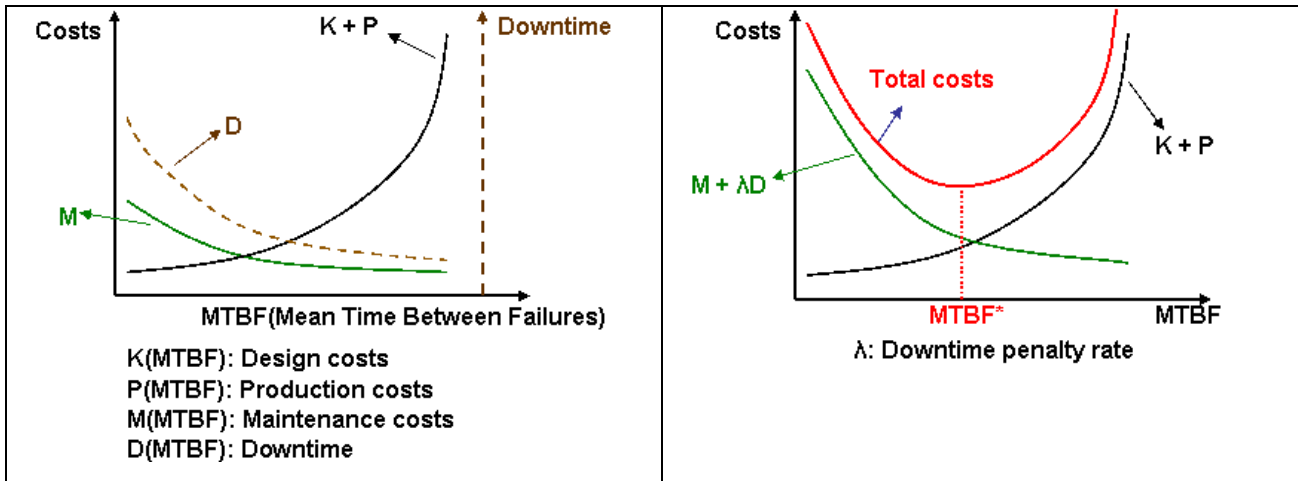


## Mathematical models for optimal reliability decisions

### Kurtuluş Öner & Radj Bachoe

The reliability levels of components of a system and redundancy are the major reliability decisions that affect availability and Life Cycle Costs (LCC) of systems. These decisions are taken in the design phase and companies traditionally focus on design and production costs (or acquisition costs) in their decision making. However, these decisions have a high impact on maintenance and downtime costs.



In Kurtuluş Öner's project, quantitative models for the optimal reliability decisions are developed. In these models, LCC are taken into account. Spare parts inventory levels are also incorporated into these models. The results of this project revealed that the optimal component reliability

- increases as
  - as the number of the systems increases
  - the downtime cost per unit time increases;
  - the exploitation phase gets longer;
- and decreases as the price of a component increases.

Conditions under which redundancy should be implemented are also derived in this project.

A model, which can be viewed as a detailed extension of Öner's models, is developed to investigate the joint effect of the reliability decisions, spare parts inventory levels, and preventive maintenance on availability and LCC. This model was tested at Vanderlande Industries. The main finding in this project was that investments in increasing the designed capacity and system availability can pay off by savings on downtime costs.

