Material handling plays vital role in any industry. The hoist crane is one of the demonstrated material handling devices. A hoist is a device used for lifting or lowering a load by means of a drum or lift-wheel around which rope or chain wraps. In normal operating conditions with rated load and under test conditions with test loads up to 125 percent of rated load, despite this fact many operators and owners of hoists and cranes fear the possible catastrophic damage that can occur if the driving motor of a unit should fail for any reason. This may lead to Loss of life, Damage of goods or property, loss of Production time due to down time of hoist. Hence there is a need of a safety system in advent of failure of the motor that will avoid above damages. One solution to this problem is to feed the power of two motors of equal rating into a planetary gear drive. This system is proposed with view to offer a dual advantage to the existing single motor system, Safety in case one of the motor fails. Dual speed drives so that same device can cater to more than one application.

**Keywords:** Hoist, Rated load, catastrophic, production time, planetary gear

### I. INTRODUCTION

Manufacturing industries an important part of the Indian economy. In every manufacturing industry material handling plays vital role. A hoist crane is a device used for lifting or lowering a load by means of a drum or lift-wheel around which rope or chain wraps. It may be manually operated, electrically or pneumatically driven and may use chain, fiber or wire rope as its lifting medium. These project concepts identify problems in conventional hoist and improve them in terms of two motor planetary gear drive attachment.

One motor drives the ring gear, which has internal teeth. The second motor drives the sun gear directly. Both the ring gear and sun gear rotate in the same direction. If both gears rotate at the same speed, the planetary cage, which is coupled to the output, will also revolve at the same speed (and in the same direction). It is as if the entire inner works of the planetary were fused together. There would be no relative motion. Then, if one motor fails, the cage will revolve at half its original speed and the other motor can still lift with undiminished capacity. The same principle holds true when the ring gear rotates.

### II. LITERATURE REVIEW

A number of research papers and patents have been published in recent years on hoist and planetary gear drive. A brief Review of some selected references on this topic is presented here.

V. Moise et al [1] has given an outline of the kinematics analysis of planetary cylindrical gears is usually accomplished by using Willis’s method. This method is difficult to follow in the case of complex mechanisms. By analogy with the relative coordinate’s method, from the linkages, this paper presents a simple and intuitive method, easy to apply to the study of planetary cylindrical gears.

Kaustubh V. Wankhade et al [4] have carried out work on Material handling task (of handling molten metal) in casting industries is very difficult and risky one. At present this task carried out manually for small-scale castings and with the help of ladle attached to the overhead crane hook for medium and large-scale castings. Now a day this operation required at least two workers in both cases, and aim of this research paper is to minimize labour requirement for handling and pouring molten metal and with less risk. This paper reviews the design, modeling and computer simulation as a tool for aiding trolley used by various researchers earlier. The results of computer simulations and results obtained by real experimentation compared to get detailed idea about the design ideas. Design and analysis carried out with various CAD software like CREO PARAMETRIC or CATIA and ANSYS.

Syed Ibrahim Dilawer et al [3] explain a concept in his research paper in ajer that, gears in the Epicyclic gear trains are one of the most critical components in the mechanical power transmission system in which failure of one gear will affect the whole transmission system, thus it is very necessary to determine the causes of failure in an attempt to reduce them. The different modes of failure of gears and their possible remedies to avoid the failure are bending failure (load failure), Pitting (contact stresses),
scoring and abrasive wear, in any case it is related to the loads acting on the gear and this research deals with the Optimization of the gear design leading to the reduction in the load failure of the gears. This study carried out in this research shows the optimization analysis of the epicyclic gear train in INDIA to reduce load failure. The analysis is restricted to the optimization of gear train through load analysis of the gears, pinions, and annulus including the sun and plant gears, and finding out the optimal load conditions for the gear train to perform effectively without leading to load failure. This research paper provides an attempt in filling that gap in aiming to get the epicyclic gear trains load performance on different parameters. The process in which it has the best performance without any failure and with minimum loads acting on the gears.

Tomasz Haniszewski et al [5] had discover that, the test object is one-girder overhead travelling crane with a hoisting capacity of 5 [1]. The beam is a typical welded box structure. Immutability of the geometric cross-section of the girder is being provided by located inside the welded membranes and stringers made from rolled channels. In addition to the girder, construction also includes two buffer beams and additional elements such as platform, hoisting winch of hoist drive.

Dr. Alexander Kapelevich et al [6] has been documented that, Maximization of gear transmission density is important in that it delivers increased output torque within given dimensional constraints. This is critical, for instance, in racing gearboxes or in reducing size and weight of aerospace gear drives. It can also yield reduced costs for automotive and consumer product gear trains, for example. There are several ways to increase gear drive load capacity, including advanced design, materials and technologies. This paper presents an approach that provides optimization of both gearbox kinematic arrangement and gear tooth geometry to achieve a high-density gear transmission. It introduces dimensionless gearbox volume functions that can be minimized by the internal gear ratio optimization. Different gearbox arrangements are analyzed to define a minimum of the volume functions. Application of asymmetric gear tooth profiles for power density maximization is also considered.

Dhaval H. Kanjariya et al [7] has review in this paper in today’s modern era; crane is very important material handling equipment in industry because of safety reliability, fast speed, economy etc. Hence need of the present day, equipment to handle heavy loads with fast speed, reliability, safety, economy etc. So the crane is used. Crane is one of the most important equipment used in the industries. It works as a material handling equipment or device. There is several components used for hoisting mechanism in EOT crane. In this review paper, discussed about various parts of hoisting mechanism. Carried out design calculation of various parts and analyzed it for structural or functional aspect.

### III. CONCLUDING REMARK

From several studies this paper reported that because of catastrophic damage may occur in hoist crane because of failure of motor due to some uncertain reason. This may lead to loss production time due to down time of hoist, dangerous to worker life, economic loss etc.

On the above research two motor hoist with planetary gear drive as a variable solution to achieve safe and quality material handling in any industry.

**REFERENCES**

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