

Gauge R&R in Minitab

Stap 1: open Minitab

The screenshot displays the Minitab software interface. At the top is the menu bar with options: File, Edit, Data, Calc, Stat, Graph, Editor, Tools, Window, Help, and Assistant. Below the menu bar is a toolbar with various icons for file operations, editing, and data analysis. The main workspace is divided into two panes. The top pane, titled 'Session', shows a timestamp '8-6-2017 15:56:49' and a welcome message: 'Welcome to Minitab, press F1 for help.' The bottom pane, titled 'Worksheet 1 ***', displays a grid with 16 columns (C1 to C16) and 5 rows (1 to 5). The cell at row 1, column C1 is selected. The status bar at the bottom indicates 'Current Worksheet: Worksheet 1'. The Windows taskbar is visible at the very bottom, showing various application icons and the system clock.

Minitab - Untitled

File Edit Data Calc Stat Graph Editor Tools Window Help Assistant

8-6-2017 15:56:49

Welcome to Minitab, press F1 for help.

Worksheet 1 ***

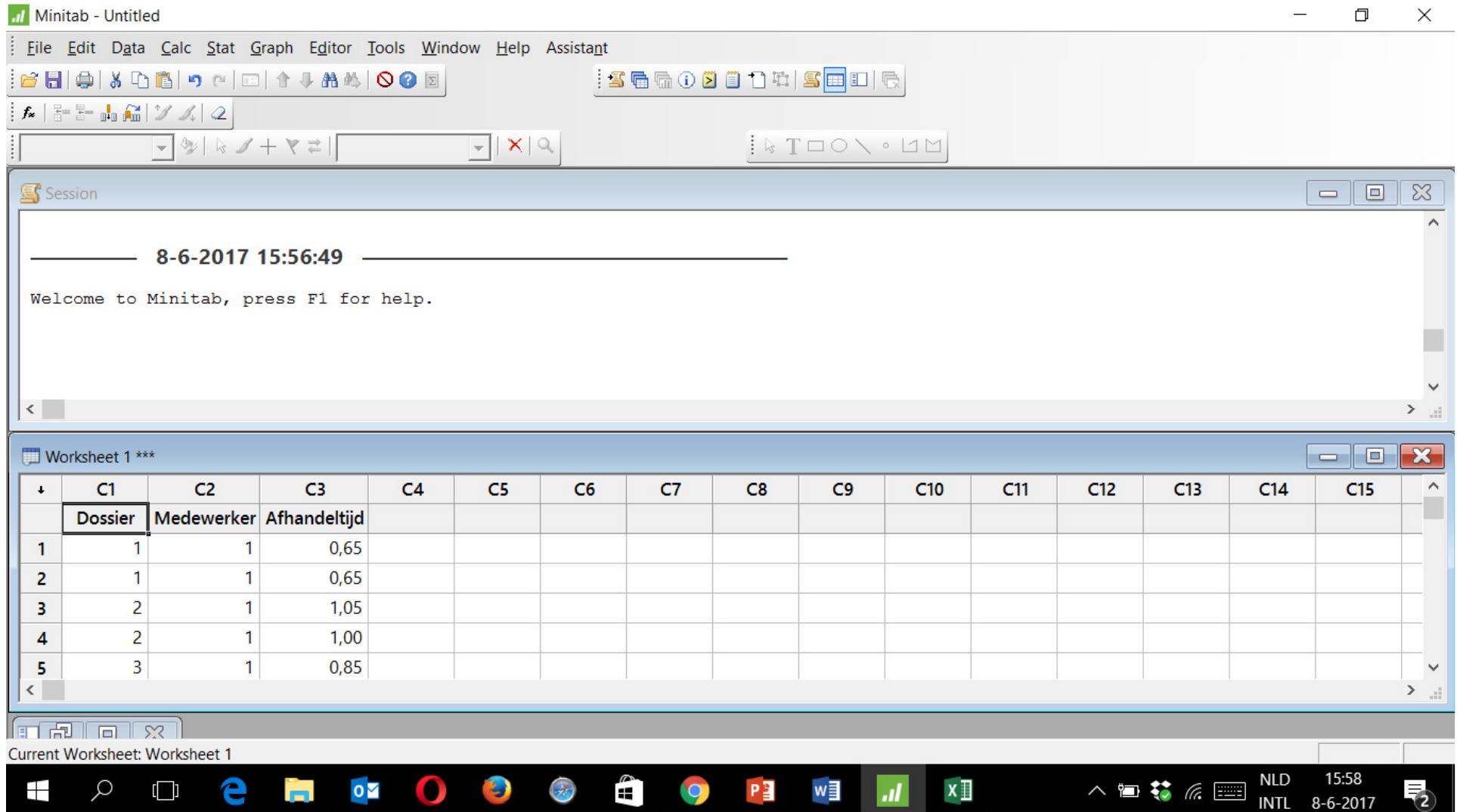
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
1																
2																
3																
4																
5																

Current Worksheet: Worksheet 1

NLD INTL 15:57 8-6-2017

Gauge R&R in Minitab

Stap 2: kopieer en plak de data uit excel



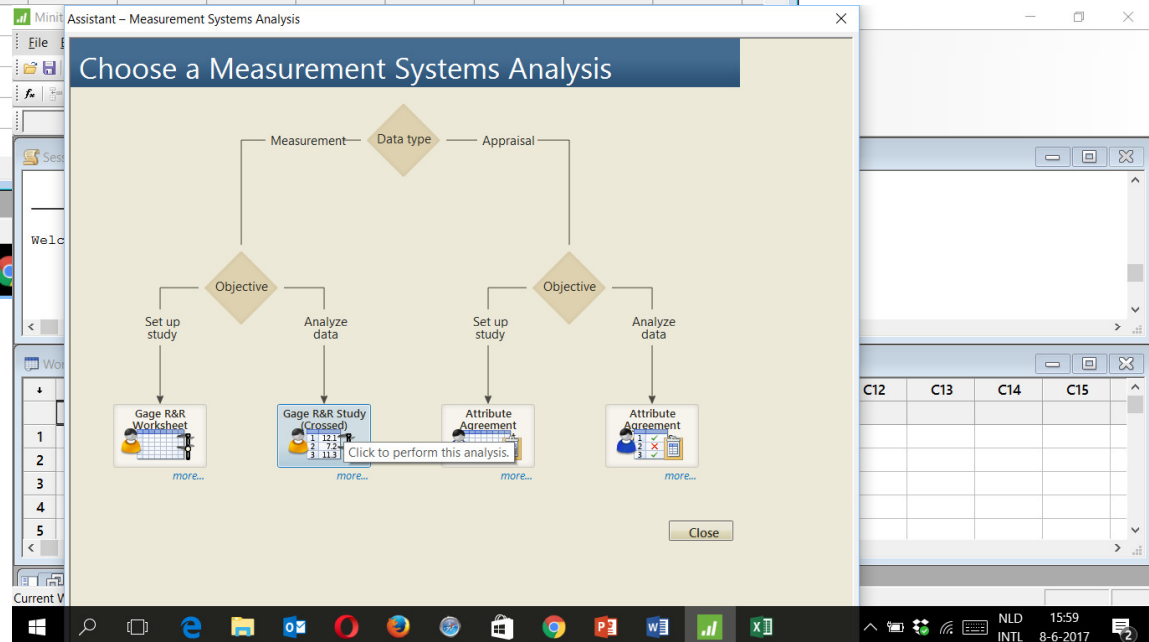
The screenshot shows the Minitab software interface. The top menu bar includes File, Edit, Data, Calc, Stat, Graph, Editor, Tools, Window, Help, and Assistant. Below the menu bar is a toolbar with various icons for file operations, editing, and data analysis. The main window is divided into two panes. The top pane, titled 'Session', displays the date and time '8-6-2017 15:56:49' and a welcome message: 'Welcome to Minitab, press F1 for help.' The bottom pane, titled 'Worksheet 1 ***', shows a data table with 16 columns (C1 to C15) and 6 rows (header and 5 data rows). The data is as follows:

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15
	Dossier	Medewerker	Afhandeltijd												
1	1	1	0,65												
2	1	1	0,65												
3	2	1	1,05												
4	2	1	1,00												
5	3	1	0,85												

The bottom status bar indicates 'Current Worksheet: Worksheet 1'. The Windows taskbar at the bottom shows the system clock as 15:58 on 8-6-2017, along with various application icons.

Gauge R&R in Minitab

Stap 3: ga naar MSA

[illegible]

Gauge R&R in Minitab

Stap 4: vul gegevens in

Gage R&R Study (Crossed)

C1 Dossier
C2 Medewerker
C3 Afhandeltijd

Measurement data

Operators: (optional)

Parts:

Measurements:

Process variation

How would you like to estimate the process variation?

☒ Use historical standard deviation: (strongly recommended)

☐ Estimate from parts in the study

Process tolerance (optional)

Would you like to evaluate the capability of the measurement parts?

☒ Enter at least one specification limit

Lower spec:

Upper spec:

☐ Enter tolerance width

Upper spec - lower spec:

Select

Gage R&R Study (Crossed)

C1 Dossier
C2 Medewerker
C3 Afhandeltijd

Measurement data

Operators: (optional)

Parts:

Measurements:

Process variation

How would you like to estimate the process variation?

☐ Use historical standard deviation: (strongly recommended)

☒ Estimate from parts in the study

Process tolerance (optional)

Would you like to evaluate the capability of the measurement system to accurately accept or reject parts?

☒ Enter at least one specification limit

Lower spec:

Upper spec:

☐ Enter tolerance width

Upper spec - lower spec:

Select

OK Cancel



Gauge R&R in Minitab

Stap 5: bekijk de uitkomsten

Gage R&R Study for Afhandeltijd Summary Report

Can you adequately assess process performance?



The measurement system variation equals 29,9% of the process variation. The process variation is estimated from the parts in the study.

Study Information

Number of parts in study	10
Number of operators in study	3
Number of replicates	2

(Replicates: Number of times each operator measured each part)

Comments

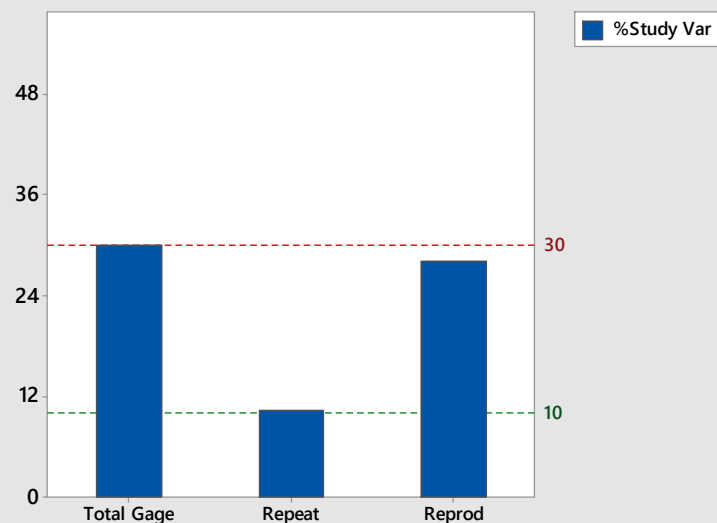
General rules used to determine the capability of the system:

- <10%: acceptable
- 10% - 30%: marginal
- >30%: unacceptable

Examine the bar chart showing the sources of variation. If the total gage variation is unacceptable, look at repeatability and reproducibility to guide improvements:

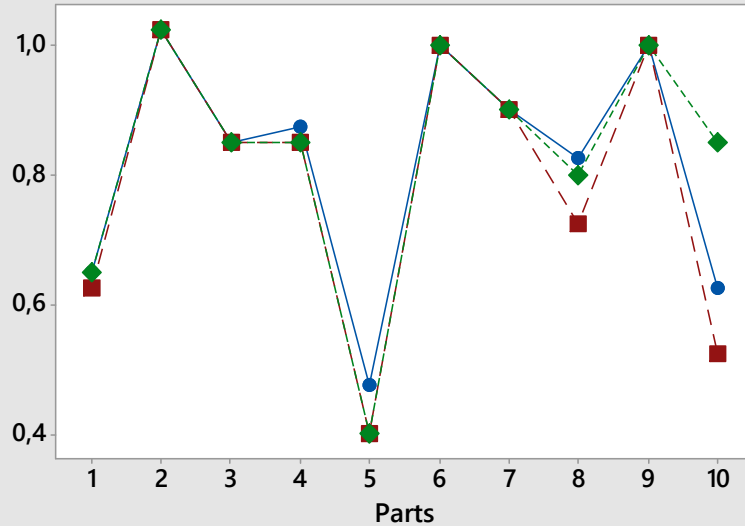
- Test-Retest component (Repeatability): The variation that occurs when the same person measures the same item multiple times. This equals 34,6% of the measurement variation and is 10,3% of the total variation in the process.
- Operator and Operator by Part components (Reproducibility): The variation that occurs when different people measure the same item. This equals 93,8% of the measurement variation and is 28,1% of the total variation in the process.

Variation by Source



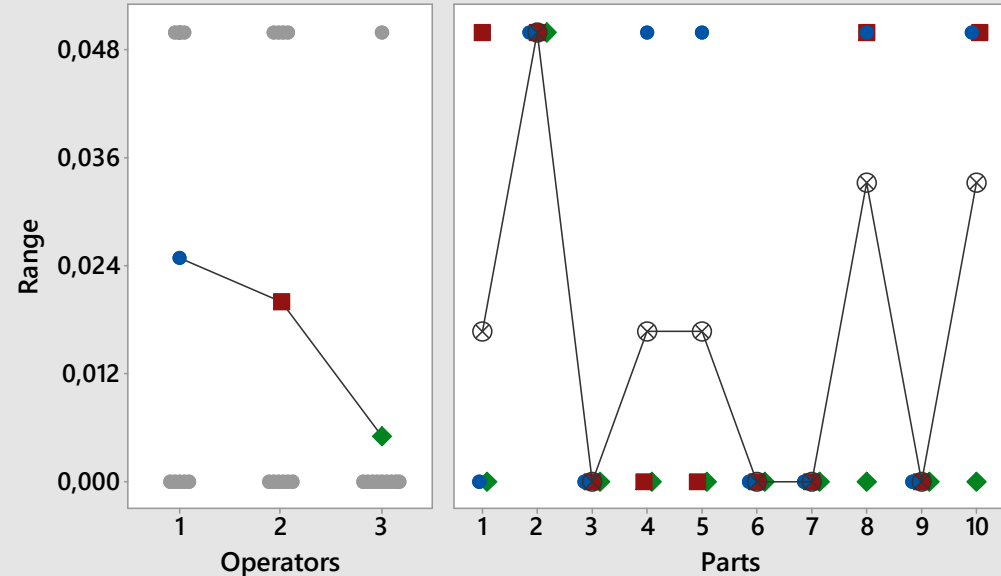
Gage R&R Study for Afhandeltijd Variation Report

Reproducibility — Operator by Part Interaction
Look for abnormal points or patterns.

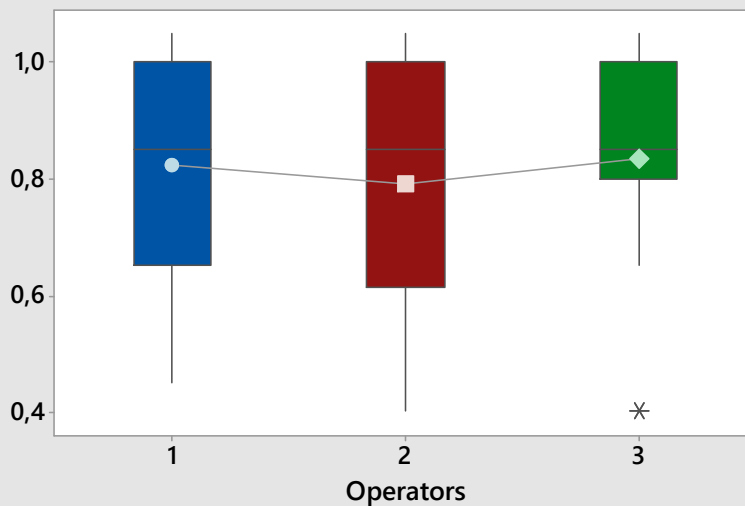


Test-Retest Ranges (Repeatability)

Operators and Parts with larger ranges have less consistency.



Reproducibility — Operator Main Effects
Look for operators with higher or lower averages.



Source	StDev	%Study Variation
Total Gage	0,059	29,91
Repeatability	0,020	10,35
Reproducibility	0,055	28,06
Operator	0,014	6,90
Operator by Part	0,054	27,20
Part-to-Part	0,188	95,42
Study Variation	0,197	100,00

Gauge R&R in Minitab: conclusie?

Net op de grens. Total G R&R is 8,94% (grens is 9%) en % Study is 29,91 % (grens is 30%) Kijk of je het meetsysteem nog kan verbeteren. Reproduceerbaarheid is het grootste probleem. .

Gage R&R

Source	VarComp	%Contribution (of VarComp)
Total Gage R&R	0,0034792	8,94
Repeatability	0,0004167	1,07
Reproducibility	0,0030625	7,87
Medewerker	0,0001852	0,48
Medewerker*Dossier	0,0028773	7,40
Part-To-Part	0,0354190	91,06
Total Variation	0,0388981	100,00

Source	StdDev (SD)	Study Var (6 × SD)	%Study Var (%SV)
Total Gage R&R	0,058984	0,35391	29,91
Repeatability	0,020412	0,12247	10,35
Reproducibility	0,055340	0,33204	28,06
Medewerker	0,013608	0,08165	6,90
Medewerker*Dossier	0,053641	0,32184	27,20
Part-To-Part	0,188199	1,12920	95,42
Total Variation	0,197226	1,18336	100,00

