

Optimizing Job Shop Scheduling in Pharma

2025 | Use Case | Optimization with a Hybrid Classical-Quantum Annealing Solution

CHALLENGE

The Job Shop Scheduling Problem involves sequencing jobs across machines, playing a crucial role in work order management and significantly impacting a company's operational efficiency.

Finding an optimal solution is highly complex and requires careful consideration of multiple factors, including the number of work orders, limited machine availability, varying due dates, customer priority levels, product shelf-life considerations, and legal or contractual obligations.



SOLUTION

PROBLEM FORMULATION

Incorporating more Variables & Constraints



QUANTUM OPTIMIZATION

Through D-Wave's Quantum Annealer

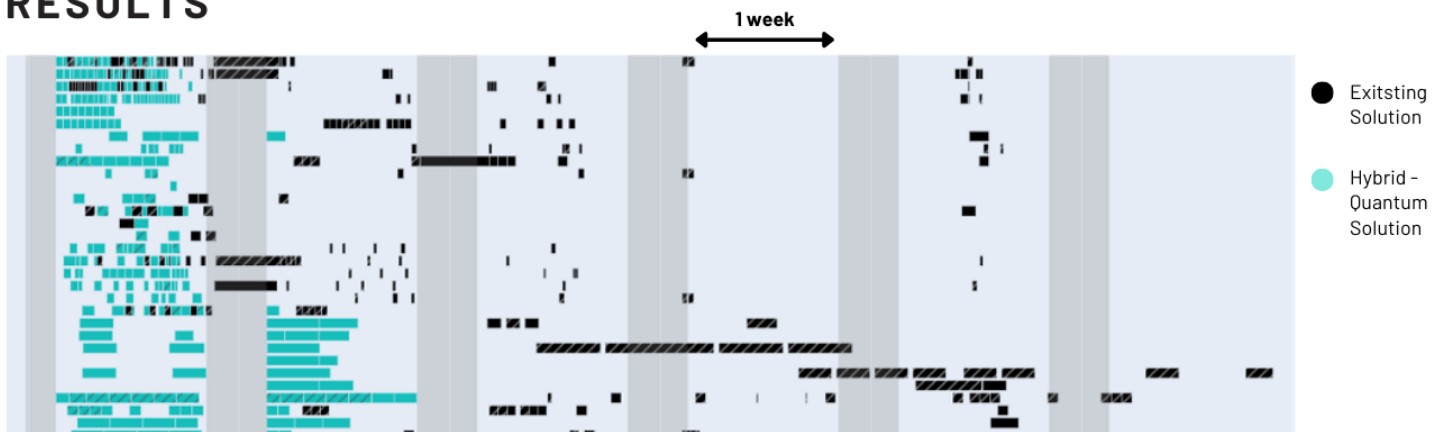


BENCHMARKING

Compare to existing solutions

Quantum annealers use quantum tunnelling to move through energy barriers, allowing them to explore possible solutions beyond what classical methods can. This makes them particularly **useful for solving highly complex optimization problems with many variables and constraints**, including the Job Shop Scheduling Problem. It is a technique used on planning and scheduling use cases in production today.

RESULTS



In this recent proof of technology over the course of 12 weeks, **QuantumBasel showcased the power of quantum optimization on Job Shop Scheduling for Pfizer**. The solution significantly reduced scheduling violations, minimized total make span, and decreased the number of late jobs. **This improvement can enhance production efficiency, which would also lead to substantial cost savings.**

60%

approximate reduction in total product make span for all jobs scheduled over a 6 week production schedule

32%

fewer constraints violations, resulting in smoother and more compliant scheduling.

