

# A Review Paper on Dewatered Flooring

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## ABSTRACT

The fundamental constituent of solid is water. The quality of the solid is being influenced by the water concrete proportion however for ground surface, the main PCC to be laid on plinth and afterward tiles are conferred on PCC work for the better appearance. This experiment provides a new way of concrete flooring by the use of vacuum dewatering concrete technique/Tremix method in the area of concrete flooring in civil structure with its advantages of VDF system. Vacuum concrete is the effective technique used to overcome this contraction of opposite requirement of workability and high strength. This process is a means to efficiently remove excess water from newly placed, compacted and levelled concrete surfaces. Vacuum dewatering of concrete has been refined to specially address concreting of large exposed surfaces in any weather conditions. Vacuum dewatering greatly improves the abrasion and impact resistance of the concrete surface. The uncontrolled removal of water from the concrete matrix can result in adverse effects such as plastic shrinkage cracking. Excessive bleeding of concrete can negatively interfere with surface characteristics such as resistance to wear. Thus the durability and service life of the flooring element is in question. Concreting in areas exposed to the elements, specifically in hot and windy conditions poses even higher demands in order to produce quality, durable concrete. The main aim of the technique is to extract water from concrete surface using vacuum dewatering. As result of dewatering, there is a marked reduction in effective water-cement ratio and the performance of concrete improves drastically. The improvement is more on the surface where it is required the most. **Keywords-** Vacuum Dewatering, Tremix Method, Cement, Sand, Aggregate.

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## INTRODUCTION

### What do you understand by the term VDF?

VDF Flooring or Vacuum Dewatered Flooring or Tremix flooring is a system for laying high quality concrete floors where the key is Dewatering of Concrete by Vacuum process wherein surplus water from the concrete is removed immediately after placing and vibration, thereby reducing to the optimum.

- Concrete is being the most versatile of flooring material has been in use for a long time.
- To overcome the deficiencies of concrete flooring, a system was devised to improve the properties of such concrete floors.
- This system was "VACUUM DEWATERED FLOORS."
- It permits to add much water for workable and easily pourable.
- The system removes the excess water and maintains an ideal water/cement ratio.
- This system will maintain all the properties of the concrete.

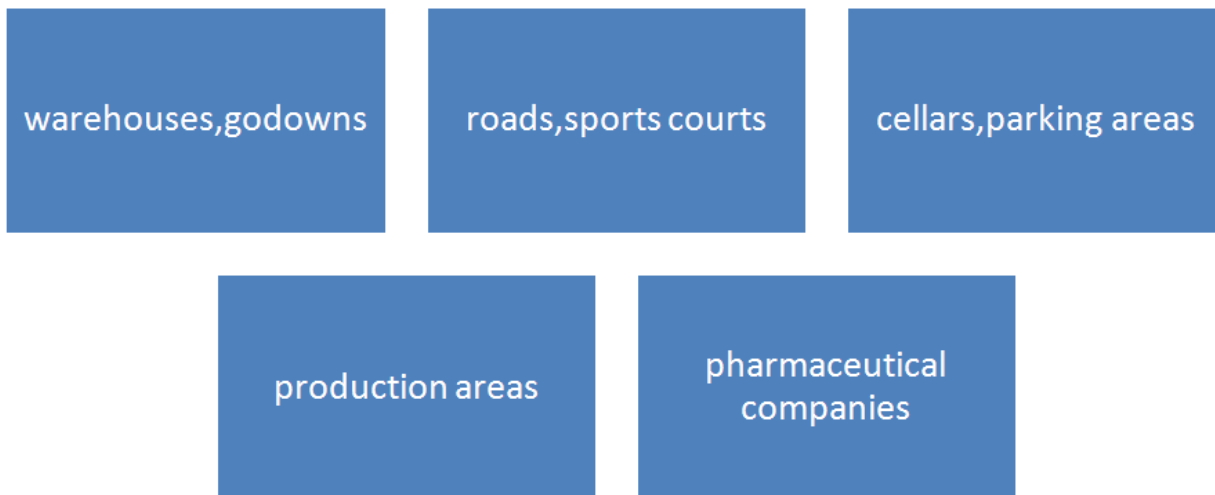
## LITERATURE REVIEW

From International Conference on 11th April 2015, S.N Patel Institute of technology & Research Centre Barolo, Gujarat.

Vacuum treatment of concrete based on Ordinary Portland Cement Results in a marked increase in compressive strength. In General, Compressive strength of vacuum dewatering processed concrete is 25-45% Higher at 28 days after casting.

Increases flexural strength as well as a higher modulus of elasticity.

### TYPICAL APPLICATION AREAS OF VDF FLOORING



### HISTORY RELATED TO VDF

- It was originally invented by Tremix AB, Sweden many years ago. Scandinavian firms simplified the equipment enough to make it practical for almost any builder.
- Vacuum dewatering is used widely throughout Europe today, and in Sweden the method is used for 40 to 50 percent of all concrete floors.
- Tremix or Vacuum Dewatered Flooring is popularly known in India.
- This process was introduced in India by Aquarius technologies in 1987.
- In 1991 to start production of Vacuum system in India.
- It became so popular in India that almost everybody related to concrete flooring industry.

### PROCEDURE OF VACUUM DEWATERING

1. Concrete shall be laid between the steel forms and precast concrete rail acting, as a stop end and also 'rail to be used for surface vibration.
2. The concrete thus laid shall be vibrated with poker vibrator. During poker vibration, proper compaction of coarse aggregates, fine aggregates and cement shall be obtained. The surface will then be finished in level with the help of surface vibrator to give a dense level surface of concrete.
3. Vacuum dewatering method will be used to remove excess water from the laid concrete and filter pad and suction mat shall be laid on the freshly laid concrete which will not allow cement paste to flow out, and the suction pump are then started immediately to remove the excess water. The suction time normally is 20 to 30 minutes. This vacuum process will enable to carry the floating operations.
4. The top surface after removal of mat shall be floated with a mechanical skim floater with trowelling blade to enable the top surface to grind and give a uniform water resistance surface on top. Under no circumstances neat cement be sprinkled directly on concrete surface to absorb bleed water as surface scaling may occur later. Similarly water should not be applied between towelling operation as it may cause surface weakness. Minimum two passes shall be carried out. The surface shall then be watered and cured as per clause.
5. The vacuum dewatering process consists of levelling, compacting and dewatering the concrete flooring by using vibrating screed, vacuum pumps, suction mats, filter pads, accessories etc. The sequence of operation shall be placing of concrete, vibration, vacuum treatment and floating and the operation shall follow immediately behind each other.
6. The contractor shall have persons well experienced in the vacuum dewatering process, and in the operation of all related equipments. All process equipment to be used shall be in good working condition and shall be subject to the approval of the Engineer.

7. The work should be planned well in advance with a view to determine areas to be concreted daily, the required number of equipment, size of vacuum mats, length of vacuum hoses, arrangement of rails, screeds etc.
8. The area to be concreted shall be thoroughly cleaned, reinforced checked and got improved by the engineer. Then the specified grade of concrete shall be placed in position without segregation and properly vibrated.
9. The concrete surface shall be screened high by 2 of the slab's thickness to compensate for the compaction caused by the vacuum dewatering process.
10. Vacuum is immediately created between the filter pads and the top cover. Atmospheric pressure compresses the concrete and the surplus water is squeezed out.
11. This process lowers the water content in the concrete by 20-25%. The dewatering operation takes approximately 1.5-2 minutes per centimeter thickness of the floor. The dewatered concrete is compacted and dried to such an extent that is possible to walk on it without leaving any foot prints.
12. This is the indication of concrete being properly dewatered and ready for finishing.



**Suction bottom mat**



**Suction top mat**



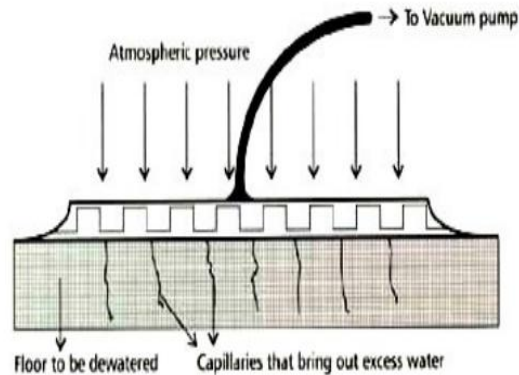
**After Dewatering Power Trowel Machine**

### **REQUIREMENT OF VDF**

- In conventional concreting practice, an important challenge is the prevention or limiting of evaporation of mixing water out of the freshly placed concrete.
- The uncontrolled removal of water from the concrete matrix can result in adverse effects such as plastic shrinkage cracking.
- Excessive bleeding of concrete can cause for wear resistance.
- Thus the durability and service life of the flooring element is in question.
- In hot and windy conditions it produces quality, durable concrete.

### **ADVANTAGES OF VDF**

- Due to dewatering through vacuum, both workability and high strength are achieved simultaneously.
- Reduction in water-cement ratio may increase the compressive strength by 10 to 50% and lowers the permeability.
- It enhances the water resistance of concrete surface.
- The surface obtained after vacuum dewatering is plain and smooth due to reduced shrinkage. The framework can be removed early and surface can be put to use early.
- It reduces the time for finishing the floor and stripping of the wall forms.
- Lowers the permeability.
- Provides good bond with the underlying concrete.



SCHEMATIC DRAWING SHOWING VDF

### DISADVANTAGES OF VDF

- The inherent porosity of the concrete allows water, oil, and grease to seep through, consequently weakening the concrete.
  - Joints are a necessity for concrete floors (to accommodate shrinkage, thermal movements etc) which can lead to joint breakage as well as seepage of the above contaminants.
  - Concrete floors generate dust due to abrasive movement of vehicles commonly found in industrial plants which can cause tangible and intangible plant and machine, sub-assemblies etc.
  - The best laid floor (Tremix) can have undulations of above 5mm(not normally visible to naked eye).While it is typically accepted in various engineering industries, it must be kept in mind that heavy movement of vehicles can wear out the surface faster.
- Develop Spiral crack of Concrete top layer.

### CONCLUSION

From these studies it is concluded that, Vacuum dewatering concrete is very important in modern construction in the context of economy, facility, modern technology and comfort. It is very useful special purpose project like for Warehouse, Parking area, industrial flooring, Pavement and Bridge. In which increase in compressive strength, corrosion resistance, tensile strength, flexural strength, workability, durability and decrease in permeability, shrinkage, minimize the cracks and concrete become denser than conventional concrete. And now a day vacuum dewatering process is very easily used in the construction industry by using any modern techniques and machineries. Good quality of floor and pavement can be obtained. 200 to 250sqm concrete flooring can be done in 8-10 hours. And 15 to 25% water extracted out with the increases the compressive strength about 20-25%.

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