Gypsum Capping

V.S.

Grinding Machine

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Abstract

In Concrete Compressive Strength test, using a grinding machine is a very common and standard surface treatment method. However, the initial investment is substantially high and must be properly maintained otherwise the surface will become uneven.

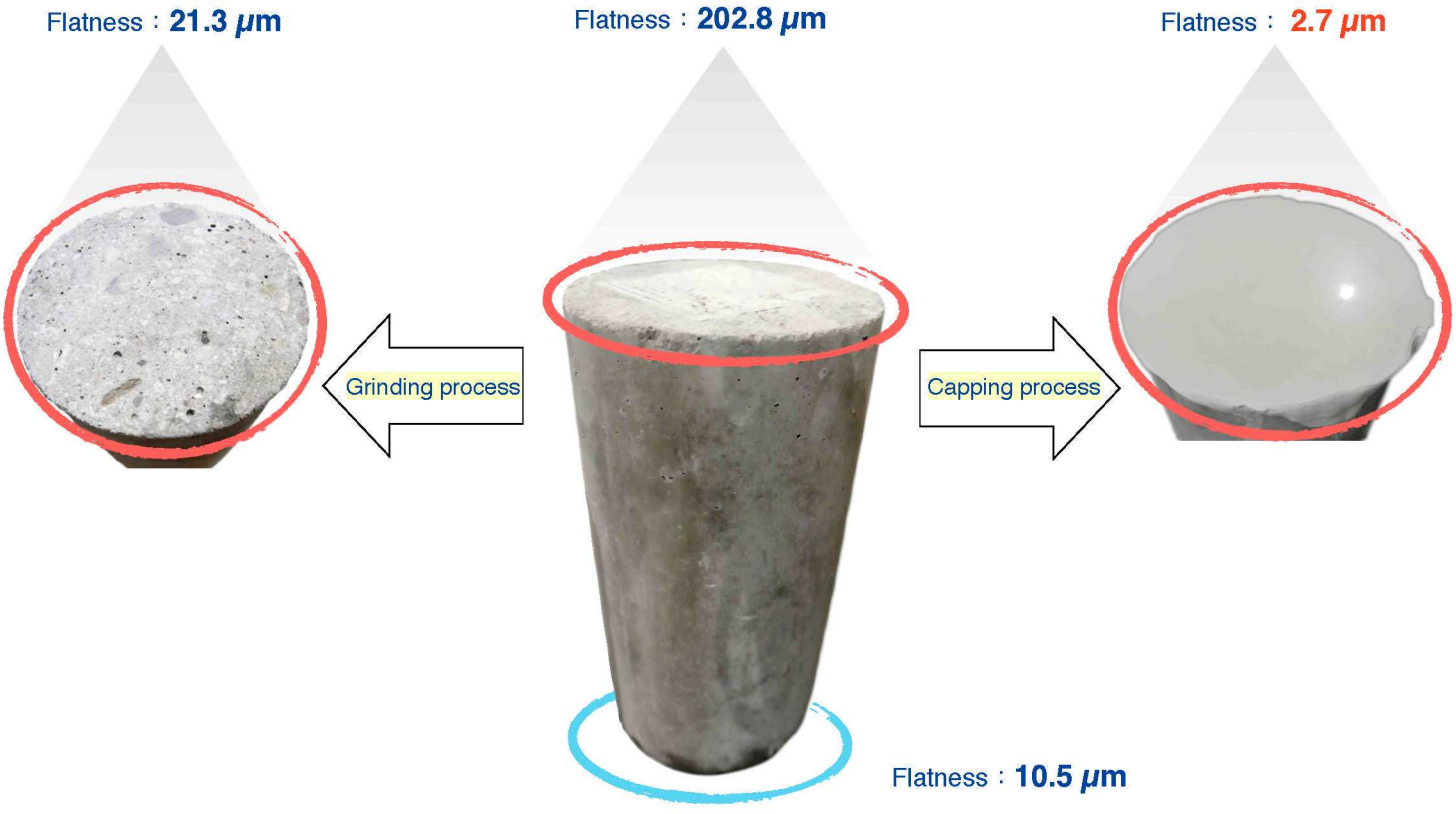
The alternative and better option is “High Strength Gypsum”, which also comes from ASTM C617 providing excellent end condition with outstanding flatness. The gypsum strength could reach 9000 psi within 40 min. The operator could process 10 ~ 15 concrete specimens in one time without any other equipment investment.

The following “Capping Gypsum” is a better choice for the compressive strength test.

1. Surface Flatness **2. Pressure Uniformity** **3. Sample Applicability** **4. Retainable Tag**

Surface Flatness

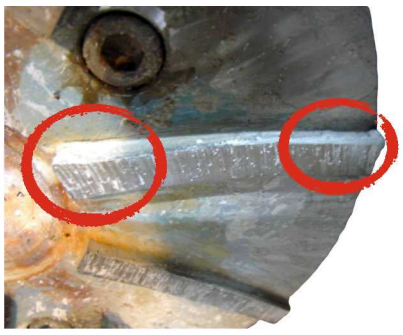
- Gypsum Capping method shows the better flatness after capping(1).
- Grinding method merely shows similar flatness to the bottom end(1).



(1)Yen-kuei Chang., 2007, “The investigation of the compressive stress deviation of concrete cylinders under different capping methods using the pressure sensitive films.” p74-97

Why Different Flatness

Flatness : **21.3 μm**



The concrete surface is treated by the grinding knife. It is difficult to get a completely smooth surface.
Without the periodic maintenance, the knife has a high possibility to be damaged causing a poor end surface.

Flatness : **2.7 μm**

The completely smooth surface comes from the flowing gypsum slurry and thick glass plate.
After being covered by the glass, the gypsum surface will be flat just like glass similar to a mirror.

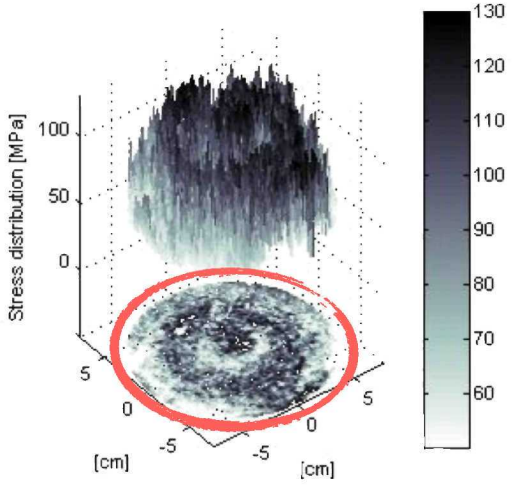
Pressure Uniformity

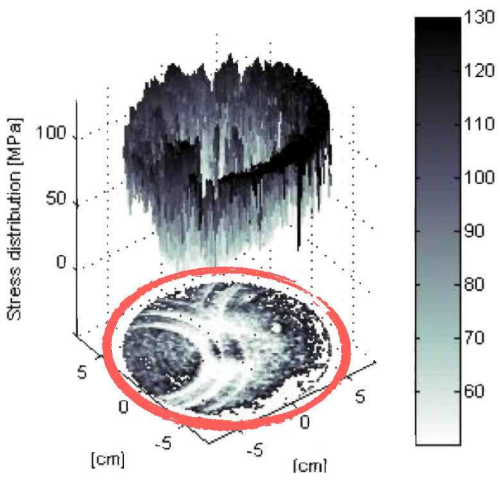
pressure distribution diagram

Below pressure simulation diagram is tested by pressure-sensitive paper. It shows the pressure distribution on the concrete cylinder surface after the Gypsum Capping and Grinding Machine treatment (1)

- Gypsum Capping pressure uniformity:
  It provides a perfect load transformation.

- Grinding pressure uniformity:
  It shows an obvious knife pattern. Knife condition could impact the performance.

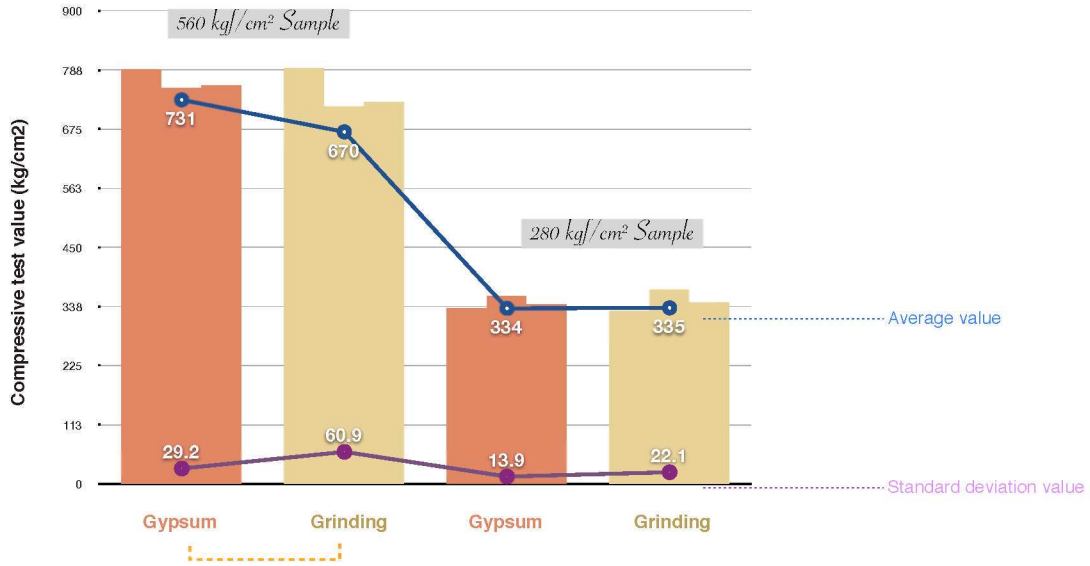




(1)Yen-kuei Chang., 2007, "The investigation of the compressive stress deviation of concrete cylinders under different capping methods using the pressure sensitive films." p74-97

Pressure Uniformity test data analysis

Sample test comparison for the Average and SD of compressive strength test [1]:
Capping Gypsum shows higher average value and lower SD value due to better flatness.
Werner [2] mentioned ,"*Cylinders of high-strength concrete with rough ends resulted in lower strengths than similarly capped cylinders with smooth ends.*"



They had greater effects on the strengths of cylinders made of high-strength concrete compared with cylinders of low-strength concrete[3].

(1)Yen-kuei Chang., 2007, "The investigation of the compressive stress deviation of concrete cylinders under different capping methods using the pressure sensitive films." p48-52
(2) Werner, G., 1958, "The Effect of Capping Material on the Compressive Strength of Concrete Cylinders," ASTM Proceedings, V. 58, pp. 1166-1186 (including Discussion by S. Helms).
(3) Carino, Nicholas J., 1994, "Effects of Testing Variables on the Measured Compressive Strength of High-Strength (90 MPa) Concrete" p10-11.

Sample Applicability

	General Concrete Sample	Low strength concrete and CLSM Sample	Drilled Core Sample
		 	
Grinding	✔	✘	✘
Gypsum	✔	✔	✔

Retainable Tag

Grinding

- Mark will be wiped off after grinding

Gypsum

- The removable gypsum cover could still retain the tag filled up with sample information (company name, date ,etc.).