

Question 1:

What is the total amount of downtime occurrence per machine?

Purpose:

To determine how frequently each machine experiences downtime, helping identify the least reliable machines.

Tools:

SQL

Expected Output:

Summary table showing total downtime occurrences for each machine.

Question 2:

Which machine has the highest frequency of downtime?

Purpose:

To identify which machine contributes most to production loss, allowing maintenance teams to prioritize their focus.

Tools:

Python (Matplotlib)

Expected Output:

Bar chart highlights machines with highest downtime counts.

Question 3:

What are the average values of pressure, temperature, coolant, vibration and cutting force before and during downtime?

Purpose:

To analyze machine behavior and detect parameter changes that may lead to downtime or signal failure conditions.

Tools:

SQL

Expected Output:

Summary table showing average sensor readings before vs. during downtime.

Question 4:

Which month has the highest frequency of downtime?

Purpose:

To identify seasonal patterns or time periods with frequent failures.

Tools:

Python (Matplotlib)

Expected Output:

Bar chart shows downtime occurrences per month.

Question 5:

How does downtime change over months?

Purpose:

To track downtime trends over time and evaluate whether machine performance is improving or deteriorating.

Tools:

Python (Matplotlib)

Expected Output:

Line chart showing downtime duration or frequency by month.

Question 6:

Do newer machines experience less downtime?

Purpose:

To evaluate whether machine age affects downtime frequency or duration. This helps the organization decide if newer machines are more reliable and whether older machines need replacement or more maintenance.

Tools:

SQL, Python (Pandas, Matplotlib)

Expected Output:

Bar chart showing downtime vs. machine age. Summary table comparing average downtime between newer and older machines.