Component Repair or Replace

An important asset has broken down. What now? When equipment breaks down, everything from your productivity to your bottom line is disrupted. Your team needs a ***quick and effective*** solution. The difficult question arises- should you try for a repair, or replace the asset outright?

Replacing equipment is the larger investment, so many technicians choose to repair the equipment instead of replacing it. But the costs that go along with frequent breakdowns — lower productivity, defective output, rising labor costs, and unmet production schedules — can sometimes be greater than the cost of replacing the equipment outright.

Leaving your decisions to guesswork can be a costly and dangerous approach. If you aren't using a computerized maintenance management system (CMMS) effectively, you'll be forced to make decisions reactively, and as soon as something breaks down, you'll need to make a quick decision on what to do. With productivity plummeting, your decision will likely be made from an ***emotional standpoin***t, rather than solid data to support your decision.

Data Driven Decisions

Without a plan in place, your only concern will be getting your production back online as quickly as possible. The reactive decision you're forced to make may work out, but you may also end up making a hasty decision that solves the problem in the short-term but isn't the best solution in the long run.

In addition to the obvious replacement cost for a new piece of equipment, there are several other factors to take into consideration when deciding whether to repair or replace a piece of equipment:

- Ongoing maintenance costs over the remaining life of the equipment
- The impact any repair would have on productivity and quality
- Costs incurred from the equipment downtime
- Health, safety, and environmental costs that come with equipment breakdown
- Training costs for a new piece of equipment

- Disposal costs
- Installation costs

With so many factors to consider, it's clear this decision shouldn't be made without the proper data analysis.

Factors to consider when replacing a component:

1. **Analyze the Costs**

Always think in the long-term when analyzing the costs of repairing or replacing. For a ***new piece*** of equipment, consider the cost of purchasing the equipment, its service life, potential salvage value operating costs, and any revenue increase it may bring.

For an ***old piece*** of equipment, consider its remaining service life, operating costs, its market value and future salvage rate. From these figures, you can determine an annual average cost for each option, which will then be easy to compare.

2. **Consider the Age of Equipment**

Equipment does not age with ***grace***. The older your machinery, the more extensive repairs it will need. This often translates to higher maintenance costs. As you continue to repair, the machine will give you less and less for your investment of repair. You may want to consider replacing an old malfunctioning piece of equipment for a newer, technologically advanced model that will give you better efficiency and longevity. When your equipment is new, it makes more sense, in many cases, to repair it once it malfunctions.

3. **Consider the Cost of Repairs**

What are the cost of repairs, and more importantly, how often will you be paying those costs for repairs? Documenting asset repair events provides information on number and frequency of

breakdown events and costs for the repairs. Can you tell if you're going to continue repairing this equipment several times a year, or will it likely just be a one-time fix?

4. **Consider Downtime**

What's the impact of downtime while the asset is being repaired? If it takes several days to repair, and if this happens frequently, you're looking at too many hours of lost productivity. Consider this when deciding if repair or replacement is better in your situation.

Keep in mind, however, that repairing often takes less time than replacing a machine. Replacing involves waiting for the replacement to arrive, installation, new training, and more. If you're on an extremely tight schedule and if the equipment is crucial to your process, you may lose too much in production if you take the time to replace.

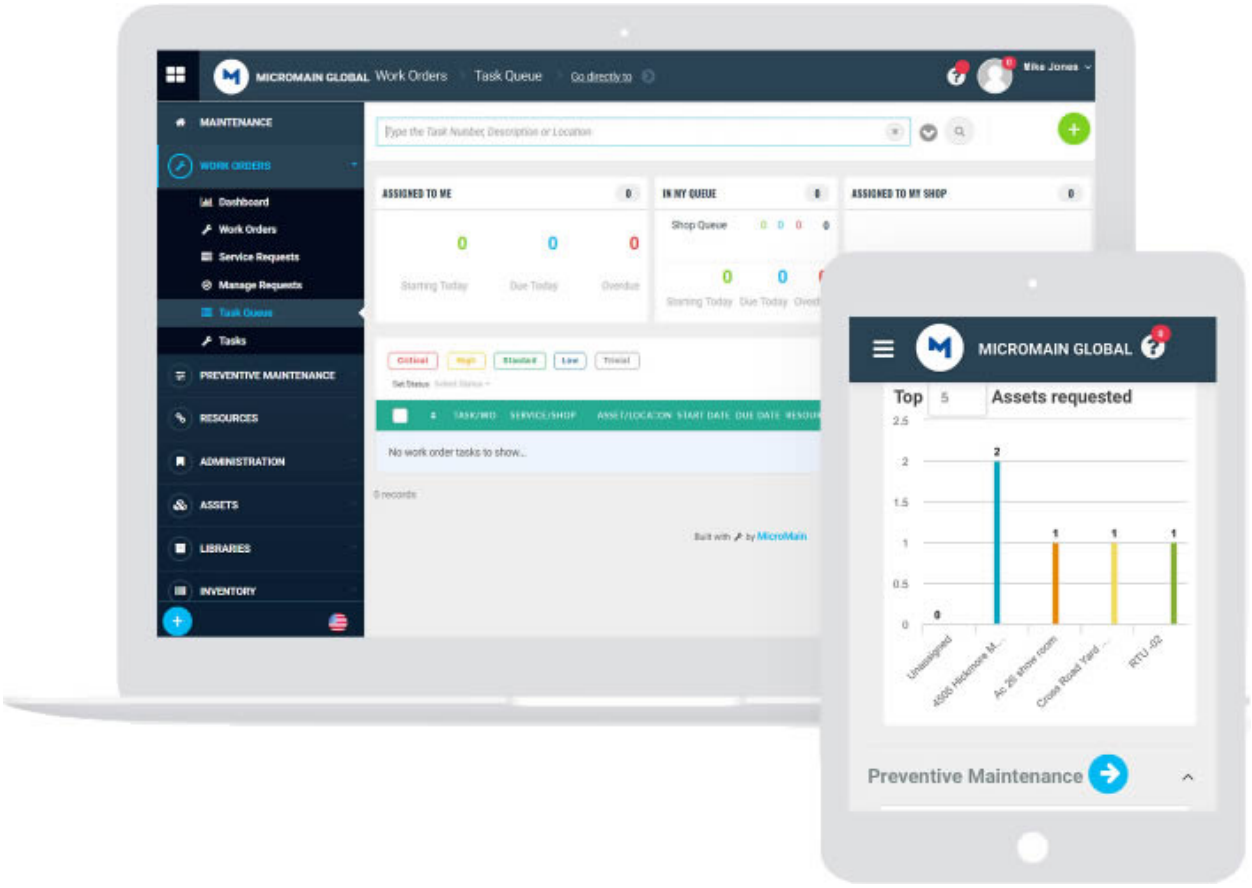
5. **Consider Safety**

Remember that older equipment can cause injury to workers if it malfunctions. Even if you stay up to date on maintenance, equipment wears down as it ages. Thoroughly inspect your machinery before making your decision so you can determine if your current equipment will continue to provide a safe environment for your workers. If it won't, replacement is the obvious choice. If it is still meeting safety standards, it's worth comparing costs of a replacement versus repair.

6. **Consider Efficiency**

Always think of the long run. How efficient is your machine operating now, and will a simple repair keep efficiency at the level you want, or would a new piece of equipment that uses less fuel, offers newer features, and breaks down less frequently be better for your efficiency and your bottom line?

Maintenance Management Software-



MicroMain's Computerized Maintenance Management System (CMMS) enables businesses to make more informed decisions when it comes to repairing or replacing equipment. Decisions will be based on actual data provided by the CMMS / EAM solution, not merely guesses. Micro-Main's CMMS / EAM solutions help businesses streamline their maintenance operations and take the guesswork out of their maintenance related decisions.

Motherboard Components and Connectors

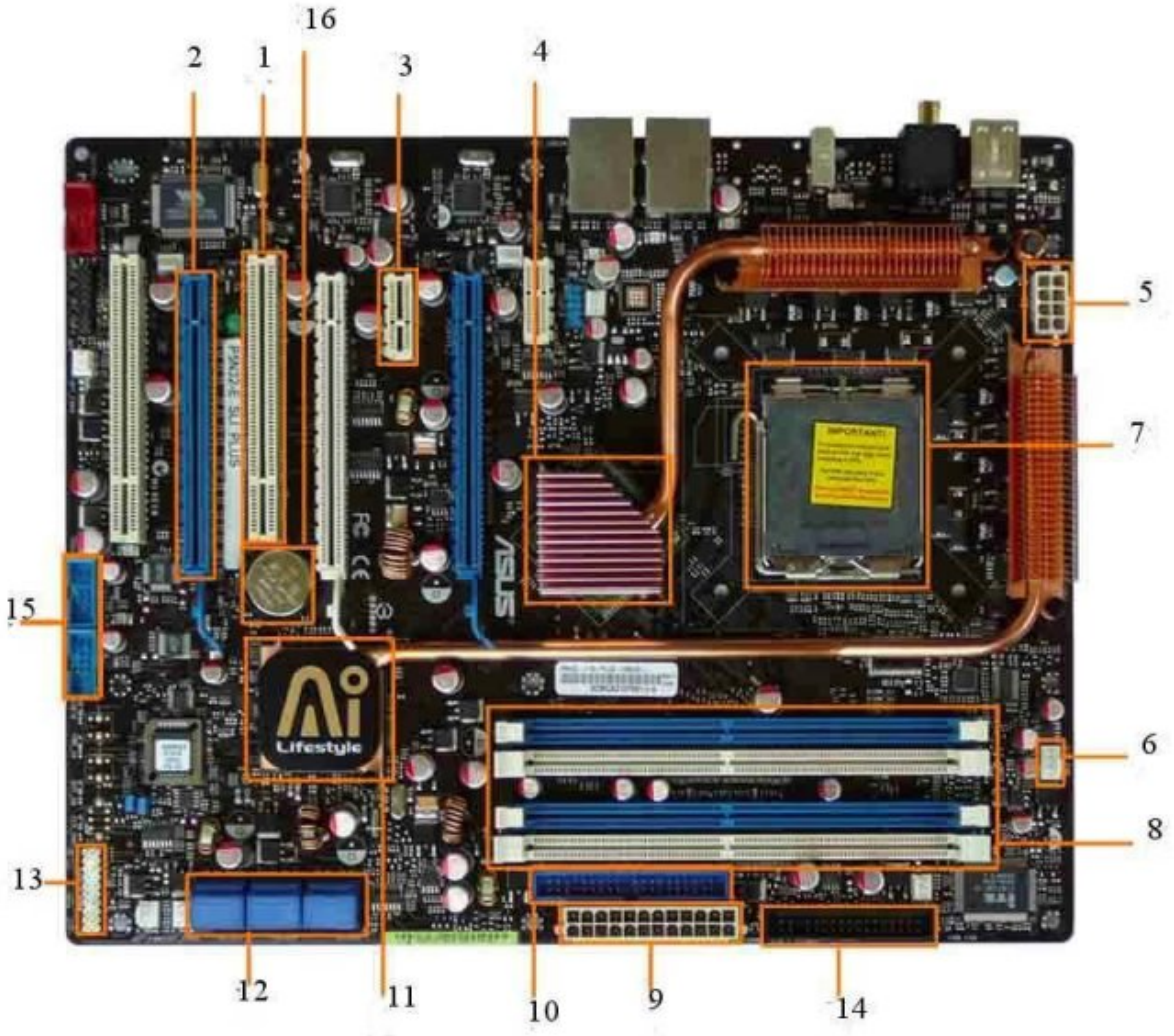
A typical Asus P5N32-E SLI motherboard with constituent components is given below:

1. <u>PCI SLOT (Peripheral Component Interconnect)</u> : PCI slots are used to Insert or install Add-on cards, such as LAN cards, Sound cards, Capture cards and TV tuner cards. There are

usually anywhere from 1 to 6 PCI slots available on the motherboard(above board has 2 PCI slots.), they have decreased in number and are being replaced by the PCI Express 1x slots.

2. <u>PCI-E 16x Slot</u> : the most common slot for Graphics cards, the PCI Express 16x slots provides 16 separate lanes or data transfer. These are the 16x speed versions, which are currently the fastest. PCI-E16x allows up to 4 GB/s of peak bandwidth per direction, and up to 8 GB/s concurrent bandwidth.

3. <u>PCI-E 1x Slot :</u> Single slot - In the PCIe 1.x generation, each lane (1x) carries 250 MB/s compared to 133 MB/s for the PCI slots. These can be used for expansion cards such as Sound Cards, or Ethernet Cards.



4. <u>Northbridge</u>: This allows communication between the CPU and the system memory and PCI-E slots. It is a focal Point of Motherboard and It is also called as Memory Controller Hub.

5. <u>ATX 12V 2X and 4 Pin Power Connection</u> : This is one of two power connections that supply power to the .motherboard This connection will come from your Power Supply.

6. CPU-Fan Connection: This is where the CPU fan will connect. Using this connection over one of the power supply will allow the motherboard to control the speed of the fan, based on the CPU temperature.

7. Socket: This is where the CPU will plug in. The orange bracket that is surrounding it is used for high end heat sinks. It helps to support the weight of the heat sink.

8. DIMM slots: DIMM's are by far and away the most used memory types in today's computers. They vary in speeds and standards however and they need to match up to what your motherboard has been designed to take. The four standards of DIMM's being used at the moment are SDR (Single Data Rate), DDR (Double Data Rate), DDR2 and DDR3. The speeds of memory can vary between 66Mhz to 1600Mhz.

9. ATX Power Connector: This is the second of two power connections. This is the main power connection for the motherboard, and comes from the Power Supply.

10. IDE connectors or PATA connectors : IDE full form is Integrated Device Electronics. it supports IDE devices, such as Hard disks and CD and DVD drives. Most drives today come with SATA connections.

11. Southbridge: This is the controller for components such as the PCI slots, onboard audio, and USB connections.

12. SATA Connections : SATA full form is Serial Advanced Technology Attachment. These are connect with serial ATA devices, such as Hard disk drives and CD or DVD drives.

13. Front Panel Connections: this is where we will hook in the connections from the case. These are mostly the different lights on the case, such as power on, hard drive activity etc.

14. FDD Connection: The FDD is the Floppy Disk controller. Floppy Drive Connector is used to connect floppy drives. It supports two floppy drives.

15. External USB Connections: There are usually a couple of these ports located on each motherboard used for connecting pen drives and external hard drives, like Ipods or Mp3 players.

16. CMOS battery : This is the motherboard's battery, which is used to power the south bridge and the BIOS to save the setting, data and time.

Differentiate between ATX and BTX Motherboards.

Computer testing

What is Component Testing

Component testing, also known as program or **module testing**, is done after unit testing. In this type of testing those test, objects can be tested independently as a component without integrating with other components e.g., modules, classes, objects, and programs. This testing is done by the development team.

Description:

Component testing is like unit testing with the difference that the developer uses real data instead of dummy data for testing of the written code.

Suppose there is a software application that consists of five component modules. The testing of each module is done independently by the developer as part of the development cycle before it is ready for **integration testing**. By doing component testing, bugs can be found at a very early stage in the cycle and help save time.

Debugging tools or unit test structure tools are used for this type of testing since this is done by programmers on the code written by them and with the support of integrated development environment. Defects are fixed as soon as possible when they are found without formally recording incidents.

Component testing plays an important role in finding the issue. Before we proceed with the integration testing it's always advised to do the component testing in order to ensure that each module of an application is working correctly and as per requirement.

Review questions

a) What are the different types of software testing?

b) What are the different levels of software testing?

c) What are the different types of Software Testing Techniques?

d) Define factors to consider when replacing components?

e) Differentiate between ATX motherboard and BTX motherboard?

f) What is component testing?

g) **Case situation:** You are asked to maintain a computer lab at an institution. You see that their DVD/ CD drive is not working. What is your suggestion?

h) **Case situation**: You have received a call from a client saying that their laptop is not starting after it fell down from the bed. Your client says that there is no outside damage. What will you tell your client?

i) If you have a PC with an ATX motherboard and case, can you replace it with a BTX motherboard?

   a) Yes
   b) Yes, if you set the jumpers
   c) Yes, if you add more screw holes
   d) Yes, if you remove some ports
   e) No

j) _____ is defined as a software testing type, in which the testing is performed on each individual component separately without integrating with other components.

   a) Component testing
   b) RAM
   c) Chip extractor
   d) Motherboard