

# Prevent Mechanical Lifting Incidents in Construction and Process Industries through Implementation of Best Practices for Mechanical Lifting Safety

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**Abstract:** *Cranes are the fundamental machinery used during lifting operations, and are crucial to the construction industry. Several key construction processes would be impossible without cranes and the benefits they provide. Cranes are often massive pieces of equipment capable of causing significant damage to both property and human life. Because of their importance to the construction industry, and their potential to cause harm, the safe and correct use of these machines is imperative. This study documents 75 recent accidents involving cranes in North America, systematically cataloguing them into detailed categories.*

*Comprehensive data sets have been compiled for each of the 75 incidents. Each data set includes: the date and location of the incident, crane type and capacity, a review of the responsible parties, conditions during the accident, causative factors, and the outcome of the accident. Cataloguing of these incidents is based off of forensic engineering reports from licensed engineers who are well established in the field, input from industry experts, photos, research of consensus industry safety standards and regulations, and any other available documents. Upon being catalogued into a database, these accidents have been statistically analysed for patterns. Patterns in these crane accidents are then used to identify areas where increased safety standards and regulations are needed. The study reviews the importance of careful lift planning and offers data to be used to improve lifting operation through implementation of Safety procedure for mechanical lifting operation, industry safety standards, and lift coordination.*

*The aim of this report to assess and evaluate the effective implementation of Safety procedure for mechanical lifting safety to prevent incident at construction and process industries. The problem statement is dealt with through the use of various risk assessment tools to identify, analyse, and evaluate the risks of the gantry crane's operational process. HAZID is used to identify hazardous events and according to M/s Crop Sustain risk management principles, seven out of eight are at an acceptable risk level. The last identified hazardous event is at a tolerable risk level. A Fault Tree Analysis is then used to identify the base causes of all eight hazardous events. Followed by an Event Tree analysis for the identification of accidents scenarios, with each their own consequences. The Event Tree Analysis also contains the probability and the annual frequency of a specific accident scenario. According to M/s Crop Sustain risk management principles, 61 accident scenarios are at an acceptable risk level and eleven accident scenarios are at a tolerable risk level. The last tool used is the Bow Tie analysis for identifying the preventive and mitigating measures. The results of all used risk assessment tools are then put together in a Bow Tie to visualize the overall risk picture by including the base causes, the preventive measures, the hazardous events, the mitigating measures, and the consequences.*

*After evaluating the results of the risk assessment tools, the author considered which risk management option was the most suitable for M/S CROP SUSTAIN. The choice fell on risk retention and risk mitigation. Risk retention because the identified risk levels are mostly at an acceptable risk level, which needs no additional measures. A few identified risks are at a tolerable risk level, but according the ALARP principle. Risk mitigation is therefore chosen for the tolerable risk levels. The procedures, documents, checklists, and work instruction are identified as the preventive and mitigating measures of the Bow Tie and are therefore included in the risk assessment. An additional evaluation concluded that the risk level of those*

*with a tolerable risk level might be changed to an acceptable level by improving or expanding some of these M/s Crop Sustain measures.*

**Keywords:** risk assessment

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