

# [Improvement of cement concrete strength properties by short long steel fibre addi...](https://assignbuster.com/improvement-of-cement-concrete-strength-properties-by-shortlong-steel-fibre-additives/)

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| * Project Title: Improvement of cement concrete strength properties by short/long steel fibre additives

Section 1: Introduction/Rationale: The development of industrial and architectural structure refers to the new technology which balance between building plan and auxiliary material with effective performance. Concrete is a fundamental component to use in modern-building due to the ability to mold any shape and form in practical terms. Therefore, concrete construction has made rapid progress in the recent years. However, concrete is significantly more brittle but exhibits a poor tensile strength and strain capacity (Mindess, 2019 p. 17). A possible solution is using discrete steel fibre to ameliorate the performance of brittle materials (Mansour et al., 2007). The idea of using the fibres as materials reinforcement can reduce the concrete permeability and improve crack control ability. Furthermore, the element of steel fibre control opening also propagation micro-crack in early-stage (or plastic stage) until contributed in final strength of concrete (Brandt, 2008, p. 3-9), increases the young modulus,  reduce its consequent growth and water bleeding (Bencardino et al. 2008). Furtherore, steel fibres additive makes concrete more cohesive and isotropic, and transforms it from a brittle to a more ductile material (Wafa and Ashour, 1992). However, the beneficial effect on concrete design depend on many components, for instance type of steel fibre, characteristics of fibre and concrete mix design. Due to the lack of documentation on the behaviour of steel fibre in concrete mix design with tensile and compressive strength, the investigation of this research was conducted to evaluate and compare the mechanical efficiency of short / long steel fiber reinforcement concrete and steel fiber dosage in plain concrete. Section 2: Research Questions: * How much ratio of long and short steel fibre to mix with reinforcement cement that give the optimum volumetric to compressive and tensile strength?
* Which type of steel fibre short  produce greater mechanical impact in reinforcement concrete design?

Section 3: Annotated Bibliography : * Tadepalli, P. R., Mo, Y. L. and Hsu, T. T., 2013. Mechanical properties of steel fibre concrete. Magazine of Concrete Research , 65(8), pp. 462-474.

Tadepalli (2013) examine the relationship between type of fibres, the characteristic of steel fibre bonding and the amount of steel fibre used in reinforcement concrete design that effect on the mechanical propose of concrete, which I am discussing in my review looking at between our the relationship of bonding steel fiber characteristic with mechanical strength. These authors recommend reviewing case histories and the standard to reduce the risk by use of Soulioti et al. , 2011 and ASTM standard, 2011. However, the result of this paper can be used in large scale prestressed concrete beam only. * Fraser, L. T., May, R. N. and Bagala, R. D., 2018. Exploring the Properties of Fiber Reinforced Concrete. Worcester Polytechnic Institute

This paper focuses on the toughness of concrete and the additional of different type of reinforcement material such as glass, steel fibre and polymer fibre. The author compared the corrosion testing resistance by using Shores et al ., 2017. Concrete durability is the permeability concrete and Fraser et al. found that the polymer-fibre and steel fibre can reduce the void in mortar. This study will use be useful for my research as it presents a detail overview role of steel fibre can diminish void in concrete. Though, they recognised that they were unable to clearly prove their findings of the mixing ratio between steel fibre reinforcement and concrete mix design. Furthermore, the limitation of room temperature and the moisture are attributing the curing time, multiple cracking and producing a yield strength. * Soutsos, M. N., Le, T. T. and Lampropoulos, A. P., 2012. Flexural performance of fibre reinforced concrete made with steel and synthetic fibres. Construction and building materials , 36, pp. 704-710.

This paper focuses on the quantify different in fluctuations toughness of concrete made with fibre and steel of different shape and length by using the same dosage. Moreover, the researcher compares the influence result of steel fibre configuration, dosage, and synthetic fibre on shear bending performance and mechanics properties of fibre concrete performance has been investigated by Jovicˇic, (2009), p, 723-30 and Parker et al. (1974). This article assisted me in understanding the relationship between characteristic of steel fibre and the performance of mechanical properties. However, they recognised that they were unable to clearly prove that their findings the minimal required thickness determined for the different steel fibre types even the same dosage * Ragavendra, S., Reddy, I. P. and Dongre, A., Fibre Reinforced Concrete-A Case Study . In Proceedings of the 33rd national Convention of Architectural  Engineers and National Seminar on” Architectural Engineering Aspect for sustainable building envelopes” ArchEn-BuildEn-2017.

It is clear that this paper categorises the fibre matrix interaction, reinforcement mechanism and performance characteristic is advanced. It performance has been already claim by Swamy et al. (2003) and Surendra (1987, p. 83-88). Although it did not examine the primary of steel fibre concrete compressive-tensile strength and steel fibre type to use in experiment, which is the focus of my essay. * Shende, A. M., Pande, A. M. and Pathan, M. G., 2012. Experimental study on steel fiber reinforced concrete for M-40 grade. International Refereed Journal of Engineering and Science , 1 (1), pp. 043-048.

Shende et al. (2012) focus on the micro crack in mortal aggregate is responded in plan concrete M-40 and inclusion of fibres in the mixture. This paper shows the advance admixture of concrete design sulphonate naphthalene polymer properties with Hook Tain Steel fibre. The authors suggested a new model that uses Permalatha et al. (2003) which suggest the new ration of mix polymer with steel fibre concrete design. Even though, it did not examine the relationship between of steel fibre and bending load directly, the methodology used by the author might be applied to my own study. Section 4: Methodology: The research approach influence design and provide to consider benefit and limitation of various available to the researcher in any sources and time. In this research are considered use to type of approaches are available, for instance, which gain from test theories while inductive came from theories. This report uses secondary research approach as it aim to formulate the hypothesis and develop the mechanical performance of concrete mix with short/long steel fibre. There are two method available for data analysis- Qualitative and Quantitive; this project uses the quantitative data collected that gained form the researches, journal or published on the University of Glasgow website or library  and explored the research question as it allow researchers to conduct in-depth exploration of particular mixture of concrete design. * Project scope:

Regarding the limitation and scope of this research, the study briefly considered the entire production method, but the main focus was on the interrelationship between materials, their properties and how they can be measured, and the structural behaviour /performance. * Research limitation and constraints: mention time and money contraints, resources.

This study has potential limitation. The effect of time constrains and implementation of data collection method which may have be influenced the bias data or inaccuracy data than would have chosen. Furthermore, the lack of previous studies in the research area are too specific and reliability of data would be out of date. * Ethics consideration:

No ethics consideration needed as secondary research. Section 5: Reference List * Alsayed, S. H. and Alhozaimy, A. M. (1999), Ductility of Concrete Beams Reinforced with FRP Bars and Steel Fibers, Journal of Composite Materials, Vol. 33, No. 19, pp. 1792–1806.
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* Tadepalli, P. R., Mo, Y. L. and Hsu, T. T., 2013. Mechanical properties of steel fibre concrete. Magazine of Concrete Research , 65(8), pp. 462-474.
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