

HW # 5 Solution

4.4 The change in altitude between two regions is an example of functional variability in performance due to outer noise, i.e., variation in some of the factors that comprise the environment in which the products function. In this case, for example, changes in the oxygen content of the air, for example, may be significantly affecting the combustion process and hence gas mileage on the vehicle. The car's quality – consistency of MPG could be improved by applying the methods of parameter design/robust design to make car's performance more consistent at all altitudes. This requires finding nominal values of certain of the design parameters that suppress the transmission of outer noise sources through the design to the output performance of the product.

4.10 Shewhart control chart can be used off-line to:

- Study process history and look for ways to reduce the overall common cause variability level.
- Discover special causes of variation which cannot be diagnosed on-line. This is done by relating statistical signals on the control charts to the occurrence of events or actual process changes and requires participation of diverse group of individual that touch the process in many different ways, not just the operator.

Greatest waste of the control chart concept is that it is not used enough off-line as a means to continually study the behavior of the process in detail, with an eye toward never-ending improvement.

4.16 Since the output quality from a process is much more predictable while that process is in control, the ability to maintain a pre-specified production schedule are greatly enhanced. Breakdown in the schedules of production often arise when erratic, uncontrolled process behavior leads to poor quality, frequent process shutdowns, and lower process efficiency. Similarly, a customer can expect more timely/predictable delivery from and have more confidence in (requiring less inspection of incoming material) the quality of product from a supplier with stable processes.

4.20 “Holding the gains” refers to the ability to make improvement actions have a lasting impact on the organization. It is one thing to identify an action that will improve quality and productivity and demonstrate the validity of action by experiment, but it is something else to make that action become an economic and lasting part of the total system so that potential gain can be realized for long term. This means that we must identify any inhibitors that might exist that stand in the way of long term implementation of the improvement action and remove those inhibitors. We must make sure, for example, that everyone involved knows the reasons for the improvement actions and will not be penalized in some way by the system for the implementation of action.