

Comparison of Wet Process and Dry Process of Cement Manufacturing with Advantages and Disadvantages

Ms. Elena Rosemaro

VIM Australia
elenarosemaro@gmail.com

Abstract

In this paper we are discussing wet and dry process of Portland cement manufacture. Wet process minerals are wet ground to form a slurry and in dry process minerals are dry ground to form a powder like substance. In this paper, we are discussing the comparison between wet process and dry process with various advantages and disadvantages.

Keywords: Portland cement, slurry, lime stone etc.

I. INTRODUCTION

There are two types of process for manufacturing the cement are shown in below.

Wet process

Raw materials are mix in wash mill by 35 to 50% water. The current Materials are known as slurry that have flow-ability features. The kiln size that are required for built-up of cement is higher so the raw material can be mixed effortlessly that's why well similar type of material can be acquired. The production cost of wet process is high and capital cost is relatively less.

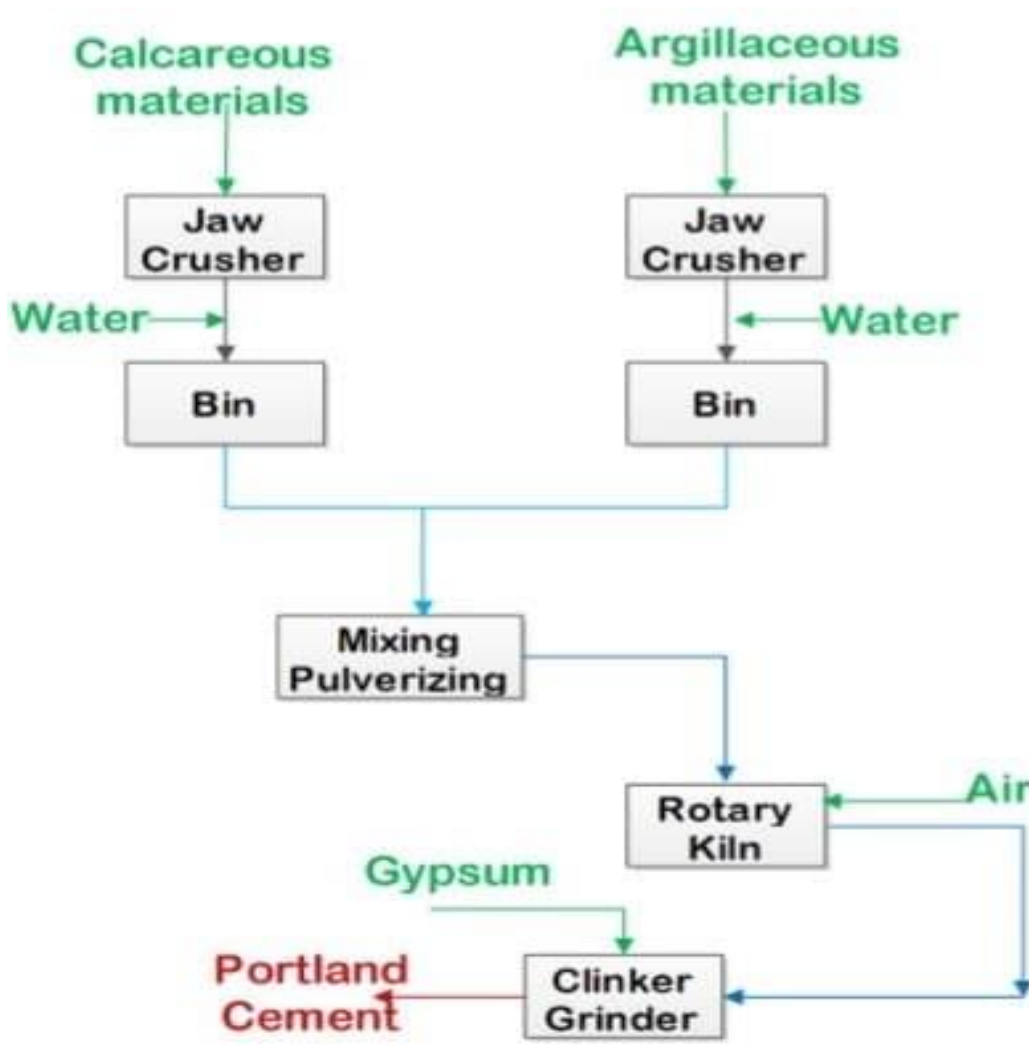


Fig 1: Manufacture of Cement by Wet Process

Dry process

In the dry process, raw material is mixed in mixers. This dry material is also known as kiln feed. The kiln size required for built-up of cement is smaller so it is difficult to control raw materials mixing and it is also challenging to find a well-similar material. The production cost is less and capital cost is relatively high because of the blender.

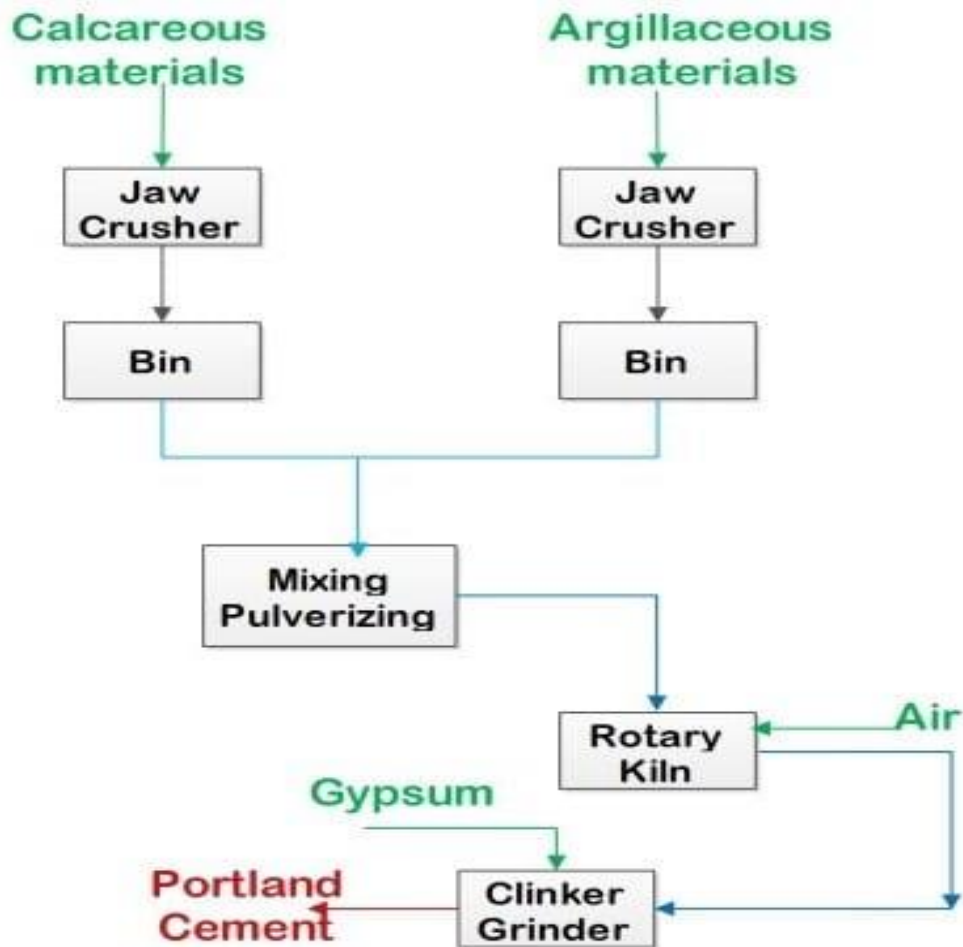


Fig: Manufacture of Cement by Dry Process

Table 1

Raw materials for Portland cement manufacture

Calcareous Materials	Argillaceous Materials			
	Calcium	Silicon	Aluminum	Iron
Limestone	Clay	Clay	Clay	
Marl	Marl	Shale	Iron ore	
Calcite	Sand	Fly ash	Mill scale	
Aragonite	Shale	Aluminum ore refuse	Shale	
Shale	Fly ash		Blast furnace dust	
Sea Shells	Rice hull ash			
Cement kiln dust	Slag			

II. DIFFERENCE BETWEEN DRY PROCESS AND WET PROCESS

S.no.	Wet process	Dry process
1.	When raw material is soft then this method is used	When raw material is hard then this method is used
2.	The raw material are changed to powdered form in the presence of water	The raw material are changed to powdered form in the of absence water
3.	cement produced-26%	cement produced-74%
4.	kilns high fuel needed	kilns less fuel needed
5.	Less Economically	More Economically
6.	Need of maintenance is less	Need of maintenance is high
7.	Raw material can be easily mix	Raw material cannot be easily mix
8.	Production cost high	Production cost less
9.	Capital cost is less	Capital cost is less

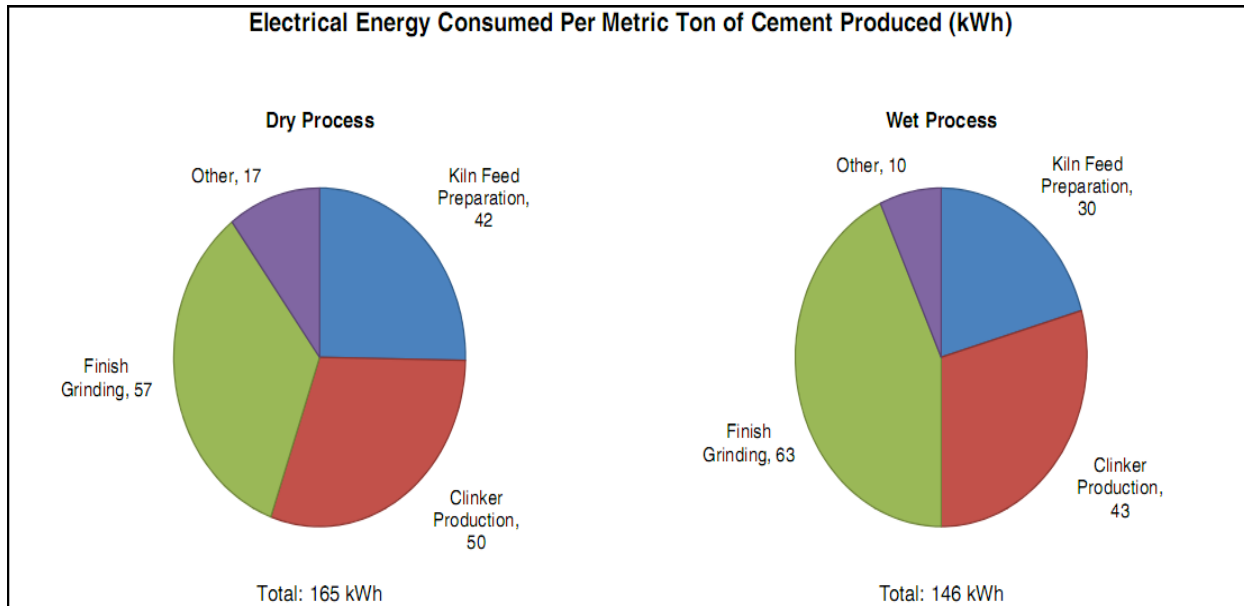


Fig 3: Electrical energy consumed by both process

III. CONCLUSION

In this paper we have discussed about the wet and dry cement manufacturing process. And also we have discussed about various raw materials for Portland cement manufacture. This paper shows the comparison between wet process and dry process with various advantages and disadvantages.

REFERENCES

- [1] C. M. Hanson, "Concrete: the advanced industrial material of the 21st century," *Metallurgical & Materials Transactions A*, vol. 26, pp. 1321–1341, 1995.
- [2] M. Bediako, S. K. Y. Gawu, and A. A. Adjaottor, "Suitability of some Ghanaian mineral admixtures for masonry mortar formulation," *Construction and Building Materials*, vol. 29, pp. 667–671, 2012.
- [3] S. H. Kosmatka, B. Kerkhoff, and W. C. Panarese, *Design and Control of Concrete Mixtures*, Portland Cement Association, Skokie, Ill, USA, 14th edition, 2002.
- [4] M. S. Mamlouk and J. P. Zanievski, *Materials for Civil and Construction Engineers*, Prentice Hall, Upper Saddle River, NJ, USA, 2006.
- [5] T. Punmatharith, M. Rachakornkij, A. Imyim, and M. Wecharatana, "Co-processing of grinding sludge as alternative raw material in portland cement clinker production," *Journal of Applied Sciences*, vol. 10, no. 15, pp. 1525–1535, 2010.

- [6] D. N. Huntzinger and T. D. Eatmon, “A life-cycle assessment of Portland cement manufacturing: comparing the traditional process with alternative technologies,” *Journal of Cleaner Production*, vol. 17, no. 7, pp. 668–675, 2009.
- [7] F. M. Lea, *The Chemistry of Cement and Concrete*, Arnold Publishers, London, UK, 3rd edition, 1970.
- [8] J. F. Young, S. Mindess, R. J. Gray, and A. Bentur, *The Science and Technology of Civil Engineering Materials*, Prentice-Hall, Upper Saddle River, NJ, USA, 1998.
- [9] H. F. W. Taylor, *Cement Chemistry*, Thomas Telford, London, UK, 2nd edition, 1997.
- [10] S. H. Kosmatka and M. L. Wilson, *Design and Control of Concrete Mixtures*, Portland Cement Association, Skokie, Ill, USA, 2011.
- [11] V. Sata, C. Jaturapitakkul, and K. Kiattikomol, “Influence of pozzolan from various by-product materials on mechanical properties of high-strength concrete,” *Construction and Building Materials*, vol. 21, no. 7, pp. 1589–1598, 2007.
- [12] A. Neville, *Neville on Concrete*, ACI, Farmington Hills, Mich, USA, 2003.
- [13] R. Fernandez, F. Martirena, and K. L. Scrivener, “The origin of the pozzolanic activity of calcined clay minerals: a comparison between kaolinite, illite and montmorillonite,” *Cement and Concrete Research*, vol. 41, no. 1, pp. 113–122, 2011.
- [14] K. Ganesan, K. Rajagopal, and K. Thangavel, “Evaluation of bagasse ash as supplementary cementitious material,” *Cement and Concrete Composites*, vol. 29, no. 6, pp. 515–524, 2007.
- [15] S. Sinthaworn and P. Nimityongskul, “Quick monitoring of pozzolanic reactivity of waste ashes,” *Waste Management*, vol. 29, no. 5, pp. 1526–1531, 2009.
- [16] J. J. Brooks, M. A. M. Johari, and M. Mazloom, “Effect of admixtures on the setting times of high-strength concrete,” *Cement and Concrete Composites*, vol. 22, no. 4, pp. 293–301, 2000.
- [17] X. Fu, Z. Wang, W. Tao et al., “Studies on blended cement with a large amount of fly ash,” *Cement and Concrete Research*, vol. 32, no. 7, pp. 1153–1159, 2002.
- [18] E.-H. Kadri, S. Kenai, K. Ezziane, R. Siddique, and G. De Schutter, “Influence of metakaolin and silica fume on the heat of hydration and compressive strength development of mortar,” *Applied Clay Science*, vol. 53, no. 4, pp. 704–708, 2011.