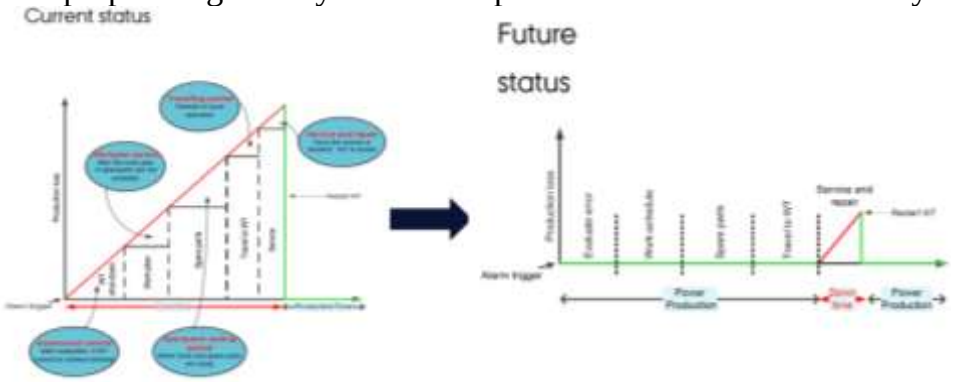
INTELLIGENT PROGNOSTIC MONITORING ON DIAGNOSTIC AND SERVICING OF AGRICULTURAL EQIPMENT

MSc in Engineering in Technology Based Business Development Maria Tikhonova
Supervisor - Michail Beliatis, Nanotechnology, PhD, prof.
Aarhus, Denmark, Aarhus University, Department of Technology and Business Development Aegirsvej 18, 8600 Silkeborg, Denmark, e-mail: maria.tikhonova89@gmail.com, mob. tel: (0045) 4220 4118;

To human beings, it often seems that machines fail suddenly, and it is something we cannot predict. The modern studies have shown, that in fact machines usually go through a measurable process of degradation before they fail. This degradation is largely invisible to human users and can't be seen with an unaided eye, even though a great deal of technology has been developed that could make such information visible. Today on the market we can find many sophisticated sensors and computerized components, which are capable of delivering data about the machine's status and performance. Data, such as for example temperature, frequency ranges of the vibration, fluctuations of rotational speed, should monitored and analyzed by artificial neural network. It will give us opportunity to identify which parts of the agricultural machines are about to fail. For example, we will be able to identify faulty gears and detect faulty bearing of a gearbox which has a lot of applications for preventing rotary machinery from fatal breakdowns. When smart machines are networked and remotely monitored, and when their data is modelled and continually analyzed with artificial neural network, it is possible to go beyond more ''predictive maintenance'' to intelligent ''prognostics''. Intelligent prognostics can continuously track health degradation and extrapolating temporal behavior of health indicators to predict risks of unacceptable behavior over time as well as pinpointing exactly which components of a machine are likely to fail.



As it is shown on the graph, the «as is» model of reparation on the left requires bigger investments due to longer down time, but also due to longer planning ordering spare parts, transportation to the workshop and so on. Ability to predict failing of the machines will reduce sufficiently both duration of down times and reparation cost. This method is nowadays used in wind turbine industry and has so far saved many millions on maintenance of the equipment. There is intense pressure on agricultural industries, due to unstable economic situation. That is why it is necessary to continuously reduce and eliminate costly downtime and unexpected breakdowns. With the advent of Internet and tether-free technologies, agricultural industry necessitates dramatic changes in transforming traditional ''fail and fix (FAF)'' maintenance practices to a ''predict and prevent (PAP)'' e-maintenance methodology. E-maintenance addresses the fundamental needs of predictive intelligence tools to monitor the degradation. This is not about detecting the faults, but about predicting and avoiding costly down time due to reparations.