**Linear 1st scenario balancing at 4: iteration1**

--- Average Times per Task (Seconds) ---

Task01: 0.69 sec

Task02: 2.65 sec

Task03: 2.73 sec

Task04: 3.94 sec

Task05: 3.68 sec

Task06: 6.38 sec

Task07: 4.16 sec

Task08: 3.72 sec

Task09: 3.86 sec

Task10: 6.88 sec

Task11: 7.80 sec

Task12: 10.09 sec

Task13: 9.56 sec

Task14: 7.35 sec

Task15: 3.94 sec

Task16: 3.56 sec

Task17: 16.44 sec

Task18: 13.64 sec

Task19: 13.45 sec

Task20: 11.81 sec

Task21: 8.40 sec

Task22: 6.69 sec

Task23: 4.23 sec

Task24: 3.58 sec

Task25: 6.80 sec

Task26: 12.97 sec

Task27: 19.22 sec

Task28: 7.48 sec

Task29: 4.66 sec

Task30: 4.38 sec

Calculating learning rates (exponent b) for each TaskXX...

C:\Users\tternghaa's\AppData\Roaming\Python\Python310\site-packages\openpyxl\styles\stylesheet.py:237: UserWarning: Workbook contains no default style, apply openpyxl's default

warn("Workbook contains no default style, apply openpyxl's default")

Loading previous state (if any)...

Performing ILP-based balancing (all times in seconds)...

Comparing current balancing scenarios...

--- Comparison Results ---

Old Cycle Times (by workstation) [seconds]: [66.14, 78.6, 70.03]

New Cycle Times (by workstation) [seconds]: [73.49, 71.25, 70.03]

Old Total Time (Bottleneck) [seconds]: 78.60

New Total Time (Bottleneck) [seconds]: 73.49

--- Task Changes ---

Workstation 1:

Added tasks: [14]

Workstation 2:

Removed tasks: [14]

--- Metrics ---

Time Saved per Hour [seconds/hour]: 250.12

Setup Time Cost [seconds]: 60.00

Learning Penalty [seconds]: 59.24

Time to Net Benefit [hours]: 0.48

--- New Scenario Workstation Allocation ---

Workstation 1: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]

Workstation 2: [15, 16, 17, 18, 19, 20, 21]

Workstation 3: [22, 23, 24, 25, 26, 27, 28, 29, 30]

Saving the new scenario as the current baseline...

**Last 4 hours**

--- Average Times per Task (Seconds) ---

Task01: 0.51 sec

Task02: 2.58 sec

Task03: 2.53 sec

Task04: 4.35 sec

Task05: 4.78 sec

Task06: 8.72 sec

Task07: 3.80 sec

Task08: 3.91 sec

Task09: 3.21 sec

Task10: 7.83 sec

Task11: 7.09 sec

Task12: 9.03 sec

Task13: 7.97 sec

Task14: 6.49 sec

Task15: 5.76 sec

Task16: 3.78 sec

Task17: 13.81 sec

Task18: 13.50 sec

Task19: 11.92 sec

Task20: 10.82 sec

Task21: 11.84 sec

Task22: 7.51 sec

Task23: 4.23 sec

Task24: 3.43 sec

Task25: 6.26 sec

Task26: 14.06 sec

Task27: 18.91 sec

Task28: 6.16 sec

Task29: 5.63 sec

Task30: 4.54 sec

Calculating learning rates (exponent b) for each TaskXX...

C:\Users\tternghaa's\AppData\Roaming\Python\Python310\site-packages\openpyxl\styles\stylesheet.py:237: UserWarning: Workbook contains no default style, apply openpyxl's default

warn("Workbook contains no default style, apply openpyxl's default")

Loading previous state (if any)...

Performing ILP-based balancing (all times in seconds)...

Comparing current balancing scenarios...

--- Comparison Results ---

Old Cycle Times (by workstation) [seconds]: [72.82, 71.44, 70.74]

New Cycle Times (by workstation) [seconds]: [72.82, 71.44, 70.74]

Old Total Time (Bottleneck) [seconds]: 72.82

New Total Time (Bottleneck) [seconds]: 72.82

--- Task Changes ---

No tasks moved between workstations.

--- Metrics ---

Time Saved per Hour [seconds/hour]: 0.00

Setup Time Cost [seconds]: 0.00

Learning Penalty [seconds]: 0.00

Time to Net Benefit: Never (no net benefit)

--- New Scenario Workstation Allocation ---

Workstation 1: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]

Workstation 2: [15, 16, 17, 18, 19, 20, 21]

Workstation 3: [22, 23, 24, 25, 26, 27, 28, 29, 30]

Saving the new scenario as the current baseline...

**Linear 1st scenario balancing at 4: iteration2**

--- Average Times per Task (Seconds) ---

Task01: 0.81 sec

Task02: 3.55 sec

Task03: 2.34 sec

Task04: 5.27 sec

Task05: 7.03 sec

Task06: 6.06 sec

Task07: 4.12 sec

Task08: 3.80 sec

Task09: 3.32 sec

Task10: 6.63 sec

Task11: 7.31 sec

Task12: 8.86 sec

Task13: 9.13 sec

Task14: 6.79 sec

Task15: 4.35 sec

Task16: 3.36 sec

Task17: 14.24 sec

Task18: 11.49 sec

Task19: 14.28 sec

Task20: 11.09 sec

Task21: 11.25 sec

Task22: 6.06 sec

Task23: 4.56 sec

Task24: 3.83 sec

Task25: 6.98 sec

Task26: 15.13 sec

Task27: 23.66 sec

Task28: 5.79 sec

Task29: 4.96 sec

Task30: 4.21 sec

Calculating learning rates (exponent b) for each TaskXX...

C:\Users\tternghaa's\AppData\Roaming\Python\Python310\site-packages\openpyxl\styles\stylesheet.py:237: UserWarning: Workbook contains no default style, apply openpyxl's default

warn("Workbook contains no default style, apply openpyxl's default")

Loading previous state (if any)...

Performing ILP-based balancing (all times in seconds)...

Comparing current balancing scenarios...

--- Comparison Results ---

Old Cycle Times (by workstation) [seconds]: [68.23, 76.84, 75.19]

New Cycle Times (by workstation) [seconds]: [75.02, 70.06, 75.19]

Old Total Time (Bottleneck) [seconds]: 76.84

New Total Time (Bottleneck) [seconds]: 75.19

--- Task Changes ---

Workstation 1:

Added tasks: [14]

Workstation 2:

Removed tasks: [14]

--- Metrics ---

Time Saved per Hour [seconds/hour]: 79.26

Setup Time Cost [seconds]: 60.00

Learning Penalty [seconds]: 61.08

Time to Net Benefit [hours]: 1.53

--- New Scenario Workstation Allocation ---

Workstation 1: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]

Workstation 2: [15, 16, 17, 18, 19, 20, 21]

Workstation 3: [22, 23, 24, 25, 26, 27, 28, 29, 30]

Saving the new scenario as the current baseline...

**Last 4 hours**

--- Average Times per Task (Seconds) ---

Task01: 0.62 sec

Task02: 3.04 sec

Task03: 2.35 sec

Task04: 4.13 sec

Task05: 5.37 sec

Task06: 8.81 sec

Task07: 3.36 sec

Task08: 4.14 sec

Task09: 3.28 sec

Task10: 6.27 sec

Task11: 4.76 sec

Task12: 8.16 sec

Task13: 8.00 sec

Task14: 5.22 sec

Task15: 5.15 sec

Task16: 4.10 sec

Task17: 14.19 sec

Task18: 14.36 sec

Task19: 13.81 sec

Task20: 9.92 sec

Task21: 10.08 sec

Task22: 7.90 sec

Task23: 4.73 sec

Task24: 3.39 sec

Task25: 6.29 sec

Task26: 13.28 sec

Task27: 18.14 sec

Task28: 5.81 sec

Task29: 5.07 sec

Task30: 4.50 sec

Calculating learning rates (exponent b) for each TaskXX...

C:\Users\tternghaa's\AppData\Roaming\Python\Python310\site-packages\openpyxl\styles\stylesheet.py:237: UserWarning: Workbook contains no default style, apply openpyxl's default

warn("Workbook contains no default style, apply openpyxl's default")

Loading previous state (if any)...

Performing ILP-based balancing (all times in seconds)...

Comparing current balancing scenarios...

--- Comparison Results ---

Old Cycle Times (by workstation) [seconds]: [67.51, 71.61, 69.12]

New Cycle Times (by workstation) [seconds]: [67.51, 71.61, 69.12]

Old Total Time (Bottleneck) [seconds]: 71.61

New Total Time (Bottleneck) [seconds]: 71.61

--- Task Changes ---

No tasks moved between workstations.

--- Metrics ---

Time Saved per Hour [seconds/hour]: 0.00

Setup Time Cost [seconds]: 0.00

Learning Penalty [seconds]: 0.00

Time to Net Benefit: Never (no net benefit)

--- New Scenario Workstation Allocation ---

Workstation 1: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]

Workstation 2: [15, 16, 17, 18, 19, 20, 21]

Workstation 3: [22, 23, 24, 25, 26, 27, 28, 29, 30]

Saving the new scenario as the current baseline...

**Linear 1st scenario balancing at 4: iteration3**

--- Average Times per Task (Seconds) ---

Task01: 0.68 sec

Task02: 3.98 sec

Task03: 2.84 sec

Task04: 4.39 sec

Task05: 4.97 sec

Task06: 7.75 sec

Task07: 4.03 sec

Task08: 3.87 sec

Task09: 3.66 sec

Task10: 8.23 sec

Task11: 6.05 sec

Task12: 9.29 sec

Task13: 9.54 sec

Task14: 6.89 sec

Task15: 3.63 sec

Task16: 3.71 sec

Task17: 14.20 sec

Task18: 12.99 sec

Task19: 13.47 sec

Task20: 10.01 sec

Task21: 11.37 sec

Task22: 7.33 sec

Task23: 4.36 sec

Task24: 3.49 sec

Task25: 7.50 sec

Task26: 14.73 sec

Task27: 15.55 sec

Task28: 6.64 sec

Task29: 4.99 sec

Task30: 4.33 sec

Calculating learning rates (exponent b) for each TaskXX...

C:\Users\tternghaa's\AppData\Roaming\Python\Python310\site-packages\openpyxl\styles\stylesheet.py:237: UserWarning: Workbook contains no default style, apply openpyxl's default

warn("Workbook contains no default style, apply openpyxl's default")

Loading previous state (if any)...

Performing ILP-based balancing (all times in seconds)...

Comparing current balancing scenarios...

--- Comparison Results ---

Old Cycle Times (by workstation) [seconds]: [69.28, 76.29, 68.92]

New Cycle Times (by workstation) [seconds]: [76.17, 69.4, 68.92]

Old Total Time (Bottleneck) [seconds]: 76.29

New Total Time (Bottleneck) [seconds]: 76.17

--- Task Changes ---

Workstation 1:

Added tasks: [14]

Workstation 2:

Removed tasks: [14]

--- Metrics ---

Time Saved per Hour [seconds/hour]: 5.58

Setup Time Cost [seconds]: 60.00

Learning Penalty [seconds]: 60.12

Time to Net Benefit [hours]: 21.54

--- New Scenario Workstation Allocation ---

Workstation 1: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]

Workstation 2: [15, 16, 17, 18, 19, 20, 21]

Workstation 3: [22, 23, 24, 25, 26, 27, 28, 29, 30]

Saving the new scenario as the current baseline...

**Last 4 hours**

--- Average Times per Task (Seconds) ---

Task01: 0.60 sec

Task02: 2.30 sec

Task03: 2.69 sec

Task04: 4.18 sec

Task05: 4.73 sec

Task06: 9.14 sec

Task07: 3.37 sec

Task08: 3.81 sec

Task09: 3.13 sec

Task10: 7.77 sec

Task11: 6.75 sec

Task12: 7.84 sec

Task13: 8.94 sec

Task14: 6.18 sec

Task15: 5.80 sec

Task16: 4.66 sec

Task17: 15.31 sec

Task18: 13.71 sec

Task19: 14.03 sec

Task20: 11.49 sec

Task21: 9.77 sec

Task22: 7.35 sec

Task23: 5.00 sec

Task24: 3.57 sec

Task25: 6.57 sec

Task26: 13.45 sec

Task27: 16.98 sec

Task28: 7.55 sec

Task29: 5.36 sec

Task30: 4.34 sec

Calculating learning rates (exponent b) for each TaskXX...

C:\Users\tternghaa's\AppData\Roaming\Python\Python310\site-packages\openpyxl\styles\stylesheet.py:237: UserWarning: Workbook contains no default style, apply openpyxl's default

warn("Workbook contains no default style, apply openpyxl's default")

Loading previous state (if any)...

Performing ILP-based balancing (all times in seconds)...

Comparing current balancing scenarios...

--- Comparison Results ---

Old Cycle Times (by workstation) [seconds]: [71.42, 74.76, 70.16]

New Cycle Times (by workstation) [seconds]: [71.42, 74.76, 70.16]

Old Total Time (Bottleneck) [seconds]: 74.76

New Total Time (Bottleneck) [seconds]: 74.76

--- Task Changes ---

No tasks moved between workstations.

--- Metrics ---

Time Saved per Hour [seconds/hour]: 0.00

Setup Time Cost [seconds]: 0.00

Learning Penalty [seconds]: 0.00

Time to Net Benefit: Never (no net benefit)

--- New Scenario Workstation Allocation ---

Workstation 1: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]

Workstation 2: [15, 16, 17, 18, 19, 20, 21]

Workstation 3: [22, 23, 24, 25, 26, 27, 28, 29, 30]

Saving the new scenario as the current baseline...

**Linear 1st scenario balancing at 4: iteration4**

--- Average Times per Task (Seconds) ---

Task01: 0.69 sec

Task02: 3.65 sec

Task03: 2.58 sec

Task04: 5.06 sec

Task05: 4.67 sec

Task06: 9.50 sec

Task07: 3.98 sec

Task08: 3.80 sec

Task09: 3.12 sec

Task10: 6.35 sec

Task11: 6.35 sec

Task12: 7.72 sec

Task13: 7.14 sec

Task14: 6.76 sec

Task15: 4.50 sec

Task16: 4.04 sec

Task17: 15.00 sec

Task18: 13.16 sec

Task19: 12.53 sec

Task20: 11.30 sec

Task21: 8.63 sec

Task22: 5.93 sec

Task23: 4.46 sec

Task24: 3.65 sec

Task25: 6.95 sec

Task26: 14.36 sec

Task27: 19.41 sec

Task28: 6.97 sec

Task29: 4.70 sec

Task30: 4.11 sec

Calculating learning rates (exponent b) for each TaskXX...

C:\Users\tternghaa's\AppData\Roaming\Python\Python310\site-packages\openpyxl\styles\stylesheet.py:237: UserWarning: Workbook contains no default style, apply openpyxl's default

warn("Workbook contains no default style, apply openpyxl's default")

Loading previous state (if any)...

Performing ILP-based balancing (all times in seconds)...

Comparing current balancing scenarios...

--- Comparison Results ---

Old Cycle Times (by workstation) [seconds]: [64.62, 75.93, 70.54]

New Cycle Times (by workstation) [seconds]: [71.38, 69.17, 70.54]

Old Total Time (Bottleneck) [seconds]: 75.93

New Total Time (Bottleneck) [seconds]: 71.38

--- Task Changes ---

Workstation 1:

Added tasks: [14]

Workstation 2:

Removed tasks: [14]

--- Metrics ---

Time Saved per Hour [seconds/hour]: 229.48

Setup Time Cost [seconds]: 60.00

Learning Penalty [seconds]: 54.84

Time to Net Benefit [hours]: 0.50

--- New Scenario Workstation Allocation ---

Workstation 1: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]

Workstation 2: [15, 16, 17, 18, 19, 20, 21]

Workstation 3: [22, 23, 24, 25, 26, 27, 28, 29, 30]

Saving the new scenario as the current baseline...

**Last 4 hours**

--- Average Times per Task (Seconds) ---

Task01: 0.70 sec

Task02: 2.59 sec

Task03: 2.24 sec

Task04: 3.56 sec

Task05: 5.87 sec

Task06: 6.97 sec

Task07: 3.56 sec

Task08: 4.29 sec

Task09: 3.00 sec

Task10: 7.00 sec

Task11: 6.05 sec

Task12: 8.72 sec

Task13: 8.96 sec

Task14: 5.46 sec

Task15: 5.71 sec

Task16: 4.17 sec

Task17: 13.22 sec

Task18: 12.46 sec

Task19: 13.39 sec

Task20: 10.45 sec

Task21: 11.01 sec

Task22: 6.89 sec

Task23: 4.59 sec

Task24: 3.46 sec

Task25: 6.67 sec

Task26: 13.82 sec

Task27: 18.57 sec

Task28: 6.47 sec

Task29: 4.75 sec

Task30: 4.40 sec

Calculating learning rates (exponent b) for each TaskXX...

C:\Users\tternghaa's\AppData\Roaming\Python\Python310\site-packages\openpyxl\styles\stylesheet.py:237: UserWarning: Workbook contains no default style, apply openpyxl's default

warn("Workbook contains no default style, apply openpyxl's default")

Loading previous state (if any)...

Performing ILP-based balancing (all times in seconds)...

Comparing current balancing scenarios...

--- Comparison Results ---

Old Cycle Times (by workstation) [seconds]: [68.98, 70.4, 69.62]

New Cycle Times (by workstation) [seconds]: [68.98, 70.4, 69.62]

Old Total Time (Bottleneck) [seconds]: 70.40

New Total Time (Bottleneck) [seconds]: 70.40

--- Task Changes ---

No tasks moved between workstations.

--- Metrics ---

Time Saved per Hour [seconds/hour]: 0.00

Setup Time Cost [seconds]: 0.00

Learning Penalty [seconds]: 0.00

Time to Net Benefit: Never (no net benefit)

--- New Scenario Workstation Allocation ---

Workstation 1: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]

Workstation 2: [15, 16, 17, 18, 19, 20, 21]

Workstation 3: [22, 23, 24, 25, 26, 27, 28, 29, 30]

Saving the new scenario as the current baseline...

**Linear 1st scenario balancing at 4: iteration5**

--- Average Times per Task (Seconds) ---

Task01: 1.18 sec

Task02: 2.48 sec

Task03: 2.78 sec

Task04: 5.63 sec

Task05: 5.65 sec

Task06: 7.16 sec

Task07: 3.07 sec

Task08: 3.60 sec

Task09: 2.81 sec

Task10: 6.68 sec

Task11: 9.70 sec

Task12: 8.26 sec

Task13: 7.94 sec

Task14: 6.79 sec

Task15: 3.81 sec

Task16: 2.94 sec

Task17: 14.83 sec

Task18: 12.33 sec

Task19: 11.62 sec

Task20: 9.48 sec

Task21: 10.02 sec

Task22: 5.81 sec

Task23: 3.90 sec

Task24: 3.50 sec

Task25: 6.52 sec

Task26: 14.05 sec

Task27: 19.39 sec

Task28: 5.39 sec

Task29: 4.82 sec

Task30: 4.36 sec

Calculating learning rates (exponent b) for each TaskXX...

C:\Users\tternghaa's\AppData\Roaming\Python\Python310\site-packages\openpyxl\styles\stylesheet.py:237: UserWarning: Workbook contains no default style, apply openpyxl's default

warn("Workbook contains no default style, apply openpyxl's default")

Loading previous state (if any)...

Performing ILP-based balancing (all times in seconds)...

Comparing current balancing scenarios...

--- Comparison Results ---

Old Cycle Times (by workstation) [seconds]: [66.96, 71.81, 67.73]

New Cycle Times (by workstation) [seconds]: [66.96, 71.81, 67.73]

Old Total Time (Bottleneck) [seconds]: 71.81

New Total Time (Bottleneck) [seconds]: 71.81

--- Task Changes ---

No tasks moved between workstations.

--- Metrics ---

Time Saved per Hour [seconds/hour]: 0.00

Setup Time Cost [seconds]: 0.00

Learning Penalty [seconds]: 0.00

Time to Net Benefit: Never (no net benefit)

--- New Scenario Workstation Allocation ---

Workstation 1: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13]

Workstation 2: [14, 15, 16, 17, 18, 19, 20, 21]

Workstation 3: [22, 23, 24, 25, 26, 27, 28, 29, 30]

Saving the new scenario as the current baseline...

**Last 4 hours**

--- Average Times per Task (Seconds) ---

Task01: 0.96 sec

Task02: 3.89 sec

Task03: 2.61 sec

Task04: 5.03 sec

Task05: 5.06 sec

Task06: 7.85 sec

Task07: 3.78 sec

Task08: 4.05 sec

Task09: 3.59 sec

Task10: 6.17 sec

Task11: 7.83 sec

Task12: 8.12 sec

Task13: 8.79 sec

Task14: 6.46 sec

Task15: 3.95 sec

Task16: 3.65 sec

Task17: 15.36 sec

Task18: 13.68 sec

Task19: 13.40 sec

Task20: 10.05 sec

Task21: 10.08 sec

Task22: 7.07 sec

Task23: 5.01 sec

Task24: 3.52 sec

Task25: 7.02 sec

Task26: 14.72 sec

Task27: 19.31 sec

Task28: 7.27 sec

Task29: 4.83 sec

Task30: 4.42 sec

Calculating learning rates (exponent b) for each TaskXX...

C:\Users\tternghaa's\AppData\Roaming\Python\Python310\site-packages\openpyxl\styles\stylesheet.py:237: UserWarning: Workbook contains no default style, apply openpyxl's default

warn("Workbook contains no default style, apply openpyxl's default")

Loading previous state (if any)...

Performing ILP-based balancing (all times in seconds)...

Comparing current balancing scenarios...

--- Comparison Results ---

Old Cycle Times (by workstation) [seconds]: [67.72, 76.62, 73.17]

New Cycle Times (by workstation) [seconds]: [74.18, 70.16, 73.17]

Old Total Time (Bottleneck) [seconds]: 76.62

New Total Time (Bottleneck) [seconds]: 74.18

--- Task Changes ---

Workstation 1:

Added tasks: [14]

Workstation 2:

Removed tasks: [14]

--- Metrics ---

Time Saved per Hour [seconds/hour]: 118.14

Setup Time Cost [seconds]: 60.00

Learning Penalty [seconds]: 60.44

Time to Net Benefit [hours]: 1.02

--- New Scenario Workstation Allocation ---

Workstation 1: [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14]

Workstation 2: [15, 16, 17, 18, 19, 20, 21]

Workstation 3: [22, 23, 24, 25, 26, 27, 28, 29, 30]

Saving the new scenario as the current baseline...