

A RESOURCE CONSUMPTION MODEL (RCM) FOR PROCESS DESIGN

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Presentation Overview

- **RCM Overview**
- **RCM Methodology**
- **RCM Application Example**

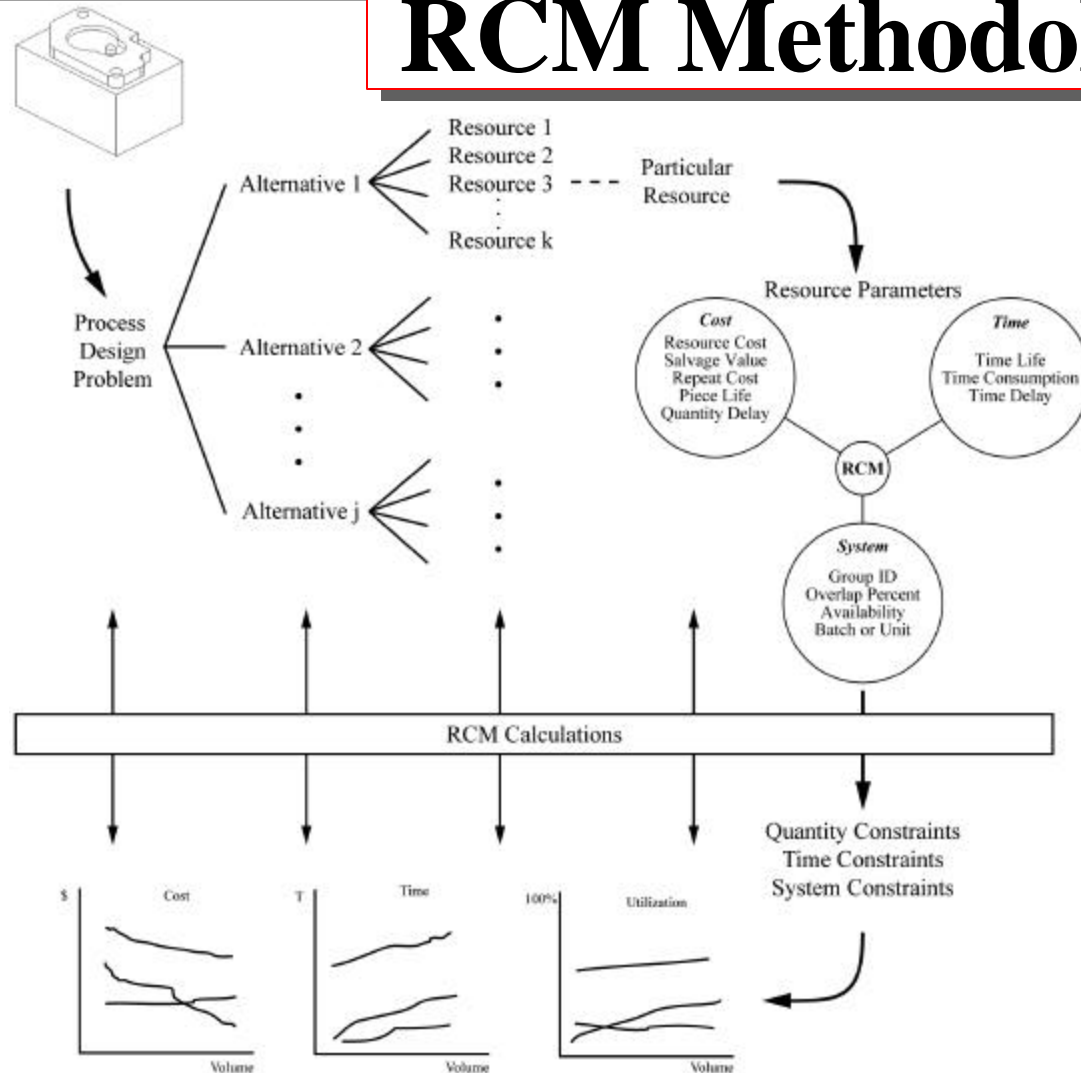
Goal: Develop a Comprehensive Methodology

- **Evaluate process design alternatives**
- **Cost, time, and utilization metrics**
- **Volume-based calculations**
- **Capture economy of scale**
- **Help evaluate manufacturing strategies**
- **Contain greater detail to assist analyst**

Existing Methodologies

- **Engineering Economics**
- **Cost Accounting and Estimating**
- **Break-even Analysis**
- **Design For Manufacture**
- **Computer Aided Process Planning**
- **Expert Systems**

RCM Methodology



RCM Methodology Attributes

- **Resource Consumption**
- **Time/Cost/Utilization**
- **Discrete Calculations**
- **Visual results**
- **CIM**

Methodology Features

- **Resource parameters**
- **Common Structure**
- **System Effects**
 - **Cycle time calculations**
 - **Availability**
- **Repeat Cost Functions**
- **Cost Delay**
- **Computer Model**

Strategies

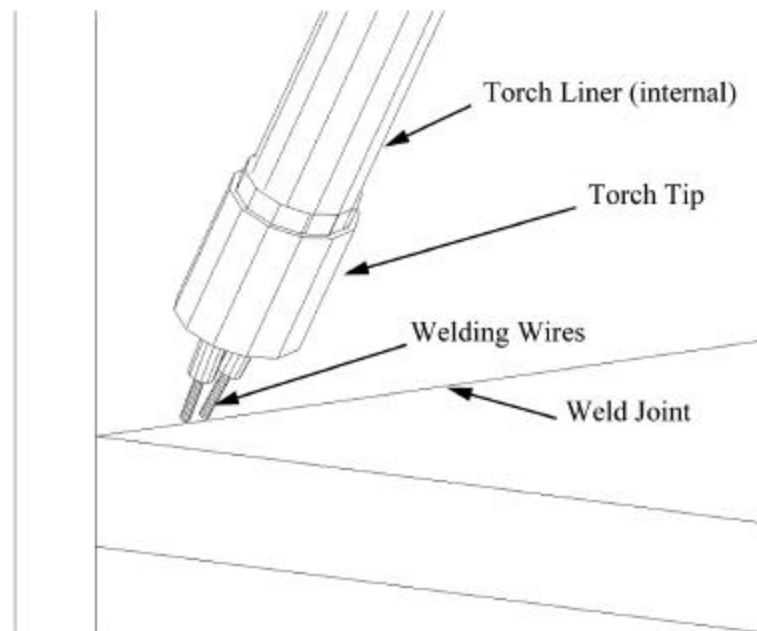
- **Low Cost**
- **Fast Response**
- **Flexibility/Agility**
- **Resource Utilization**

Management needs

- **Profits**
- **Control costs**
- **Risks**
- **Long-term decisions**
- **Understanding (cost per unit)**

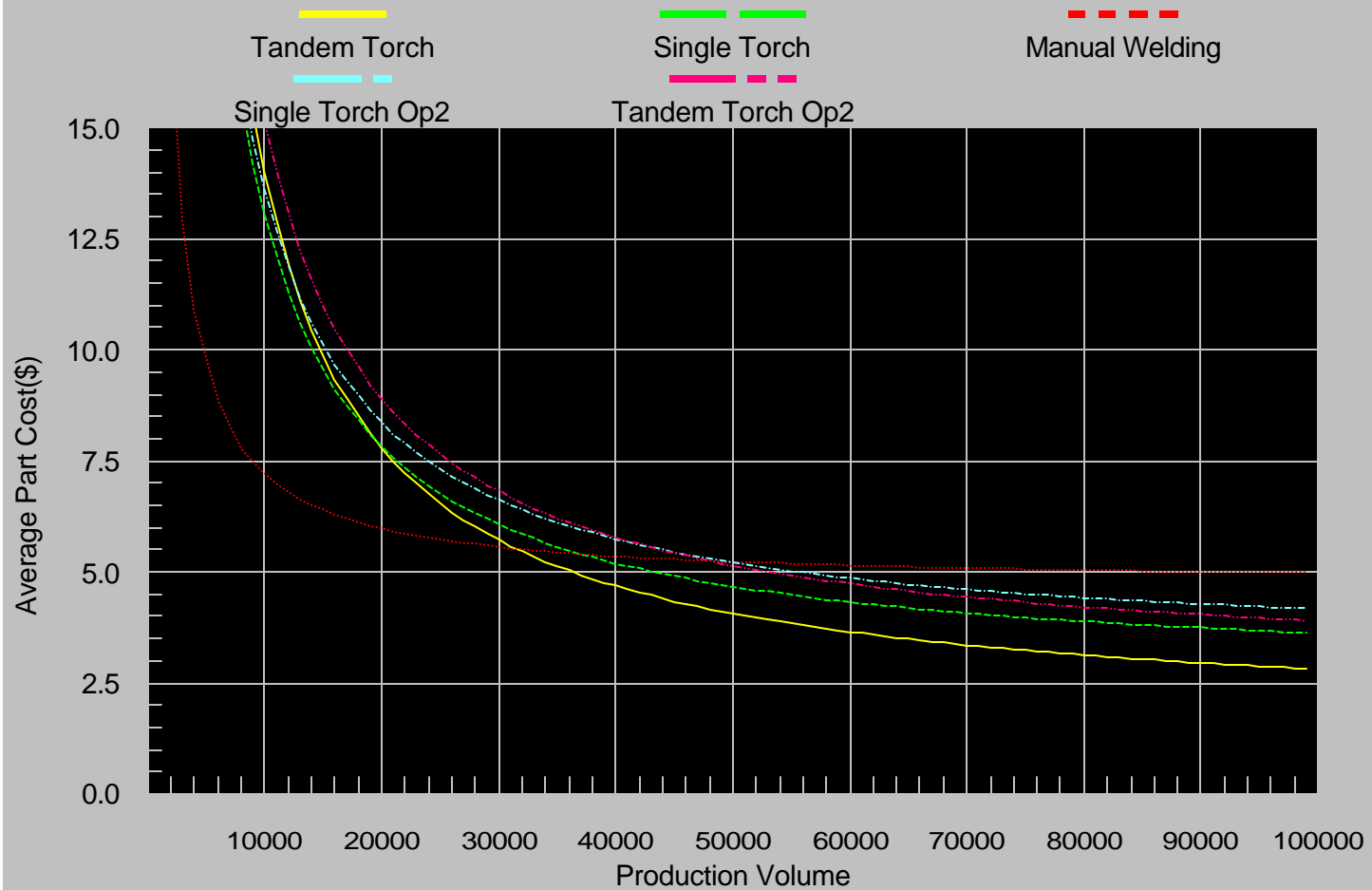
Example - Robotic Welding

- 3 Alternatives: Single, Tandem, Manual
- Cost, time, & utilization comparison



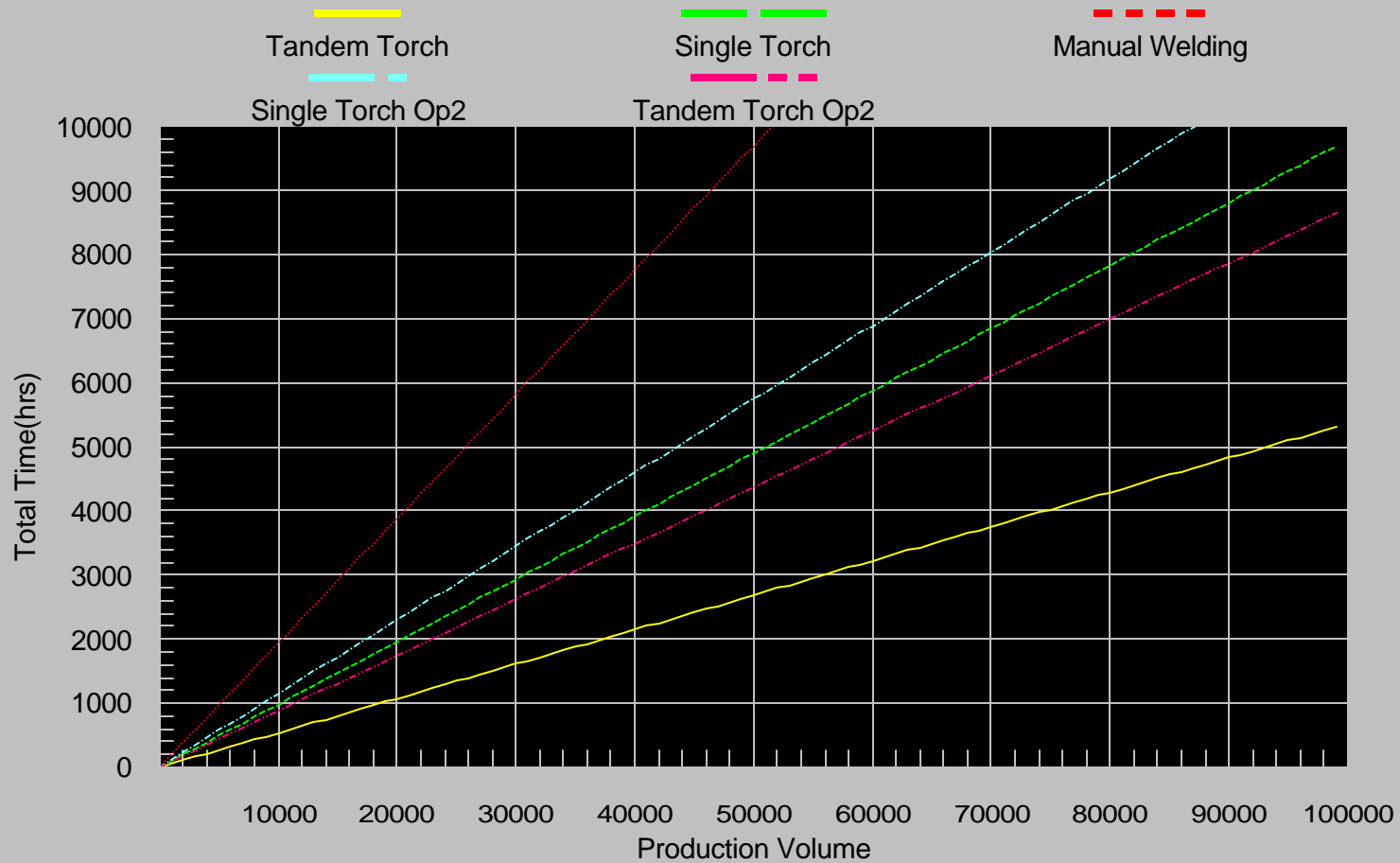
Average Part Cost(\$) vs Production Volume

Proj= Should the tandem or single torch robotic system be purchased? , for Selected Alternatives



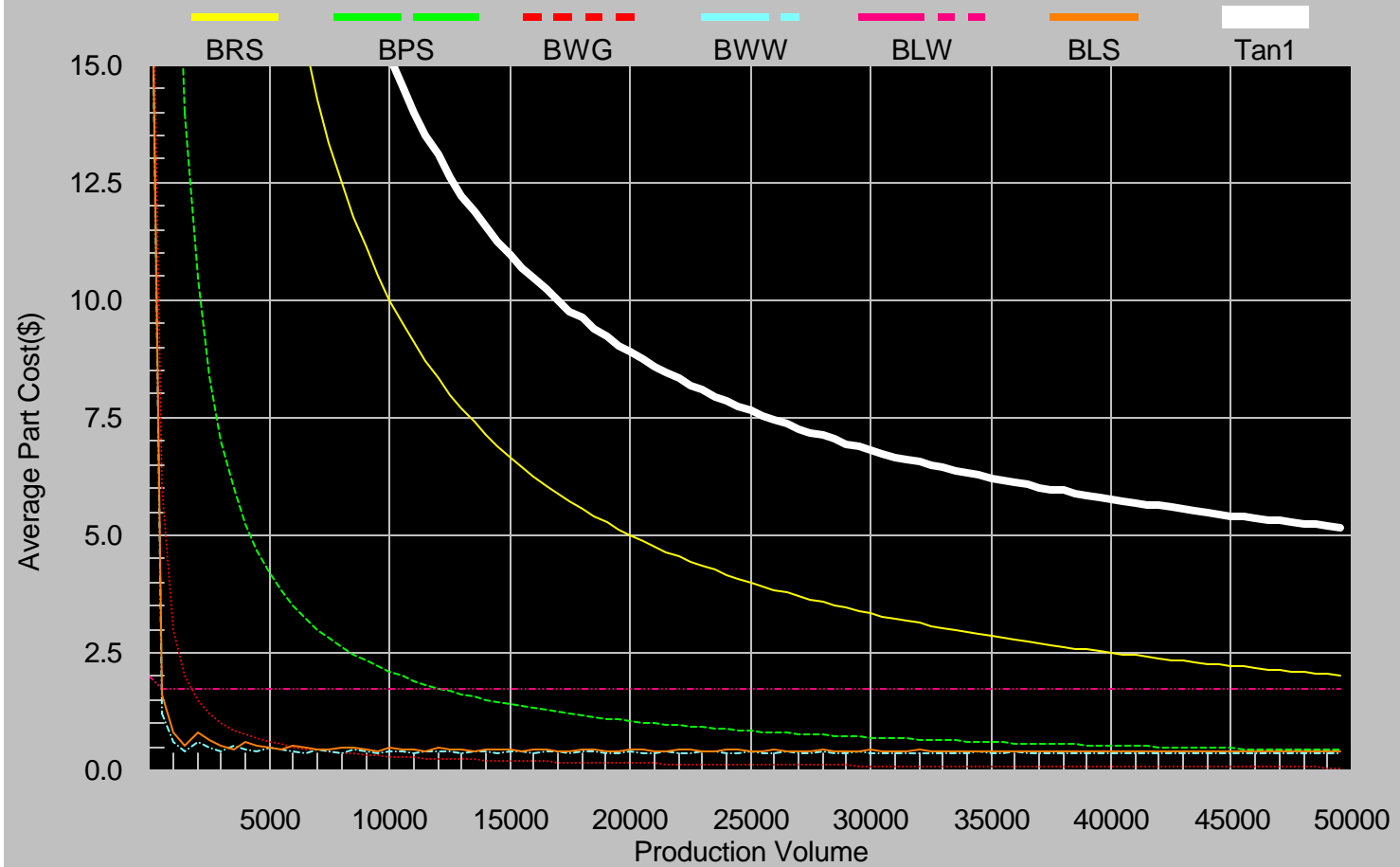
Total Time(hrs) vs Production Volume

Proj= Should the tandem or single torch robotic system be purchased? , for Selected Alternatives



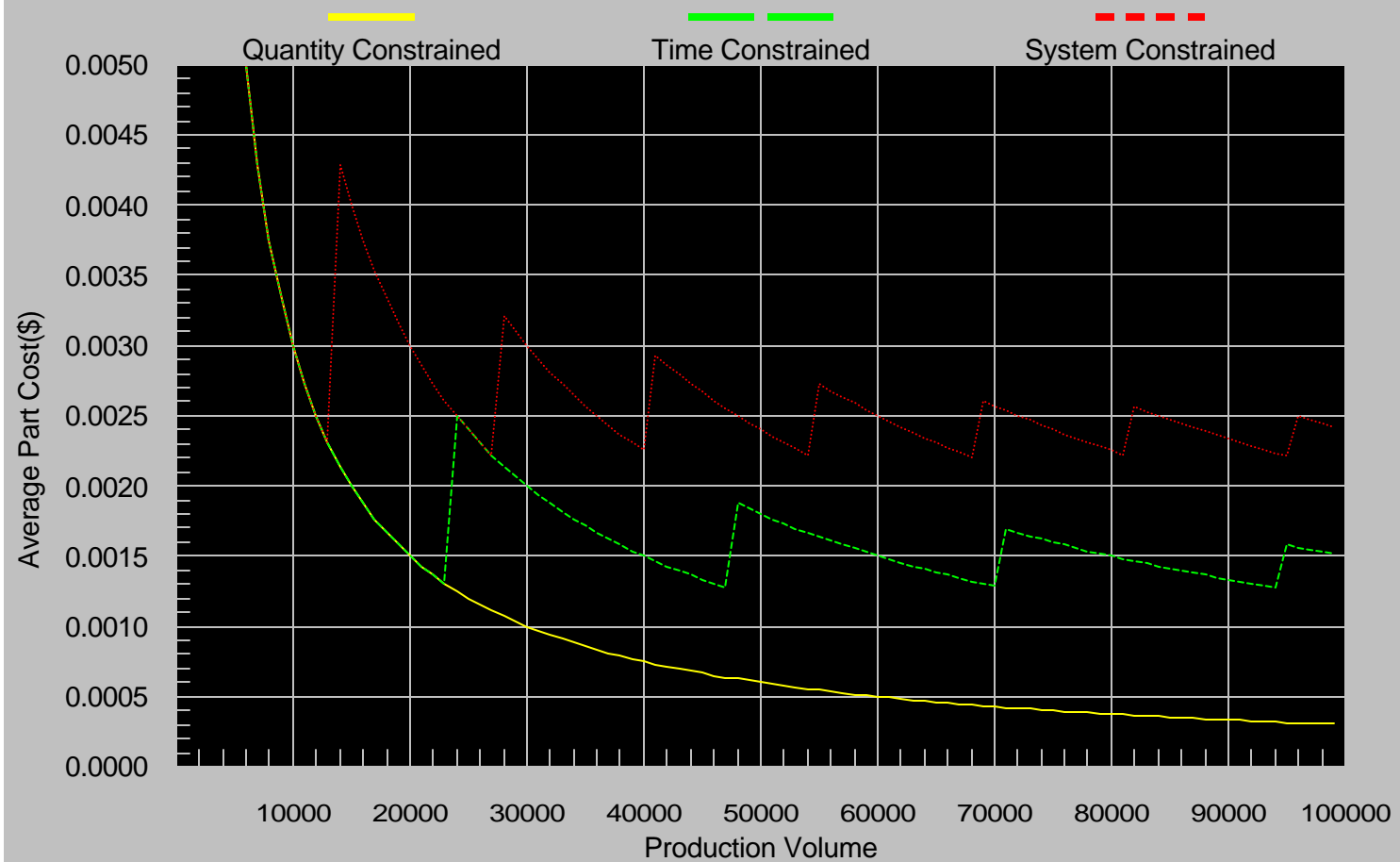
Average Part Cost(\$) vs Production Volume

Proj= P3, Selected Alt= Tandem Torch Op2



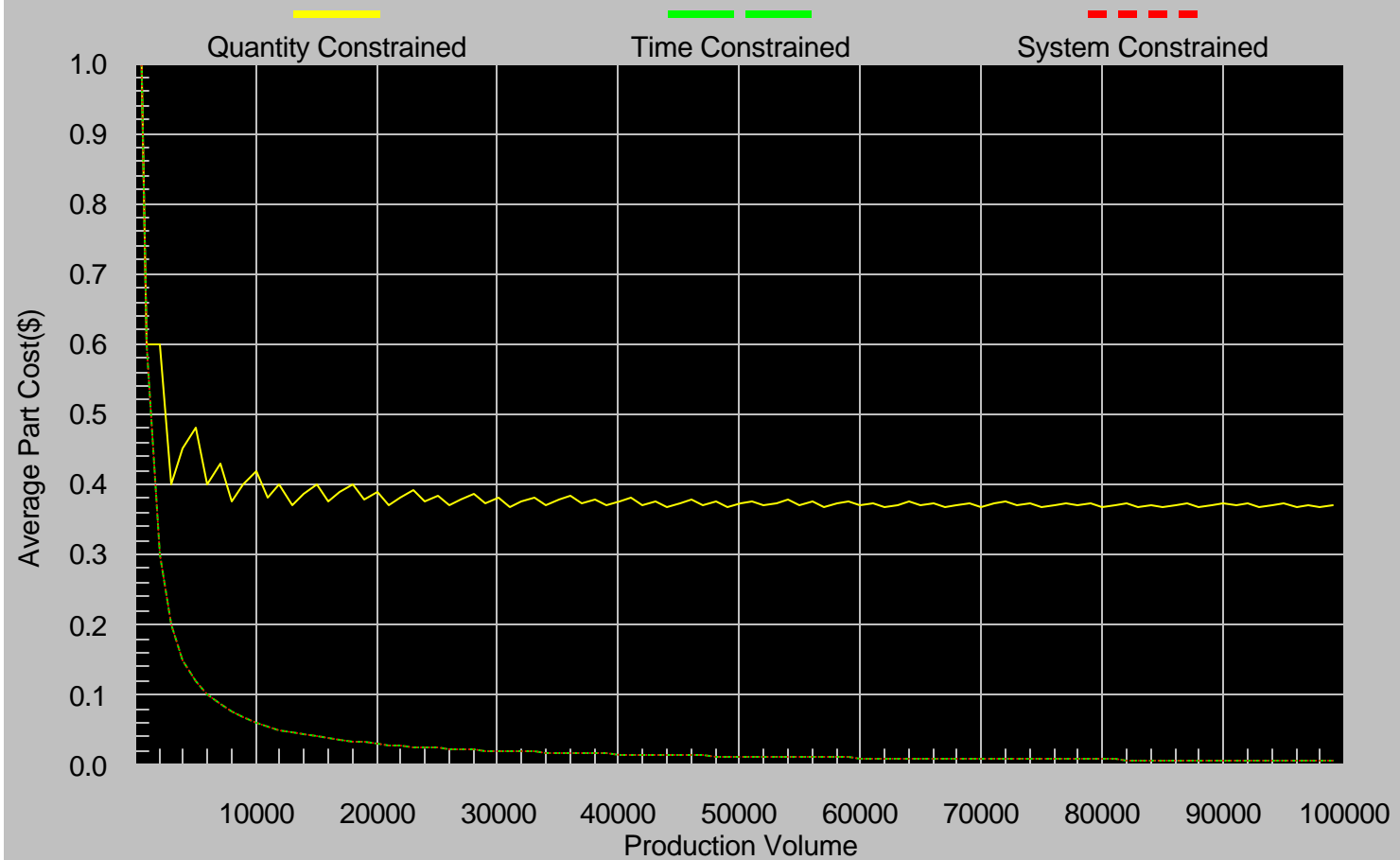
Average Part Cost(\$) vs Production Volume

Proj= P3, Alt= Tand, Selected Res= TWGL



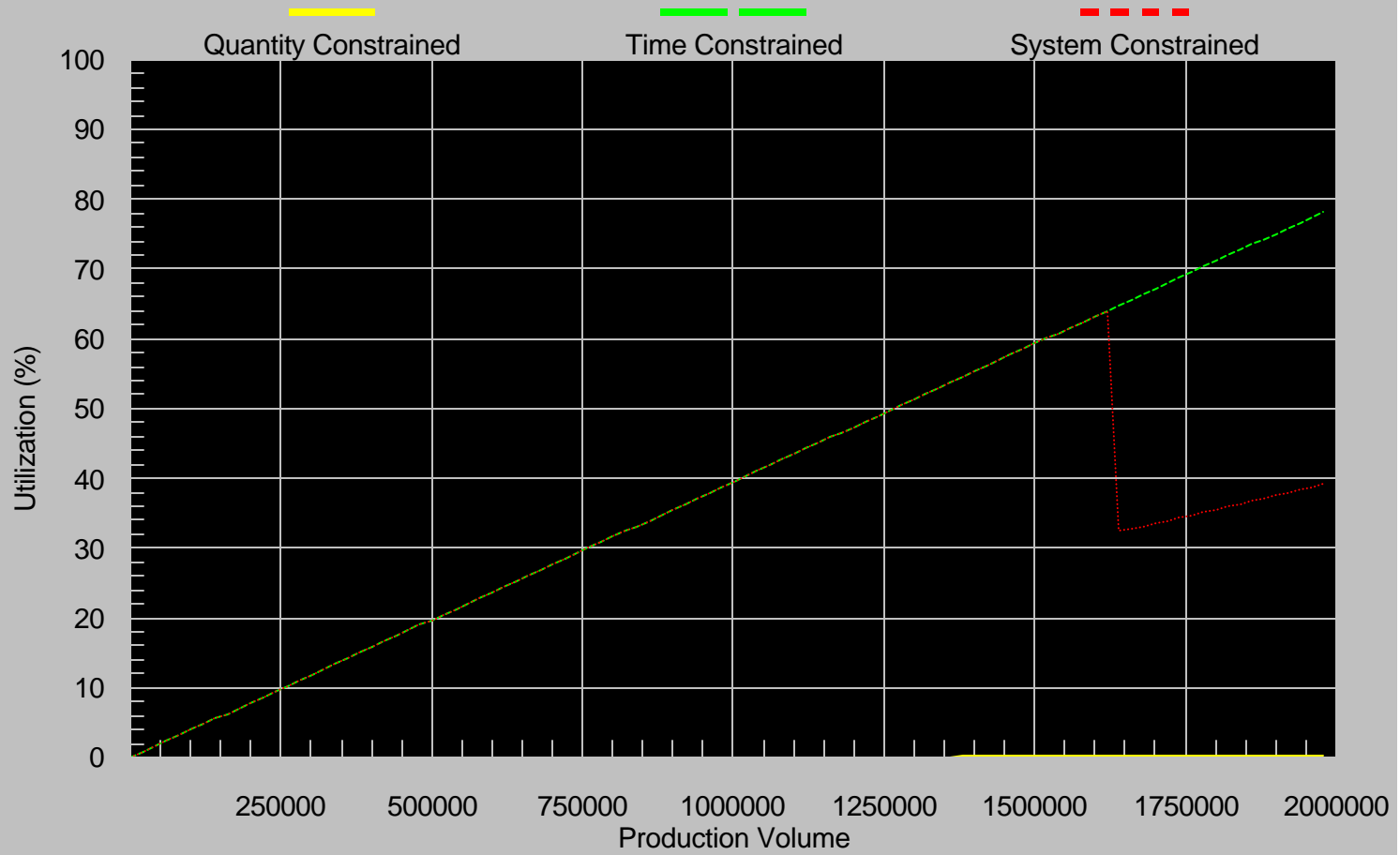
Average Part Cost(\$) vs Production Volume

Proj= P3, Alt= Tand, Selected Res= TWW



Utilization vs Production Volume

Proj= P3, Alt= Tand, Selected Res= TRS



Conclusions

- **Includes many relevant factors**
- **Represents System Dynamics**
- **Flexible**
- **Timely Implementation**
- **Incorporates Additional Capabilities**

Conclusions (continued)

● Limitations

- Deterministic approach
- Computationally intensive
- Single product
- Quality trade-offs
- Other parameter relationships