IMPLEMENTATION OF CONTROL MEASURES TO REDUCE MOBILE CRANES ACCIDENT

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Abstract

Mobile cranes are used to lift heavy modules most commonly used in industrial project and construction site.In this paper we discuss about hazard involving while working with crane and control measure to reduce these hazard associated with various operation performing in workplace and this paper review about crane specific safety plan and program ,equipment selection.Multiple contractors, each with their own Safety Program, working on the construction site, need to implement their Safety Programs in a consistent and harmonious manner to avoid overlap, omissions and conflicts. The process by which this is accomplished is the Site Specific Plan, which reflects the overall safety on the site and defines responsibilities for each activity.The owner and owner's design team shall require the preparation of Site Specific Safety Plan as part of the contract documents.The Site Specific Safety Plan reflects not only the needs of the contractors on the site, but also the concerns of the owner and design team. The owner and the design team shall require the preparation of the Site Specific Safety Plan as part of the contract documents. The project owner and the design team shall include in the contract documents specific requirements addressing the hazards and concerns identified for the contractor to document in the Site Specific Safety Plan

Keywords : Temperature sensor, Smoke sensor, Fire sensor, Buzzer, Relay, Arduino UNO and Bluetooth module.

I. INTRODUCTION

A. General

Significant risk to individuals and property associated with crane and hoisting operations justify special efforts to improve crane and hoisting safety as an integral part of construction site safety.
Cranes are essential tools for many construction projects. Cranes have multiple uses and configurations on projects that range from residential and commercial through heavy industrial, infrastructure and marine construction.

Crane accidents cost time and money for a number of reasons:

- cranes are expensive,
- loads are often of high-value,
- cost of substitute crane service,
- project progress disruption, short term,
- project schedule disruption, long term,
- insurance and compensation costs,
- Litigation costs.

Studies by The Business Roundtable indicate that reduction of accidents and corresponding accident severity lowers accident costs by as much as 8% in direct construction labor payroll.

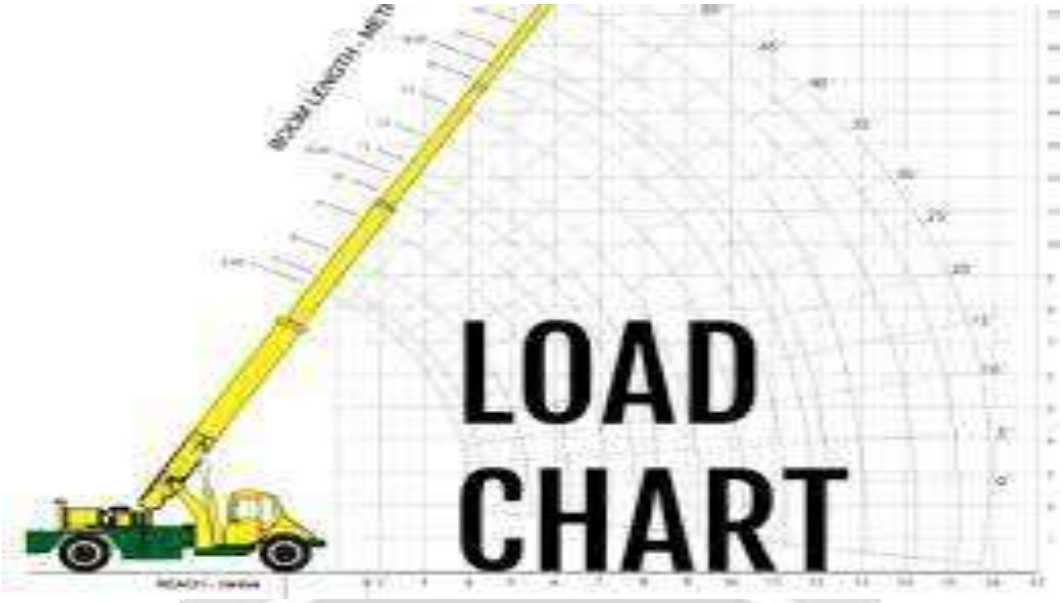

Figure.1.load chart

B.Objective

The Site Specific Safety Plan reflects not only the needs of the contractors on the site, but also the concerns of the owner and design team. The owner and the design team shall require the preparation of the Site Specific Safety Plan as part of the contract documents. The project owner and the design team shall include in the contract documents specific requirements addressing the hazards and concerns identified for the contractor to document in the Site Specific Safety Plan.

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II. METHODOLOGY

A. Introduction

The construction operations are controlled by a Prime Contractor, General Contractor, a Construction Manager or a combination of these entities (PC/GC/CM). The PC/GC/CM is responsible for planning, organizing, monitoring, and controlling all construction operations. The contract documents assign safety oriented duties to the PC/GC/CM which shall be incorporated into the Site Safety Plan. It is the PC/GC/CM's responsibility to assure that applicable topics from the Crane Safety Program and the entire site-specific Crane Safety Plan are included as a part of the overall Site Safety Plan, encompassing all project participants. All portions of the Site Safety Plan, which includes the Crane Safety Plan, remain the responsibility of the PC/GC/CM, regardless of the crane Service Provider or User.

1. Safety must be planned
2. Safety Program is the corporate philosophy
3. Safety Plan is the implementation of the corporate philosophy
4. Site Specific Safety Plan – Start early – Specific to site and job to be effective
5. Lift Plans: General, Production, Critical

B. Proposed methodology

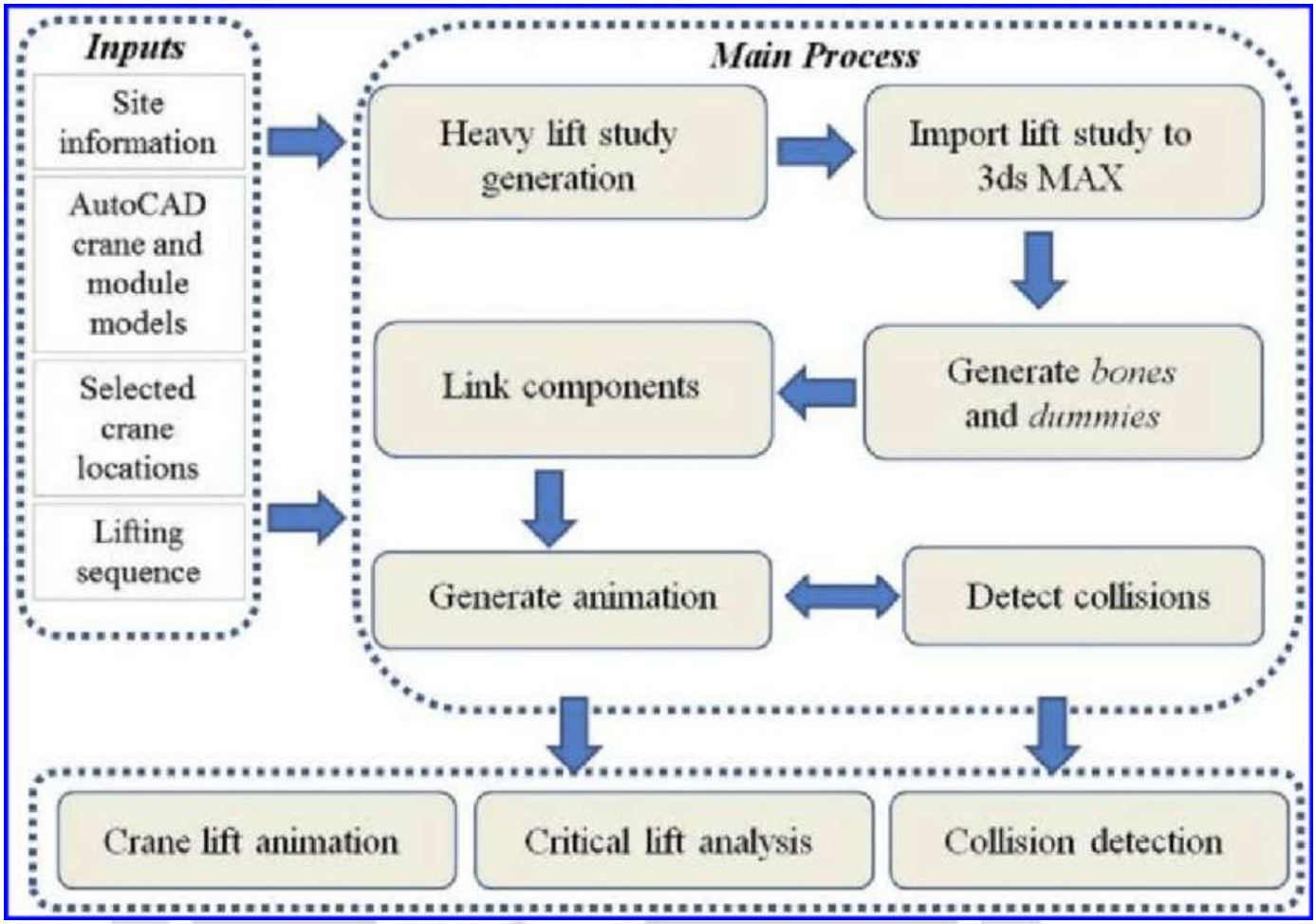

Figure-2. Methodology

Site specific safety plan

The preparation of a Site Specific Safety Plan starts with the project concept. A listing of hazards and concerns developed by the owner and the design team during the concept and design phase shall be compiled and addressed in the project documents.

- Requirements for access to the facilities, protection of owner's existing operations, if any, utilization of areas of the property, protection of adjacent property and public must be addressed in the contract documents.
- Hazards and concerns of the owner and the design team shall be addressed as part of the contract documents. A specific solution to the hazards and concerns need not be presented, but the contract documents shall clearly require the PC/GC/CM to address each topic. Each contract document topic included in the documents shall include the contractor's Safety Program topic and generate a Site Specific Safety Plan topic as a response.

III. RESULT AND DISCUSSION

Cranes play an indispensable role in the construction industry, especially high rise structures. It is a fact that cranes are involved with an alarmingly high number of casualties and fatalities, increasingly so in 2008. The sad truth is that the equipment and know-how exist to greatly reduce crane failure incidents but it's not used diligently throughout the construction industry. Furthermore, in some

cases safe operation of cranes is hampered by outdated or contradicting regulations. While the proper use of current safety equipment, the incorporation of new devices such as the CRANIUM, and appropriate regulations can make it easier to use cranes safely, they cannot put an end to crane failures themselves. As with most things, it comes down to the skills, motivation, and attention to detail of the people operating and caring for these sometimes gargantuan machines.

OSHA should update its crane regulations so that they are an effective minimum code of safe conduct for current crane operations. Ample crane inspectors must be employed to assure compliance with any new regulations. Under either OSHA regulation or its own volition the construction industry must insure that crane operators are qualified because countless lives including their own depend on it. Structural engineers must find a way despite the continually faster track of design and construction to verify that crane foundations and tie-ins are adequate.

Figure-3. Mobile crane

Thus the fire in fireworks industries can be monitored using LCD, detected using sensors and extinguished using the crusher dust. Thereby, it ensures the safety of the people under work by the proposed automated system.

The programs are loaded into Arduino such that it satisfies the criteria. There are three criteria to activate the proposed system. First is that, if the fire starts anywhere on the floor, the fire sensor will get triggered. Second is that, if the temperature level goes beyond the critical level, the temperature sensor will be triggered. Third is that, if there is presence of gas, then the gas sensor will be triggered. The supervisors will be able to monitor the temperature level in the working environment with the help of LCD. The signal will be sent to the Arduino, whenever the system meets any one of the criteria. The system gets initiated by pumping the crusher dust using PVC pipes with the help of DC motor from the storage tank. Simultaneously, the alarm gets activated and it alerts the people to leave the room immediately.

STANDERS AND CODES

BRITISH, CANADIAN, AND EUROPEAN SYSTEMS

In Britain, Canada, and Europe, the distinction between regulatory and consensus standards does not exist. They develop standards through technical committees such as the British Standards Institute and the Canadian Standards Association. These committees may have less input from industry representatives than in the U.S system. Compliance with British and Canadian standards is not a voluntary act such as compliance

with ANSI or ASTM Standards may be in the US. It is compulsory. The final result is a regulation in the British and Canadian systems that reflect a state of the industry rather than the minimum requirements. Although this system may set a higher minimum for operating performance, it does not benefit from the use of a consensus method for developing the standards. The system also inhibits early standards for "state of the art" developments because most "state of the art" developments should not yet be mandatory.

In the British, Canadian, and for the most part European systems there is an advisory document usually referred to as a guide which that is designed to assist and implement the standard and generally provides a step by step "how to comply" instruction.

U.S. REGULATIONS & STANDARDS

Occupational Safety and Health Act (OSHA)

1. Occupational Safety and Health Act of 1970, Public Law 91-596
2. Concepts and Techniques of Machine Guarding, OSHA No. 3067, 1980
3. Regulations and Standards adopted by OSHA

   Code of Federal Regulations, General Industry Standards, Title 29, Part 1910 Code of Federal Regulations, Construction Standards, Title 29, Part 1926 Safety and Health Regulations for Marine Terminals, Title 29, Part 1917 Safety and Health Regulations for Longshoring, Title 29, Part 1918

Other U.S. Regulations & Standards

1. National Electrical Code, National Fire Protection Association (NFPA), Chapter 6, Article 610, Cranes and Hoists
2. Safety and Health Requirements Manual, EM 385-1-1, US Army Corps of Engineers, Department of the Army
3. Mobile Power Crane and Excavator Standards, PCSA Standard No. 1, Power Crane and Shovel Association (PCSA), a Bureau of the Construction Industry Manufacturers Association
4. Mobile Hydraulic Crane Standards, PCSA Standard No. 2, PCSA
5. Hydraulic Excavators and Telescoping Boom Cranes, PCSA Tech. Bull. T-6

Local Law

- New York City Local Law 73 and the amendment to the New York City Building Code Reference Standard RS 19-2 relating to power operated cranes and derricks. Adopted on September 14, 2006, titled “Safety of Public and Property During Construction Operations.”
- City of Los Angeles Crane Regulations

U.S. CONSENSUS STANDARDS

American National Standards Institute (ANSI), "Safety Standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings

ANSI A10.28	Work Platforms Suspended from Cranes or Derricks
ANSI A10.18	Floor and Wall Openings, Railings and Toe boards
ANSI A12.1	Safety Requirements for Floor and Wall Openings, Railings, and Toe boards
ANSI A14.3	Safety Requirements for Fixed Ladder
ANSI B30.1	Jacks
ANSI B30.2	Overhead and Gantry
Cranes ANSI B30.3	Construction Tower
Cranes	
ANSI B30.4	Portal, Tower, and Pedestal Cranes

ANSI B30.5 Mobile and Locomotive Cranes
ANSI B30.6 Derricks
ANSI B30.7 Base Mounted Drum Hoists
ANSI B30.8 Floating Cranes and Floating Derricks
ANSI B30.9 Slings
ANSI B30.10 Hooks
ANSI B30.11 Monorails and Underhung Cranes
ANSI B30.12 Handing Loads Suspended from Rotorcraft
ANSI B30.13 Storage Retrieval (S/R) Machines and Associated Equipment ANSI B30.14 Side Boom Tractors
ANSI B30.15 Mobile Hydraulic Cranes (NOTE: B30.15-1973 has been withdrawn. The revision of B30.15 is included in the latest edition of B30.5) ANSI B30.16 Overhead Hoists
ANSI B30.17 Overhead and Gantry Cranes ANSI B30.18 Stacker Cranes
ANSI B30.19 Cableways
ANSI B30.20 Below-the-Hook Lifting Devices ANSI B30.21 Manually Lever Operated Hoists ANSI B30.22 Articulating Boom Cranes
ANSI B30.23 Personnel Lifting Systems ANSI B30.24 Container Cranes
ANSI B30.25 Scrap and Material Handlers ANSI B30.26 Rigging Hardware
ASSI B30.27 Material Placement Systems

IV. CONCLUSION

Cranes play an indispensable role in the construction industry, especially high rise structures. It is a fact that cranes are involved with an alarmingly high number of casualties and fatalities, increasingly so in 2008. The sad truth is that the equipment and know-how exist to greatly reduce crane failure incidents but it's not used diligently throughout the construction industry. Furthermore, in some cases safe operation of cranes is hampered by outdated or contradicting regulations. While the proper use of current safety equipment, the incorporation of new devices such as the CRANIUM, and appropriate regulations can make it easier to use cranes safely, they cannot put an end to crane failures themselves. As with most things, it comes down to the skills, motivation, and attention to detail of the people operating and caring for these sometimes gargantuan machines.

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