An Overview of Few Advanced Software in Sub – Disciplines of Civil Engineering

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Abstract – *There are various software available in market that are used in Civil Engineering works. Due to technological progression, the amount of software serving Civil Engineering and design requirements are increasing tremendously. So, here is in this paper overview of few civil engineering software that is exorbitantly used by many civil engineers all around the world is given. Regardless of the ranking, this software is very much useful in Construction projects. Although, there are numerous sub-disciplines like Transportation Engineering, Surveying, Structural Design, Geo-tech Engineering, Construction planning, Environmental Engineering, we have provided an general information of few software's that is used throughout the construction industry. Hoping that, this paper may help, many civil engineers to understand the scope of software's in their own field and assist them to become a skilled civil engineer.*

Key Words: **Software, Civil Engineering works, Advance technology, Sub-discipline, etc.**

1. INTRODUCTION

In this paper, an overview of a few advanced engineering science software has discussed. Some decades ago, when the computers and software were in their initial stage, planning and construction of buildings were quite slow. Further, thanks to the rapid historic period, engineering companies speed up the development ensuring quality and strength. Today there are several friendly user software's available within the field of engineering science practices to create large and challenging projects briefly time. The techniques of soppy computing were introduced early and now it becomes a serious research and study area particularly in automatic control engineering. Technology design software has proven to assist in reducing the price and minimizes human error related to project. The techniques of soppy computing are nowadays being employed successfully in many domestic, commercial, and industrial applications. With the arrival of low-cost and high-performance digital processors, it's clear that the techniques and application areas of soppy computing shall have a bright future to expand.

2. REQUIREMENTS OF CIVIL ENGINEERING DESIGN SOFTWARE

- **Sustainable structures:**

Sustainable design has become an incredibly relevant trend within the development and engineering fields. Meaning there'll be a rise in element for smart materials, intelligent electric grid, smart building and more. Hence, engineering science design software solutions will likely adapt to accommodate these trends.

- **Advance materials:**

The technology industry is setting out to introduce advanced materials that are ready to adapt to external conditions. As this becomes more relevant in industry, applied science tools change to accommodate this sort of design.

- **3D printing:**

The trend of 3D printing demand has been recently reached the applied science space, as 3D printing is capable of turning design created within applied science models into physical model.

3. FEATURES OF CIVIL ENGINEERING SOFTWARE

- This feature enables to users to draw basic lines, create plan and shapes in faster to act because the foundation design for structures.
- This functionality allows user to make 3D models of the structures for they are designing. These models will be complete with realistic details so that they can look as near what the engineer envisioned as possible.
- Applied science design tools provide the capabilities for user to edit their design as they deem necessary with functionalities like erase, trim, undo etc.
- This feature takes a 3D model and places it into a completely realized 3D environment so user can better visualize how their final product look like.

- This ensures that the file created from the answer is compatible with variety of advanced design and imaging.
- Some tools provide the choice for users to sequence the steps i.e. they can create and animate the steps, materials.
- The unique features like analysis of diversified structural elements, structural modelling of varied elements, structural dynamic analysis and checking of geometrical errors.

4. OVERVIEW OF FEW CIVIL ENGINEERING SOFTWARE

1) Build-Master

Build-Master is hottest Indian software for RCC building design and an application release for the automation tool, designed by the software development team, Inedo. Build-Master is that the flagship software of Ensoft which may be a complete package for RCC building analysis, design, drawing and estimation. BUILDMASTER is user friendly software and complicated functions of the package are driven by simple menu commands. This software is an automatic deployment tool which is using by the reputed design engineers everywhere India. It combines the features to manage and automate processes primarily associated with continuous integration, database change scripts and production deployments. This tool is browser-based and able to be used "out-of-the box".

Fig no. 1 Build Master Logo

Features:
Build Master is straightforward to put in, learn and use. Build Master also contains a tight integration with PowerShell and is usually used together with other DevOps tools. Single user version software comes on CD and also the same will be installed on multiple computers whereas it runs only on one computer at a time where the lock is connected. The schematic 3D elevation of building is generated from the identical plan data at various levels. Build Master can make sure the protection of sensitive information. The detailed working drawings are prepared

without entering even a line command in drafting package.

Application:
It's a whole package for analysis, design, drawing and estimation of RC buildings. The program perform earthquake and wind analysis by generating 3D space frame model. It's employed to manage, store, control access to tokens, passwords, and API Key that are involved in deployments. Measurements at site is cross-checked easily at the office before billing of bar bending schedule, generated by BUILD-MASTER will be sent to site for action by fitters.

2) HEC-RAS

It is a malicious program that models the hydraulics of water flow through natural rivers and other channels. HEC-RAS may be a bug for modelling water flowing through systems of open channels and computing water surface profiles. The program was developed by us the Army Corps of Engineers so as to manage the rivers, harbors, and other construction under their jurisdiction. The Hydrologic Engineering Centre (HEC) in Davis and California developed the River Analysis System (RAS) to help hydraulic engineers in channel flow analysis and floodplain determination.

Fig no. 2 HEC-RAS Logo

Features:
Use feature objects and a TIN to develop the geometry of a HEC-RAS model. It creates cross sections, edit and merge during a database to be used with HEC-RAS and other hydraulic models. Delineate floodplain from water surface elevation data and also the same is computed by HEC-RAS, defined interactively, or imported from a file. It's within the property right with peer-reviewed and available to download freed from charge from HEC's computing machine. It's applicable to uncertainty in modelling parameters on a Delineated floodplain.

Applications:
It's capable of modelling subcritical, supercritical, and mixed flow regime flow along with effects of bridges, culverts, weirs, and structures. HEC-RAS finds commercial application in floodplain, management and studies to evaluate floodway

encroachments. It's often possible to use HEC-RAS to beat instability issues on river problems. The extended version of HECRAS is applicable to bridge design, culvert design, and dam analysis and channel modification etc. It's used for modelling water flowing through systems of open channels and computing water surface profiles.

3) Water GEMS

Bentley open flows Water GEMS provides a comprehensive and easy-to-use for water distribution networks. This software helps to boost the knowledge of how infrastructure behaves as a system, how it reacts to operational strategies and the way it should grow as population and demands increases. Open flows Water GEMS is that the hydraulic modelling application software for water distribution systems with advanced interoperability, asset management tools, geospatial model building and optimization. The users of this software enjoy the facility and flexibility afforded by working across CAD, GIS, and standalone platform while accessing one, shared, project data source. Water GEMS could be a superset of Water CAD so will get data as obtained from Water CAD plus more with Water GEMS.

Fig no. 3 Water GEMS Logo

Features:
It creates and manages the customized reports that automatically combine graphs, data tables, color-coded and annotated plan views. Access tools quickly through a modernized ribbon-based programmer with built-in search to seek out commands more easily. It's wont to run historical simulations using actual operation of pump and valve control based on SCADA system records. It automatically assigns elevation values to junctions, tanks, pumps, valves, reservoirs, and fire hydrants, saving engineers time and avoiding potential manual-input mistakes. Water GEMS also provides drawing and connectivity review tools to possess guarantee about hydraulically co-herent model.
Applications:
This Bentley's tool used for real-time predictive and operational analytics for decision support. Engineers at utilities, municipalities, and applied science firms use Water

GEMS for the analysis and style of water distribution systems. Building a water-distribution network system and network design optimization. This software is employed for water quality analysis. It's employed for model calibration. Water GEMS provides synchronized database connections, geospatial links and advanced model-building modules that connect with virtually any digital formatting. Water GEMS' helps engineers to allocate water demands supported GIS water consumption data from any point, line, or polygon using customer meters, lump-sum demand distribution, population-estimation polygons, or utility meter routes.

4) Tekla

Tekla is a software product family that consists of software for analysis, design and detailing and project communication in all modern construction projects. It is a building information modeling software which is able to model the structures that incorporate different kinds of building materials including steel, concrete, timber and glass. Tekla allows structural drafters and engineers to design a building structure by using its components using 3D modeling which generate 2D drawings and access building information.

Fig no. 4 Tekla Logo

Features:
The software enables users to make and manage 3D structural models in concrete or steel and guides them through the method from concept to fabrication. Tekla Structures is understood to support large models with multiple simultaneous users, but is regarded as relatively expensive, complex to be told and fully utilize. It uses only 1 tool for all materials (concrete, timber, steel etc.) and projects. Open collaboration and collaborate with project members and third parties. Localized software gets help from local support in additional than 20 languages. Its powerful software automate your repetitive structural calculations. One can choose between one and more of our regularly updated calculation libraries or can write his own. Single solution for all common element and material. It creates transparent calculations that are easy to test. This software compares different design options and makes changes quickly.

Applications:

Tekla Structures is employed within the industry for steel and concrete, detailing, precast, and cast-in-situ. Engineers have wont to model the stadiums, offshore structures, plants, factories, residential buildings, bridges and skyscrapers. It's used for various quite purposes like business, education and partner. This software is employed to put in writing, store and distribute your own custom calculations. Its accustomed analyses the frame like trusses, cranked beams and portal frames.

5) RISA Connection

RISA products are for structural design and optimization. These products are useful for the design of towers, skyscrapers, airports, stadiums, petrochemical facilities and bridges. The products of RISA are RISA 3D, RISA FLOOR, RISA FLOOR ES ,RISA FOUNDATION, RISA Connection, RISA 2D and RISASection. RISAConnection software is beneficial for steel connection design with the assistance of 3D model.
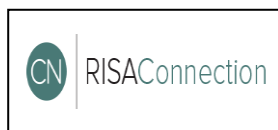

Fig no. 5 RISA Connection Logo

Features:

It allows designer to make steel connections employing a connection dialogue box with pictures and descriptions. Connection is viewed as 2D picture or 3D view. The view will be rotated at 360 degrees to determine the complete connection. It's compatible with Windows7/8.1/10 (64 bit windows).

Applications:

It is useful for designing nearly every kind of steel connections which incorporates beam to column connections, beam to Girder connection, Clip angle shear connection, End plate shear connection, End plate moment connection, Flange plate moment connection, HSS column moment connection etc.

5. CONCLUSION

Looking back on this paper, the overall outcome of this paper is, this can be a study resource for many civil engineers those are searching advancement in civil engineering technologies. These software's mentioned above are from varieties sub – disciplines of civil engineering. So, by learning the features

and applications civil engineers may understand the scope of improvement as per market need. This study is very essential for the future of the construction industry as well as our education.

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