

CHAPTER 2

LITERATURE REVIEWS

The ESEC (Europe) SA ⁽²⁾; Information is critical to meet the present and future operating requirements of semiconductor manufacturing. Large amount of data has been gathered and transferred from operating areas but it is not real time. In order to improve the quality of product and manufacturing performance, we have to look on the data in real time. Problem should be detected before machine damages the product. We can not improve anything if the information is not updated.

LPA Software, Inc. ⁽⁵⁾; Semiconductor manufacturers require equipment communication via SECS standard to improve the productivity and ensure quality on the production line. Equipment communication help Process Engineer improve the manufacturing process and pinpoint problem quickly.

Nikom O. ⁽⁸⁾; The manufacturing lines are being asked to meet new requirements in quality performance. The most of companies control the input parameters of machine with expectation of good product quality. However, the defective parts are still made by the equipment. The machine errors usually occur and may lead to the defects on the part. If the errors are ignored by the operator, it will not be fixed and the company will lose through the defective parts. A way to reduce the errors of machine is good Preventive Maintenance program. Hence, it is necessary to know all machine errors as the information for preventive maintenance.

Nikom O. ⁽⁸⁾; In order to measure the equipment Reliability, Availability and Maintainability (RAM), the state of machine shall be basically classified to be 6 states including

- 1) Productive state
- 2) Standby state
- 3) Engineering state
- 4) Schedule down time state
- 5) Down state
- 6) Shut down state

The description of each state shall be as follows:

- 1) Productive state

This is the duration that machine is being operated in order to produce the part based on its responsibility.

- 2) Standby state

Duration that the machine is not operated but it is capable of processing product and is awaiting a start command. It may be because of break time, material shortage, waiting for tool, waiting for result of buy-off.

- 3) Engineering state

This is the duration for engineering usage or experiments. The machine is capable for processing product but it is not used for normal process.

- 4) Schedule down time state

This is the duration that equipment can not be operated because of the scheduled preventive maintenance program. It includes the time that the machine is stopped due to waiting for services or spare parts during PM.

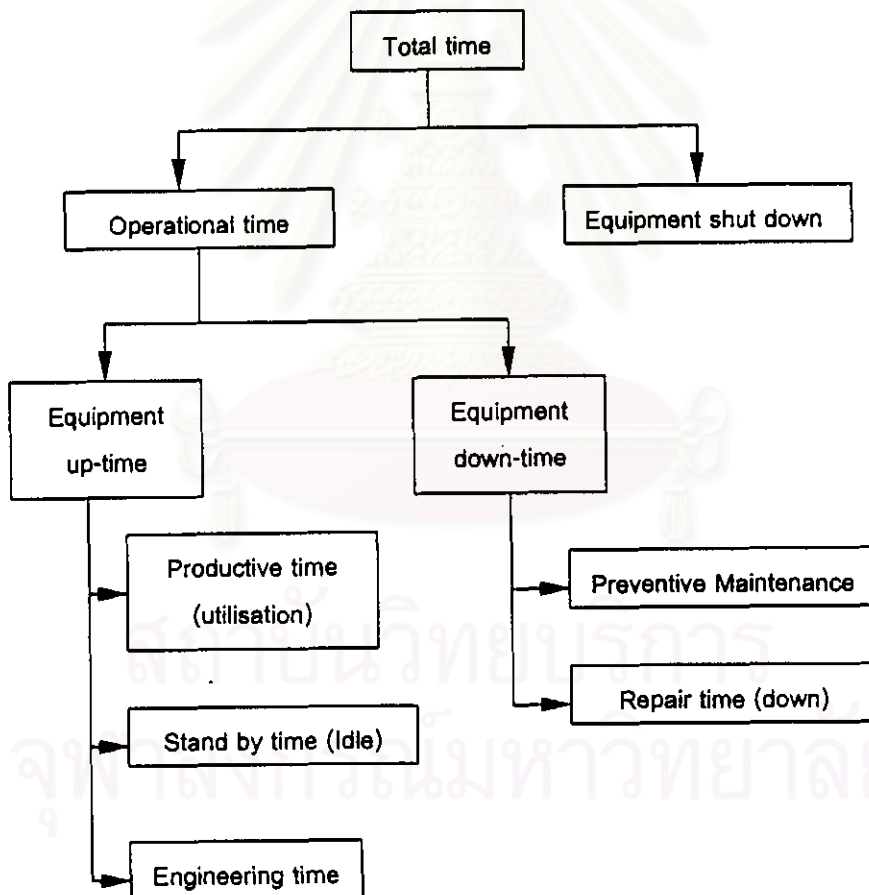
5) Down state

When the equipment error is occurred and lead to the machine repair or it is not ready to be operated, it will be considered to be down state. It is non-scheduled down state.

6) Shut down state

This is duration that the equipment do not defined for production such as holiday, shut down.

The following diagram illustrates the classification of time for equipment.



Equipment utilisation is duration that equipment is operated based on its responsibility in a time frame. It is used to measure the usage of equipment. The companies should maximise the equipment utilisation as much as possible while minimises the equipment down and idle time.

Rattamasanapapai W. (1997)⁽⁹⁾; There are four main forces within manufacturing company that are pushing for data acquisition; Manufacturing, Engineering, Maintenance and Management. Manufacturing requires real time data to maximise production and eliminate waste. Engineering needs information to improve their process. Maintenance requires machine information to for maintenance schedule. Management review fact data to make better decision. Therefore, equipment communications need to be established in manufacturing company.

Scott (1996)⁽¹⁰⁾; In order to put the machine to work as Factory Automation system, it is necessary to communicate with them via SECS. Therefore, the machine should be designed for communication. Equipment communications provide a chance to improve their manufacturing process. This is a factor that management should consider buying the semiconductor machine.

GW Associates, Inc.⁽¹¹⁾; The semiconductor is leading the electronics market in the development of equipment-level communications with SECS. SECS was chosen in order to meet the demands of managing the massive amounts of data generated and of managing the expensive equipment used in semiconductor manufacturing. This standard is crucial importance in today's factories for the direct connection of process, metrology and robotics movement equipment to factory shop floor control computers. Benefits of communication are throughput improvement, higher productivity of equipment, better automated collection of engineering data and improve yield analysis.