Identify and Remove Bottlenecks

A bottleneck is a constraint within a process that limits its overall throughput. Identifying and removing bottlenecks improves flow efficiency. Techniques include:

1. **Process Mapping** - Map out process flows step-by-step and measure metrics like cycle times, defect rates, and work-in-progress at each stage. Long queues or delays highlight bottleneck areas.

2. **Utilization Analysis** - Examine utilization rates for equipment, workers, or facilities across the process. A stage with utilization exceeding about 80% indicates a bottleneck.

3. **Throughput Measurement** - Measure outputs at each process stage. Stages with lower throughput than preceding ones reveal bottlenecks constraining the system.

4. **Work Sampling** - Randomly observe the process to detect points where work is often waiting to be processed. More time waiting equals a bigger bottleneck.

5. **Simulation Modeling** - Build computer models representing the process and identify areas with longest delays under simulated demand.

Once bottlenecks are identified, techniques to alleviate them include:

- Improving capacity utilization at the constrained resource.
- Reducing batch sizes to limit queue buildup.
- Smoothing scheduling to spread out arrival flow.
- Eliminating rework that recycles work back through the bottleneck.
- Reducing setup and changeover times.
- Offloading work from the bottleneck to other resources.

Relieving bottlenecks results in increased throughput, faster cycle times, lower costs, and improved customer service.