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Importance of MEP Co-Ordination in Residential Projects- BIM Approach

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ABSTRACT:The Construction sector has faced enormous development in last 2 decades and now the designs of structure have become so complex that the technical aspect is mandatory to operate these kinds of construction projects. In construction industry MEP that is Mechanical, Electrical and Plumbing system is the most sensible part which requires detailed designing, detailed planning and execution with help of expertise is mandatory. Also these department face a lot of co-ordination problem between contractors, designers and client which leads to delays, cost over runs and in worst cases these issues creates some serious disputes. Therefore these paper deals with ways to improve the coordination by Building Information Modelling approach. This paper presents an update work flow procedure for MEP Activities in Construction Project.

KEYWORDS:MEP, Building Information Modelling, work flow procedure, MEP Coordination.

I. INTRODUCTION

Coordination of mechanical and electrical frameworks to detail their setup gives a significant test to complex projects. Today the projects are too complex and needs specialised and experience contractors and consultants to execute such projects within the given budget and time frame. Due to lack of awareness of various tools available in the market consultants and contractors use semi-digitalized method of executing MEP projects in which design coordination is done through Auto-cad plans were as still the most critical part which is clash detection is done manually. This method results in identification of different service clash in the execution stage which leads to re-work, time consumption and cost consumption. Sometimes the value of this rework is so high that it affects the projects badly and results in cost over runs, Time overruns and thus reducing the profits of all parties. The structure coordination of Mechanical, Electrical, and Plumbing (MEP) frameworks is a manual procedure led during preconstruction period of building ventures. The challenges related with the conventional MEP coordination process have brought about broad endeavour's to improve the procedure through usage of BIM innovation. The boundless selection of BIM innovation by AEC (design/building/development) firms has offered ascends to new means and techniques for directing MEP coordination. Nonetheless, there is restricted information about different methodologies that are as of now polished as BIMbased coordination. Additionally, there is a need to recognize data things and measurements expected to appropriately catch and gauge the impact of BIM on upgrading coordination process. Therefore in this paper we describe the use of BIM methodology i.e. Building Information Modelling methodology to overcome the MEP related problems to a greater extent

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II. OBJECTIVES OF THE PAPER

The objectives of the paper are described as follows

1. To provide a workflow procedure for MEP activities using BIM.
2. To identify and overcome coordination problems in MEP activities of a construction projects.

III. LITERATURE REVIEW

- **Saman Yarmohammadi, Baabak Ashuri (2015), "EXPLORING THE APPROACHES IN THE IMPLEMENTATION OF BIM-BASED MEP COORDINATION IN THE USA", Journal of Information Technology in Construction - ISSN 1874-4753**

The structure coordination of Mechanical, Electrical, and Plumbing (MEP) frameworks is a manual procedure directed during preconstruction period of building projects. The challenges related with the ordinary MEP coordination process have brought about broad endeavours to upgrade the procedure through usage of BIM innovation. The across the board selection of BIM innovation by AEC (design/building/development) firms has offered ascend to new means and techniques for leading MEP coordination. In any case, there is restricted information about different methodologies that are as of now polished as BIM based coordination. Additionally, there is a need to distinguish data things and measurements expected to appropriately catch and quantify the impact of BIM on upgrading coordination process. The significant target of this examination is to catch the underpinnings of BIM-based coordination process as at present rehearsed by AEC firms in the U.S. An across the nation overview was directed to catch the topic specialists' suppositions in the accompanying regions of BIM-based coordination are current methodologies of leading coordination utilizing BIM, Information things gathered to screen coordination process, Factors influencing coordination generation rate, Metrics utilized by AEC organizations to quantify creation rate; and Identified prescribed procedures utilized by organizations to upgrade BIM use in the coordination procedure. The discoveries of this examination demonstrated that "remote coordination" and "normal coordination" are the most broadly utilized BIM-based coordination draws near. Number of conflicts settled in each gathering, BIM competency of colleagues, and numbers of exchanges going to gatherings were distinguished as the most regularly gathered data things by AEC firms all through the MEP coordination process. Group experience level, fundamental structure quality, and MEP framework multifaceted nature were found as the most significant components that affect the MEP coordination process. A few accepted procedures were prescribed by members in this investigation to improve the effectiveness of MEP coordination process. These systems were depicted under the four distinct periods of a MEP venture: commencement and arranging, 3D demonstrating, MEP coordination, and development and establishment. The consequences of this examination are relied upon to improve our insight about contrasts among different BIM-based coordination draws near, their ubiquity among experts, and their impacts on the coordination progress. The discoveries of this exploration will help AEC firms by portraying data prerequisites for setting up a system to track, measure, and think about MEP coordination progress crosswise over various development projects.

- **Dr. P. P. Bhangale (2017), INVESTIGATION OF CAUSES OF DELAY IN HIGH RISE BUILDING, CASE STUDY-PUNE", INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY**

Delays in a development project can be viewed as a disappointment. This paper plans to explore the reasons for delay in elevated structure projects in Pune city. The industry which is encountering successive and expensive delays is the structure and development industry. In any case, a quantities of development projects which had the defer issues are exceptionally huge. Development project includes numerous unpredicted elements which results from numerous sources. These sources incorporate the exhibition of temporary workers, assets accessibility,

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climate conditions and agreement frameworks. Anyway it happens in each development project and the noteworthy of these delays fluctuates extensively from project to project. In this manner delays are significant issue in the development segment. Examination into this delicate zone is basic so as to improved organization defer conditions and to decrease their results. This investigation is to analyse the important components contributing delays. Another parameter is Technical Failure which is answerable for delays in development exercises of elevated structure projects. Technical Failure happens due to either choice taken by experts on location/office or uncertainty in choices because of which superfluous deferral happen. This examination remembers learn about examination of reasons for delays for tall structure project which is situated in Pune city. Site comprises of six elevated structures including platform, business complex, gas supply unit, club house, and so on. Completely outfitted and prepared project deferred because of handy reasons which ran over improvement of project.

- **Wesam Salah Alaloul*, MohdShahirLiew, Noor Amila Wan Abdullah Zawawi (2016), Identification of coordination factors affecting building projects performance”, Alexandria Engineering Journal**

Construction projects execution expects improvement to fulfil the multifaceted nature of the partners' needs and desires. Coordination process is proposed as an efficient answer for feeble execution of construction projects. Accordingly, coordination factors are crucial in guaranteeing a fruitful execution of all project stages. This examination expected to recognize and organize coordination factors that influence the exhibition of building projects in Malaysian setting. A huge collection of writing on coordination process was assessed and brought about 53 coordination factor. Three rounds of Delphi method were led. The best coordination factors were positioned dependent on the Relative Importance Index (RII, for example, Scheduling (RII = 0.97), Quality affirmation plan (RII = 0.93), and all gatherings' interest in plans (RII = 0.89). These coordination factors have fulfilled the exploration hole and gave better administration and better for project parties. The outcomes offer smart points of view to define the best coordination factors, for tending to the reliance between project assignments and the gatherings to improve project execution.

- **C. Bob Tatum and Thomas Korman (1999), “MEP Coordination in Building and Industrial Projects”, CIFE CENTER FOR INTEGRATED FACILITY ENGINEENG.**

This paper describes introductory outcomes from an examination project at Stanford's Centre for Integrated Facility Engineering. The reason for this exploration is to expand the presentation of project groups and office supervisors in meeting destinations for complex structures and modern offices through improved combination and mechanical, electrical, and plumbing (MEP) coordination. The technique for this examination clench hand includes gathering information applied by specialists and detailers during MEP coordination. This information is specific; along these lines, is extremely hard for one control to know the necessities of different exchanges. The scientists are speaking to this information in a PC instrument that can distinguish a few sorts of issues in MEP coordination and make suggestions for arrangements fulfilling the various kinds of requirements. MEP coordination shows an irregular test for training and research. Propelled plant structure frameworks can give models to aid coordination, yet they are commonly not utilized on clinics, research centres, semiconductor wafer fabs, or biotech fabricating plants. Point by point structure and construction for this mind boggling offices are divided on the grounds that claim to fame plan advisors and contractual workers play out this work. The underlying driver of the MEP coordination issue isn't the absence of innovation yet the need to apply accessible innovation fitting to a particular arrangement of business and specialized conditions. Article situated 3D models could permit a modified procedure of coordination. Nonetheless, catching the circulated information concerning the various sorts of frameworks and fitting the product to meet the exceptional needs of MEP coordination stay significant difficulties. Accomplishment with this movement would bolster significant upgrades in structure, coordination, construction, authorizing, activity, support, and retrofit for new employments.

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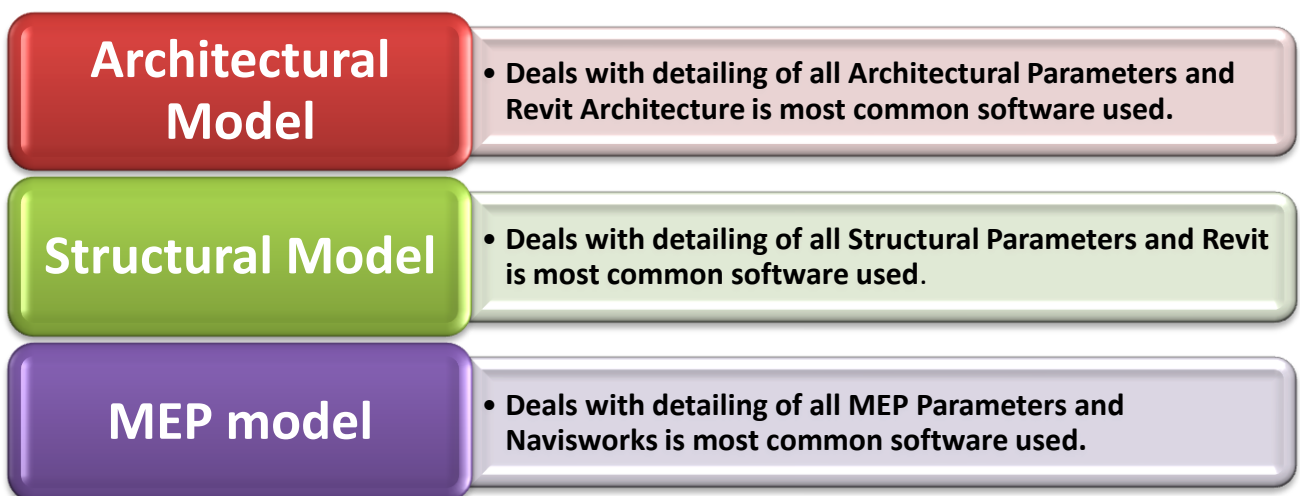
The details relegate duty regarding coordination to the claim to fame or exchange temporary workers, including checking for clearances, field conditions, and engineering conditions. The procedure of MEP coordination includes finding parts and branches from all frameworks in consistence with structure, construction, and activities criteria. The present procedure of consecutively looking at 114 inch foot scale straightforward drawings for every framework over a light table adds noteworthy expense to numerous projects and can include critical term.

IV. METHODOLOGY



V. BIM SOLUTION

Building Information Modelling consists of three different individual models that will be going up with further sub models. Those three main models are



MEP Model phases

There are two design Phases in MEP Model they are 1) Schematic design and 2) Detailed design.

Schematic Design- The "Schematic design" and "Design development" - arrange comprises of design that supports different members in the design procedure. The objective is to deliver adequate information to create the Architectural

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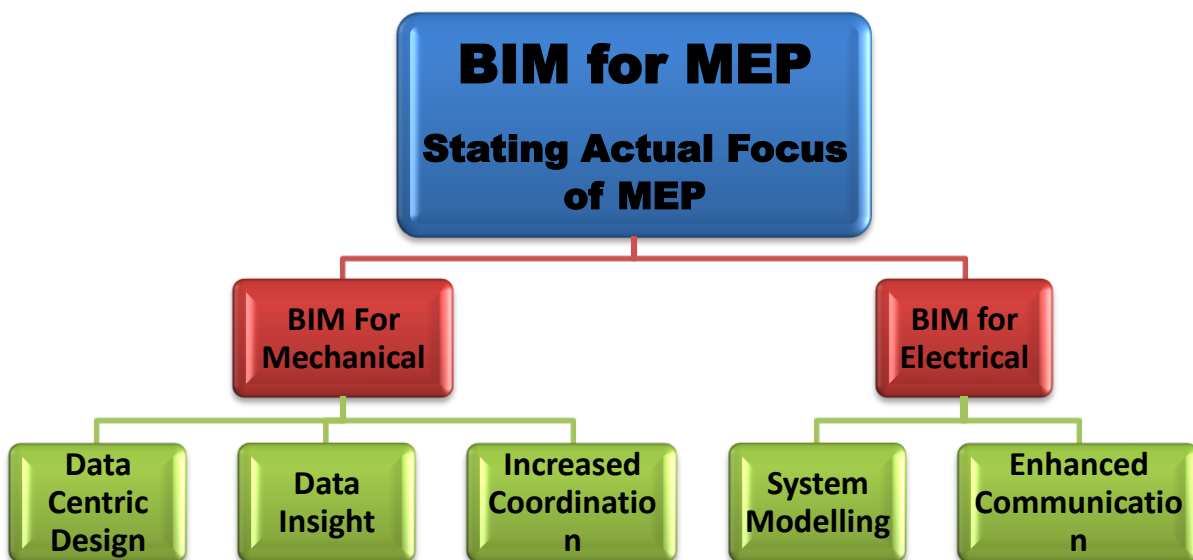
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and the Structural BIM. At the "Schematic design" and "Design development" - arrange MEP-design doesn't create a framework model covering the whole working; rather, the emphasis is on framework decisions, administration region outlines and MEP spatial reservations. At the "Schematic design" organize; elective arrangements are set up as indicated by the MEP-design task distribution list. A fitting degree for the structure data demonstrating is concurred in the undertaking or the design development records.

Detailed Design- Framework models covering the whole building are set up at the detailed design organize. Reference to the undertaking allotment list (Scope of Work, MEP-design) project information data card, Design level and General Building Information Modeling Requirements is picked. "The design is finished based on information models and CAD programming is utilized."



BIM for MEP TREE

Revit Based Design Work flow in BIM

Since Revit MEP is based on the Revit stage, coordination between MEP colleagues using Revit MEP, architects using Revit Architecture whereas structural engineers using Revit Structure is streamlined. The architectural spaces made using Revit Architecture can be utilized by Revit MEP to help load counts, track wind current in rooms and arrange board plans. The architectural and structural components made by (separately) Revit Architecture and Revit Structure can be utilized to reveal potential clashes with MEP framework segments from the get-go in the design procedure. Settled procedures for worksharing among Revit clients similarly apply to MEP engineers using Revit MEP. Revit Worksharing disseminates the intensity of the parametric demonstrating condition over an undertaking group, giving a total scope of joint effort modes to suit the work process and prerequisites of the gatherings in question, including the accompanying other options:

1. On-the-fly, concurrent access to a common model between architects, structural engineers and MEP engineers.
2. The proper division of the undertaking into discrete shared worksets that are held for altering by a solitary client at once (Ex- "floor_1_architectural", "floor_1_structural", "floor_1_mechanical", "floor_1_plumbing" and so on).
3. A total detachment of undertaking components or frameworks into independently oversight.

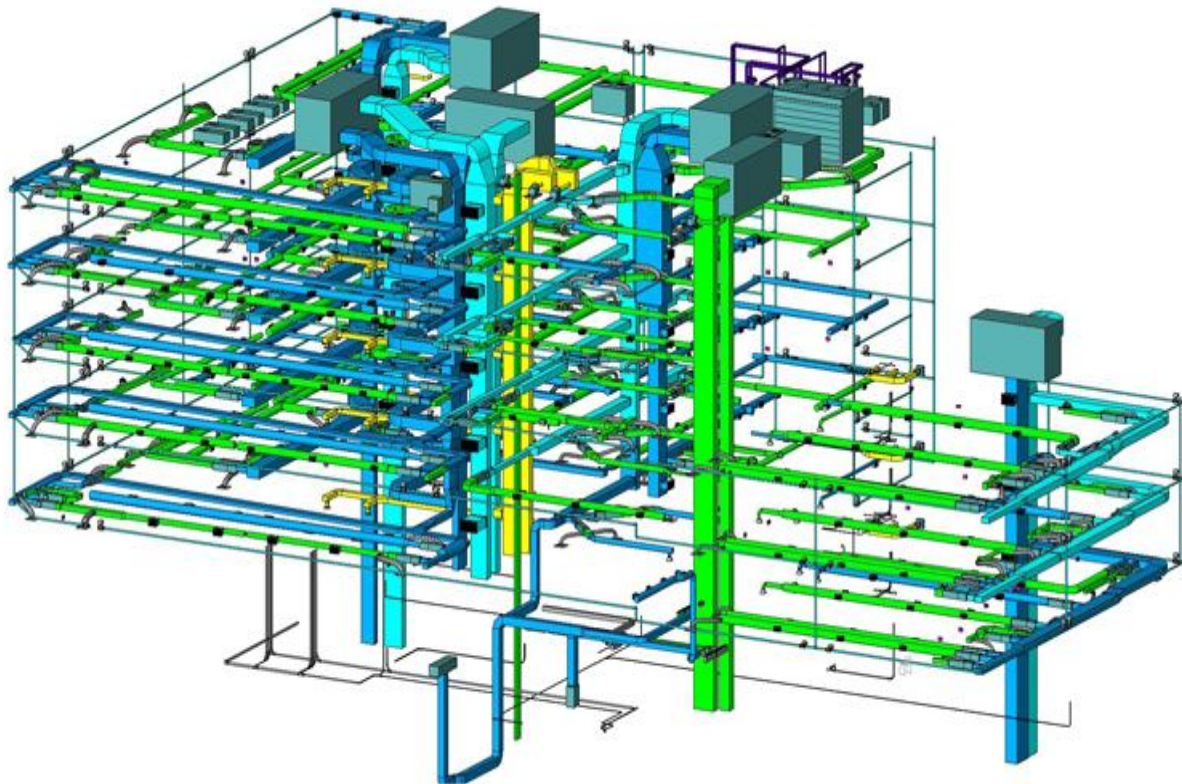
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File linking works like the External Reference (xref) ability in AutoCAD programming, with the additional capacity to screen and refresh explicit key components that are partaken in the design procedure. Worksharing offers the extra capacity to proliferate and arrange changes between designers, documentation and controls. A client works autonomously in a workset, intermittently posting changes again into the ace undertaking file and invigorating the workset with changes from other clients. Worksets can be shown as required, maintaining a strategic distance from the memory-serious showcase of parts of the structure model that aren't important for a particular design action. For instance, an electrical designer may need to continually see the architectural workset, however flip the perceive ability of the structural workset on or off to suit his design needs. Standard model viewing instruments are upheld for worksets, permitting the MEP designer to make drawings that incorporate any components from the common models.



BIM MEP MODEL

VI. CONCLUSION

Revit MEP offers MEP engineers propelled usefulness for building electrical and mechanical structure. The process able Revit building model enables firms to make, oversee and share structure data more successfully - adding to expanded benefit, decreased hazard and less wasteful aspects in building plan. Parametric change the board disposes of coordination blunders in documentation sets, and limits coordination mistakes between building configuration groups - just as designers and auxiliary architects inside Revit-based work processes. Firms can at last progress from a work process dependent on 2D drafting to the comprehensive methodology of incorporating entire frameworks in a 3D computerized condition, encouraging advanced data sharing for building examination and carefully determined structure for structures.

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