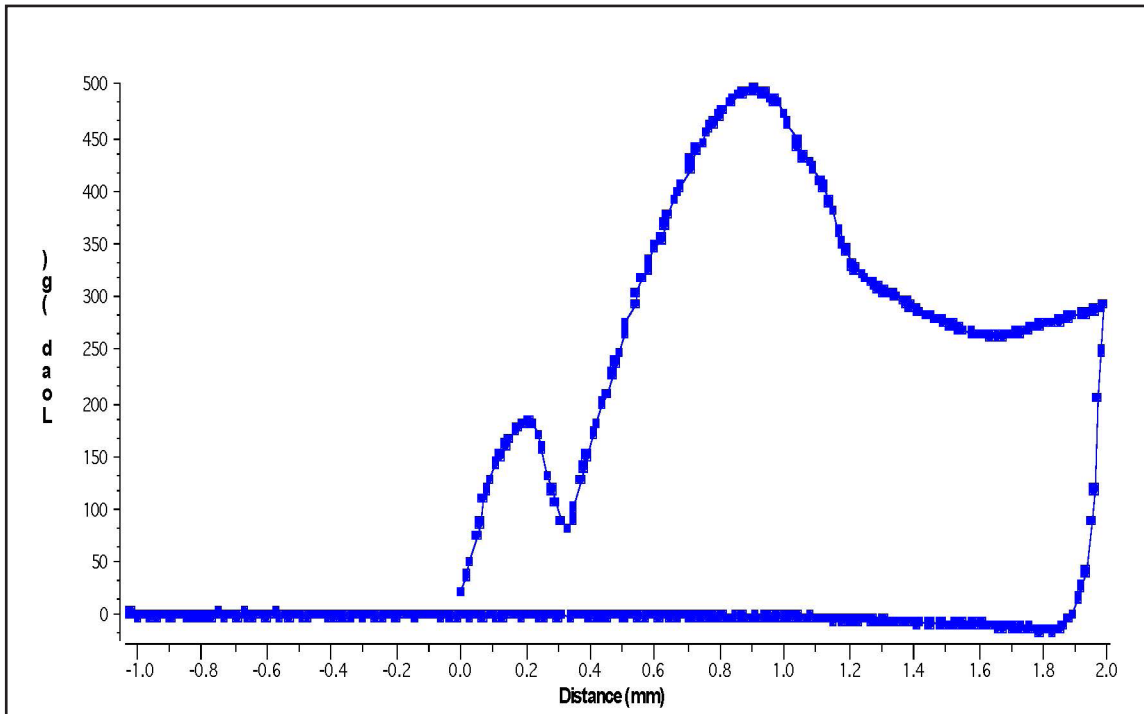


Figure 2

Figure 2: Graph shows the load versus distance for the hardness of a facial powder. The probe starts a millimeter above the same, penetrates the sample to a distance of 2 mm after which it withdraws from the sample at a post-test speed of 4.5 mm/s and returns to the starting position above the sample surface.

### OBSERVATIONS

From Figure 1, there is an increase in force as the probe penetrates into the sample to the point where the surface of the sample begins to crumble. This is the first peak value shown in the graph. After the surface is penetrated, the measured force steadily increases until a second peak value is measured. The higher the penetration force, the more compact the powder.

The test can be used to compare different powder formulations or different batches of the same make. In the case of testing different batches of the same product, differences in penetration forces may reflect the differences in compression times during manufacture.

Typical mean values for hardness and hardness work done, measured at four different locations in the sample, are shown below:

Hardness (g)	Hardness Work Done (mJ)
505.2 ± 10.1	6.60 ± 0.27