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CHEMICAL & ELECTRICAL METHOD IN POST TENSIONING OF PRE-STRESSING CAN BE USED FOR MAKING DUCKED THROUGH STRUCTURAL ELEMENT AFTER CASTING

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ABSTRACT

The pre-stressing concrete used for casting of section is quite different from Reinforced cements concrete (RCC.) in concrete Technology. The device mechanism developed for duct forming & anchoring with less losses of pre-stressing value in steel bars of concrete structural element.

In modern type of pre-stressing electricity with low voltage and high current is used for a duct forming in concrete member & sulpher coating on steel bars, as duct material. While supplying electricity in the structure, sulpher get melted up because heat generated on the steel bars of the structure. No provision of any duct formation is requiring in concrete structural element. The high strength steel structure could be anchored by tightening nuts at both the ends.

The Pre-stressing in concrete structure element is found more effective as compare to the RCC technology. To-day pre-stressing is preferred for many large structural elements like bridge etc. minute modification is required to adopt for all small concrete structure sections also. It is demand to replace

RCC completely by pre-stress concrete, because of RCC have large section with less strength as compare to pre-stress concrete.

RCC system is rein-forced first, to concrete structural element and then loaded after casting, when ever in the pre-stressing system, where reinforcement which are stressed first then casted & force is applied

INTRODUCTION

For a concrete structure this is fact that, all tensile stresses are completely taken by steel bars & is weak in compressive stresses also compressive stresses are resisted by concrete it -self which are induced above neutral axis only. “This was turning point of concept RCC and which gave birth to one of new technique known as pre-stressed concrete.” In this technique, high Strength tensile steel & concrete are basic materials considered for the structural member with the help of jack In practice steel is stressed first which induce tensile strength, & compressive stress in the concrete of member. Whole concrete bears external forces theoretically precast is the design and developed the anchoring system for post- tensioning pre-stressing.

Pre stressing in concrete technology is quite different form reinforced cement concrete (Rcc) in the sense that both are in divergent modes. Pre-stressing is the application of a predetermined force or moment to an element in the

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structures such that combined internal stresses resulting from applied force or moment and positive from external loads will be within specific limits and hence section is entirely compressive. Wires or strand or Tendons are stressed between anchorages. In fact structural behavior of RCC and Pre-stressed concrete is totally different. While steel is an integral part of RCC Section. Bond between steel and concrete plays an important part in RCC. And tension in steel develops when concrete begins to crack and during. Crack control in RCC. Cracking strains of concrete are transferred to steel through bond. In Pre-stressing bond between steel and concrete does not exist, that is stress in steel does not depend on strain in concrete. A stress in steel varies with bending moment along the length of beam in RCC. Where-as there is no variation stress in steel along the length of beam. In Pre-stress anchoring in section have less complex analysis There is a problem, because of it is required that, stresses in steel should be limited.

Finally tension of theoretical nature of pre-stressing Anchoring technology which is a significant part can be analyzed on rational basis and critical study of the existing devises modification there of as well as attempt towards development of better and efficient mechanisms will be a purposeful possibility role of welding shall be attempted and highlighted practically for strong grips.

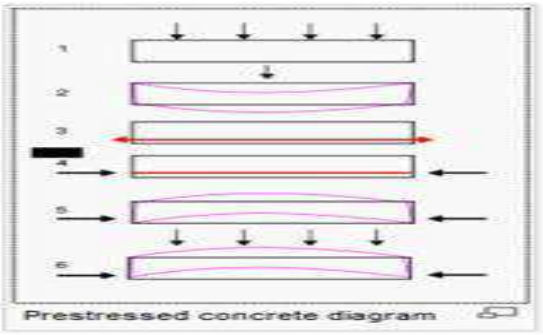

Fig.1 Pre- tensioning pre stressing diagram

LABORATORY WORK

Electrical pre-stressing:-. Through the tendons it gets heated up and sulphar coating is melted. The tendons end threaded with nut tightening provision & jacking for required stresses. By tightening those anchoring bars, the section hold is achieved by Check nut with cotter pin. Proving-ring is used for measuring of pre-stressing force in bars applied.

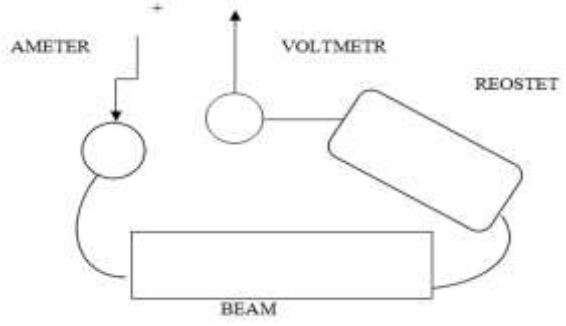

Figure 2 : Electrical Circuit For Pre-Stressing Beam

PRACTICAL APPROACH

We consider for Fe-410 steel bar – 8mm ϕ The properties come between cast iron and wrought iron. It is having property of getting hardened and tempered, also has 0.1%-1.1% of carbon & granular like structure. It is found to be tough, malleable and ductile in nature. The coating thickness of sulphar material forming a duct, on steel bar shall be considering - 0.5 mm. A mould is using to cast as a beam by concrete on coated steel bar. Mould is shown in figure below- dimensions 420x150x150 mm. cum. M15 Grade concrete having ratio-1:2:4 is prepared of required M15 Grade concrete having ratio1:2:4 is prepared of required workability then it is poured to fill the mould to cast required beam. After 24 hours it is taken out from mould & cured for 7 days the casted beam required. Similarly, other Grade concretes

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beams like M20 (1:11/2:3), M25 (1:1:2) are also made and tested as explained – Now the base plate on both ends of beam is placed. Electric current is passed so that coating is malt & at ends with bar nut is placed, tightened on both sides with spanner so that pre-stressing purpose is served. Then check nut & cotter pin is placed.

Fig.3: Casting mould

As sulpher melting point is 115.2°C.so more temperature is require sulper to melt completely.

Figure-4: Transverse Test On Pre-Stress Beam

Hence, heat generated about 1700 C temperatures which causes sulpher to be requiring melting condition, bars are elongate helps at this time we will tighten the nuts tools on both side. Check nut is provided at end and then cotter pin is placed this causes to reduce richness of concrete. It has been found more strength & durability as compare to RCC structure. Dial Gauge is used for measuring load produced which is produced along it.

It is two numbers required of each beam for our experiment of same dimensions. Prepared beams as figured. Some losses will occur in beam after anchoring been done hence it needs 24 hours for further test. Now considering beam as simply supported & using UTM (Universal Testing Machine) as for calculation of bending moment.

This process is applied for both the conditions that are flat & transverse so that graphs may be made for both the conditions.

Under UTM the distance between supports is fixed. Width, Thickness & Crosshead Travel is first found then Peak Load, Cross Head Travel at Peak & Transverse strength is found. *Plotter attached with UTM machine draw complete graph till start to specimen break.*

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Figure-5: Transverse Test On RCC BEAM

Figure-6 Universal Testing Machine with Plotter & Hydraulic Load Dial

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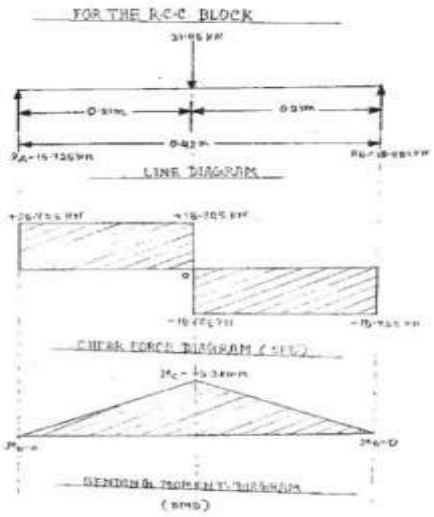

Fig.7

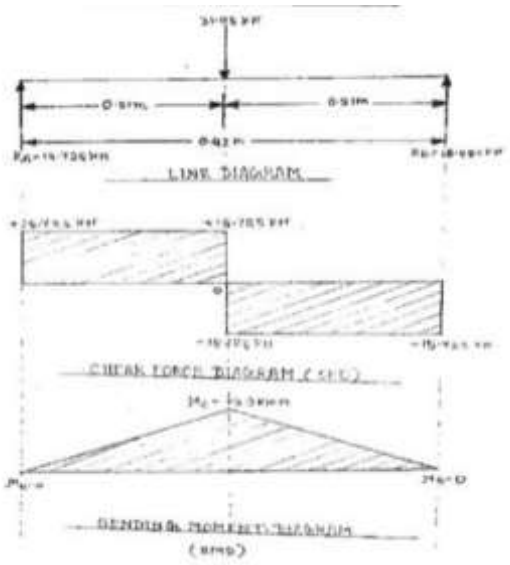

Fig.8

Transverce Test Report Is As Under:
1) Machine Model: TUE-C-1000. Machine Serial No. : 2009/50
File name: A4, CIVIL, UTM.
Material Type : **RCC Beam 1 (Pre-stress)**
Width, Thickness & Crosshead Travel is first found then Peak Load, Cross Head Travel at Peak &Transverse strength is found. *Plotter attached with UTM machine draw complete graph till start to specimen break*
Distance between Supports: 420.00 mm
Width: 150.00 mm ,Thickness: 250.00 mm
Max. Cross head Travel : 250.00 mm
Peak Load : 32.50 KN.
Cross head Travel ,At Peak : 11.20 mm
Transverse strength :06.07 N/mm2

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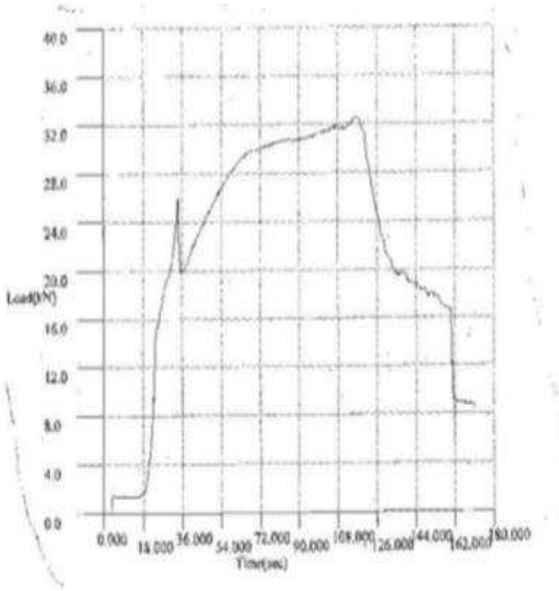

Fig.9

Transverse Test Report Is As Under:
2) Machine Model : TUE-C-1000. Machine Serial No. : 2009/50
File name : A4, CIVIL, UTM. Material Type : **RCC Beam 2 (Pre-stress)**
Distance between Support : 420.00 mm, Width : 150.00 mm,
Thickness : 250.00 mm Max. Cross head Travel : 250.00 mm
Peak Load : 32.50 KN. Cross head Travel, At Peak : 11.20 mm
Transverse strength :06.07 N/mm2

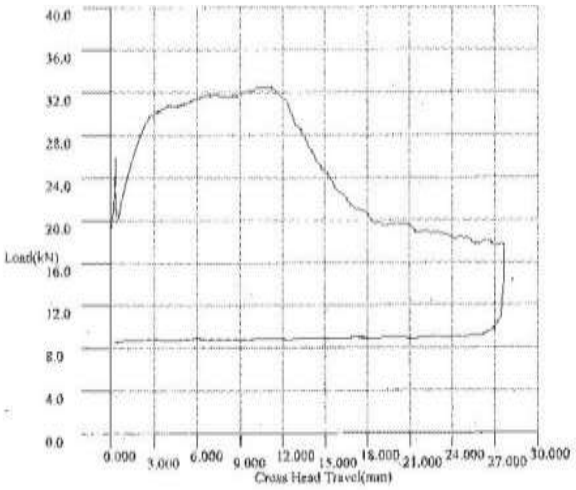

Fig.10

Transverse Test Report Is As Under
3) Machine Model: TUE-C-1000. Machine Serial No. : 2009/50 File name: A4, CIVIL, UTM. Material Type**:**

RCC Beam 3
Distance between Support: 420.00 mm Width: 150.00 mm Thickness: 250.00 mm
Max. Cross head Travel: 250.00 mm Peak Load: 31.45 KN.
Cross head Travel At Peak: 2.20 mm
Transverse strength: 05.87 N/mm2

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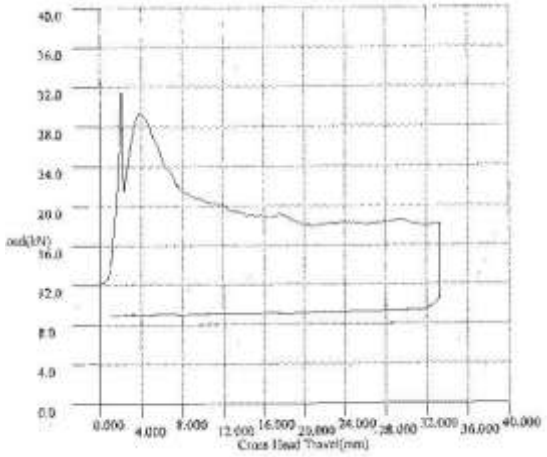

Fig11

Transverse Test Report Is As Under

4) Machine Model : TUE-C-1000. Machine Serial No. : 2009/50
File name : A4, CIVIL, UTM. Material Type : RCC Beam 4
Distance between, Support : 420.00 mm Width : 150.00 mm
Thickness : 250.00 mm Max. Cross head Travel : 250.00 mm
Peak Load : 31.45 KN. Cross head Travel At Peak : 2.20 mm
Transverse strength : 05.87 N/mm

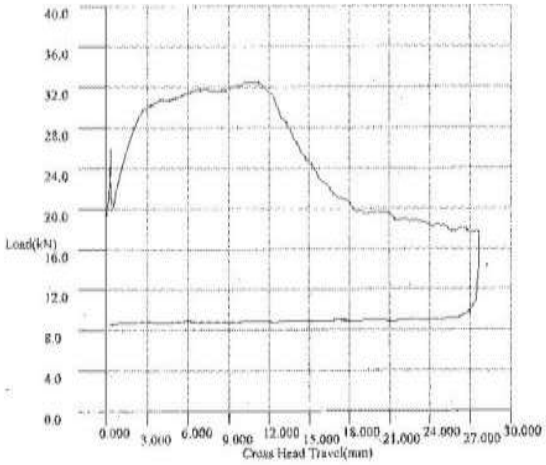

Fig.12

CONCLUSION

We found from study that, pre stress concrete anchoring devices influencing tremendously to the civil engineer decisions. It involves various process of pre stressing concrete which help us very much in understanding the mechanism of the working system.

Various tools are available to performing for structures called anchoring devices, Further we knew that structures by pre stress are more reliable, strong (Can take more Load) & reduced in size as compared to RCC . Hence we can say that by using anchoring devices better concrete structures can be made safe small section that are not Found by RCC beam. It is one of the simple post tension methods for anchoring the beam at cheaper rates. Less grad conc. may be use.

RECOMMENDATIONS

As we knew about the methods of pre stressing i.e. pre & post tensioning systems are better effective in their respective fields.

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But the post-tensioning system has less loss then the other system of pre-tensioning in pre-stressing.

CONCLUSION & RECOMMENDATIONS

We came to conclusion to adopt pre-stress concrete in practice by using this method for all kind of structural work to-day. As pre-stressed structures are found more economical may be at long run but with small section can take more loads in a structure. Check nut is provided at end and then cotter pin is placed this causes to reduce loss of pre-stress.. Rich concrete grade can be used with high strength alloy steel.

Other benefits of pre-stressing property of light weight along with high strength may be adopted by including FRP to reduce cracks as resistance to cracks is obtained, also gives more space, impact, fatigue, vibration etc.. As it can be made high strength and light weight sections with using pre-stressing in FRP. In pre-stressing concrete about 10 to 20 percent losses may be due to, creep and shrinkage in concrete. As we know even greater numbers of expensive equipment are required in using this process, though it is found effective then unstressed RCC structures.

It is sincere recommendation for adopting post-tensioning pre-stressing in all possible concrete structures section instead of RCC section.

REFERENCES

[1] PCI Report, Recommendations for estimating pre-stress loss, Report of PCI Committee on pre-stress loss, Journal
[2] PCI Report, Recommendations for estimating pre-stress loss IJBSE. Publications, Pre-stressed Concrete Works in India, 1973.
[3] IJBSE. Preliminary Publications, Seminar on Pre-stressed Concrete Structures, Bombay, January 18-21, 1975.
[4] Symposium, T.Y. Lin Symposium on Pre-stressed Concrete, Special Commemorative Issue, Journal of the Pre-stressed Concrete Institute, Vol. 21 No. 5, September-October 1976 .