

## 1. stat

terminating: specific starting, stopping points.

steady-state: long run (technically forever).

for terminating:

Run > settings > setup > Replication parameters.

turn off animation!

Run > settings > Batch Run (No Animation)

Replication	Daily Profit	Daily Late Wait Jobs
1	\$ 475.43	0.6500
2	525.17	0.6500
3	513.98	6.5500
4	389.42	0.6000
5	513.96	0.7000
6	401.20	1.0500
7	450.52	0.6500
8	388.71	0.9000
9	574.67	0.4000
10	565.81	0.2500

	Daily Profit	Daily Late Wait Jobs
Sample Mean	\$ 479.89	0.6400
Sample Standard Deviation	70.17	0.0510
95% Confidence Interval Half Width	50.20	0.1616
Minimum Summary Output Value	388.71	0.2500
Maximum Summary Output Value	574.67	1.0500

Confidence Interval:

$$\bar{X} \pm t_{n-1, 1-\alpha/2} \left[ \frac{s}{\sqrt{n}} \right]$$

Approximations

$$n = \left( z_{1-\alpha/2} \right)^2 \left[ \frac{s^2}{h^2} \right]$$

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$$n = (z_{1-\alpha/2})^2 \left[ s^2 / h^2 \right]$$

$$n = n_0 \left[ \frac{h_0^2}{h^2} \right]$$

$n_0 \rightarrow h_0$

where  $n_0$  is the number of initial replications you have and  $h_0$  is the half width you got from them. In the Total Cost example, to reduce the half width from  $h_0 = \$1,408.70$  to, say,  $h = \$400.00$  we'd thus need a total of something like

$$n \cong 1.96^2 \frac{1,969.23^2}{400^2} = 93.11 \text{ (first approximation)}$$

or

$$n \cong 10 \frac{1,408.70^2}{400^2} = 124.03 \text{ (second approximation)}$$

## 2. output analyzer

↳ operates on (.dat) files produced by arena

↳ input/output panel > output > Expression, Name, output File

Describe how in one of arena components we can compare between the mean of two alternatives and find the confidence interval for both and plot that confidence interval

output.

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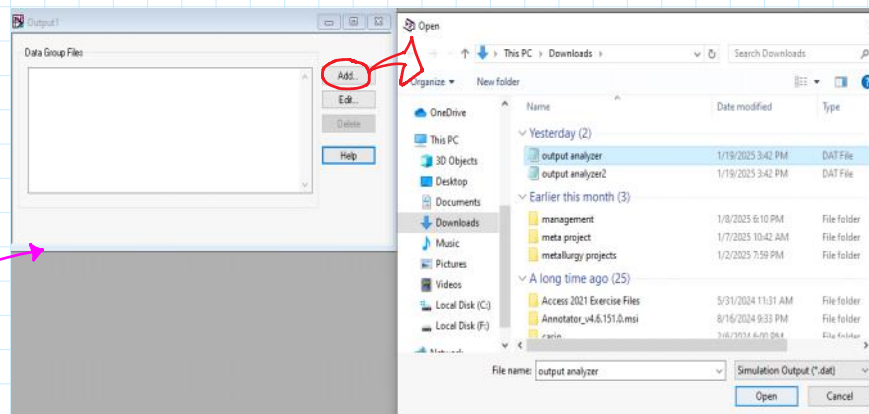
(output)

1.] we made run (one replication) of both alternatives.

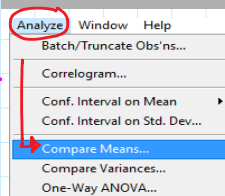
2.] window > output analyzer

3.] open new "data group files"

4.] Add > select files of interest



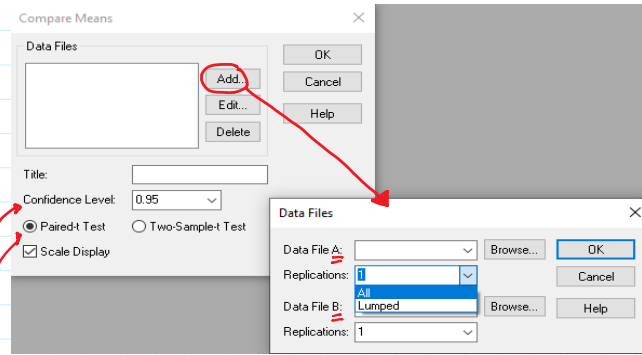
5.] Analyze > compare means



## 6.) ADD > Data Files

Data File A : Alternative 1 .dot  
Replications: Lumped

Data File B : Alternative 2 .dot  
Replications: Lumped



## 7.) \* paired t-test

\* confidence level is 0.95

8.) OK , this will find the CI & plot it.

## 3.) PAN

Describe how to Analyze alternative scenarios one with <sup>1</sup> numbers of workers equal to two or three and <sup>2</sup> number of machines 5 or six N in PAN with analysis for Entity. Time in system and system.Number out <sup>controls</sup> <sup>responses</sup>

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2 factors [controls] with 2 levels  
↳  $2^2 = 4$  scenarios

## 1.) Tools > process Analyzer

## 2.)

scenario properties	
Name	program file

First File.p

second File.p

third File.p

fourth File.p

controls	
no. workers	no. machines

2 5

2 6

3 5

3 6

Responses	
Entity. Time in system	system. number out

— —

— —

— —

— —

3.) select all of scenarios

4.) Run ▶

## 4. optquest

Describe how to optimize using **optoquest** alternative scenarios one with numbers of workers equal to two or three and number of machines 5 or six N in PAN with analysis for Entity. Time in system.

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1.) Tools > optquest

2.) New Session (File > new)

3.)

Controls					
Name	element type	type	low value	suggested value	high value
no. worker	resource	integer	2	—	3
no. machines	resource	integer	5	—	6

4.)

Constraints	
Name	Expression

First  $2 \leq \text{no. workers} \leq 3$

second  $5 \leq \text{no. machines} \leq 6$

5.)

Objective		
Name	Goal	Expression
obj. 1	Minimize	Entity. Time in system

6.)  Run