(d) $1.25v + (0.25/v)$, where v is rated speed(m/s), for other types of safety gears.

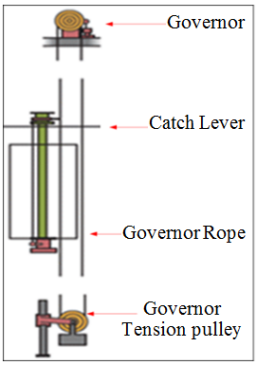

Fig. 1. Arrangement of overspeed governor system

2.2 Design Conditions

Compact were designed to match the overspeed governor and the tension pulley rated speed 2 m/s, in order to design, using the Auto CAD 2013 and the Inventor 2014.

Design characteristics of the overspeed governor is as table 1.

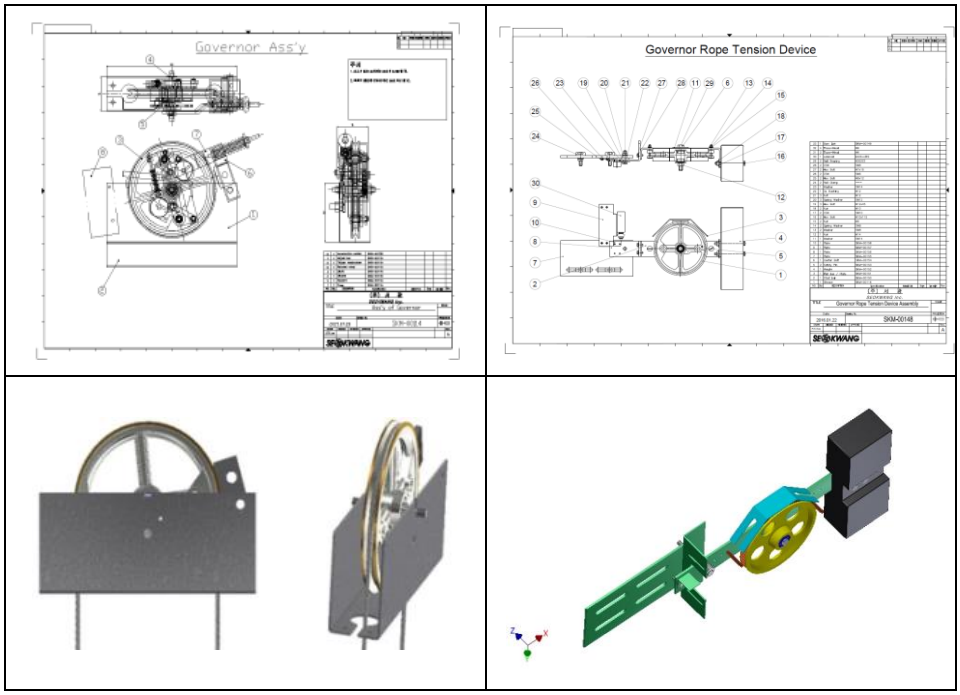

Fig. 2. Design for optimization

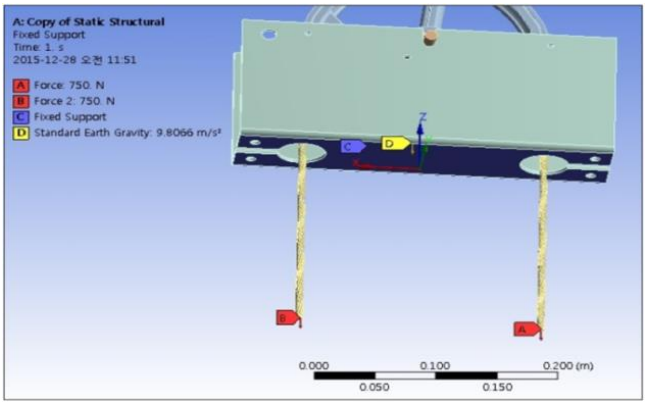

Fig. 3. FEM model(upper) and Boundary condition(below) of overspeed governor

The upper part of figure 3 is a hexa dominant method applied to determine the exact solution of the structure in mesh option and a size 0.01 mm. The lower portion of figure 3 shows the boundary conditions for the structural analysis. It gave restraint by applying a fixed support option to the case bottom.

Load conditions of the overspeed governor, you need to consider the load of the sheave for the impact of the shoe. Impact load by corresponding to about twice the static load was applied a load corresponding to the condition extremes to 1,500 N from the strap end surface of the wire rope in the direction of gravity.

3.2 Results of Analysis

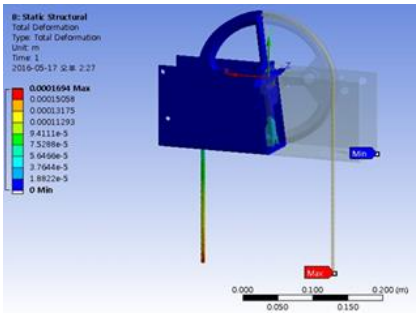

Fig. 4. Result of deformation

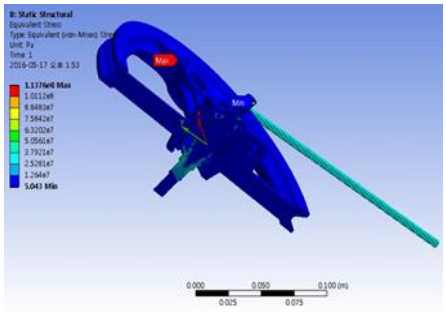

Fig. 5. Result of stress

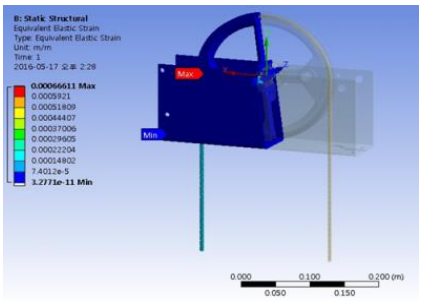

Fig. 6. Result of stain

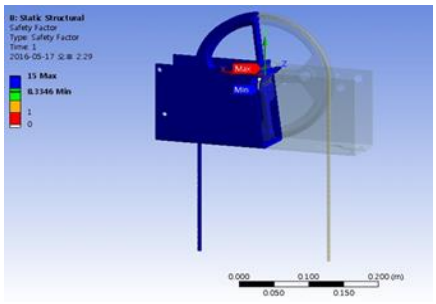

Fig. 7. Result of Safety factor

Analysis a result, in the case of the whole of the deformation, appear in the part of the displacement the wire rope of 0.00017 mm by its own weight and the load, the deformation of the governor sheave was found to be extremely small. Strain is a maximum 0.00059 mm.

For the stress, the maximum stress of $1.0743*10^{-2}$ MPa at the interface of the overspeed governor sheave and the rope from the pulling force is generated by the load conditions of the own weight direction.

Analysis results of the safety factor, the safety factor, shows the results of at least 8.3

This was verified to be a design that ensures the integrity of the structure by a numerical value that satisfies the safety factor of 8 or more to present safety standards controversial.

4 Conclusions

In this study, progress in a compact design for medium and low speed (2 m/s) core safety rope for governor of 6 mm diameter development of MRL type elevators was subjected to structural strength analysis for the design study.

Conclusions studies are as follows;

1) Designed governor has been compacted designed to meet the elevator safety standards. Therefore, space utilization rate of the building is increased, the price reduction is expected.
2) Design of the overspeed governor has been designed in compacted structures were applied wire rope for 6 mm. So, there is suitable for MRL type elevator
3) Analysis a results, for the design verification; the whole of the deformation Max. 0.00017 mm, Strain max. 0.00059 mm, Stress Max. $1.0743*10^{-2}$ MPa, appeared on the safety factor 8, and this satisfies the safety standards of the elevator.

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