Overall Labour Productivity

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Relates to version

Tags: 9.4

Overall Labour Productivity is a measure of the output of a worker compared to the expected output based on the hours worked and the standard labour costs of the work completed. Overall Labour Productivity is analogous to Overall Equipment Effectiveness (OEE) which is a common measure of production equipment performance.

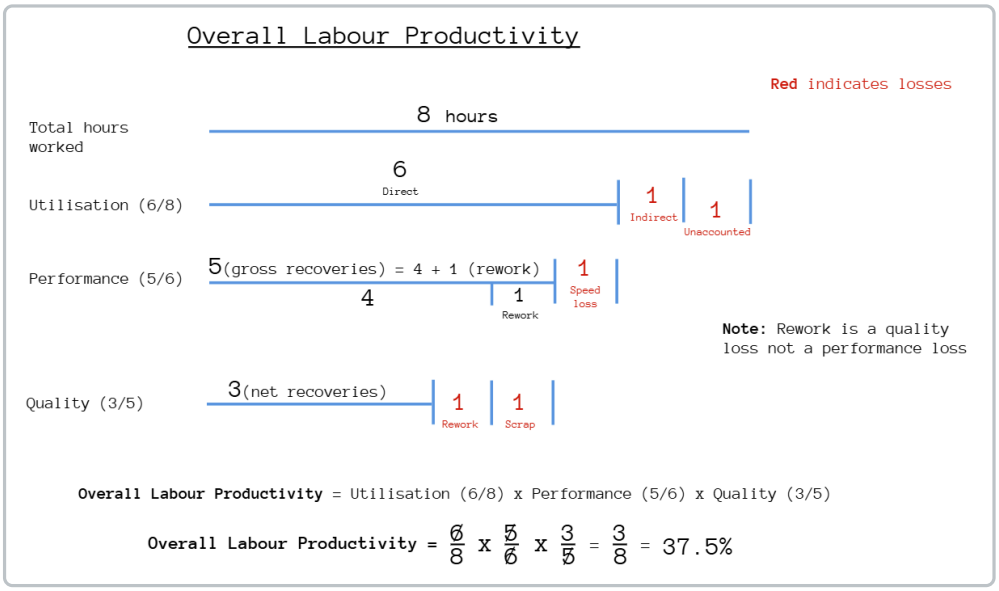
Productivity can be broken down into the following components:

- **Utilisation**: The proportion of paid hours that is booked to direct work. Utilisation is impacted by time lost to indirect activity and unaccounted time.
- **Performance**: The rate of production compared to the standard time for the work completed. Performance is impacted by speed losses.
- **Quality**: The proportion of recovered hours that are lost as a result of rework and scrap.

Key to productivity analysis is the concept of Labour Recoveries which is the standard time of the work completed.

In the example below a worker has:

- Worked 8 hours.
- Booked onto jobs for 6 hours of the day (direct time), spent 1 hour on non-productive time (indirect time) and 1 hour unaccounted for.
- During the 6 hours, completed 5 operations with a standard time of 1 hour each and so "recovered" 5 hours of work.
- Of the items completed, 1 was scrapped and hence there was a 1 hour "scrap recovery loss".



Calculation Details

A: Paid Working Hours: The hours a worker is paid for. Where Eyelit is not being used to manage pay, this is estimated based on the setting in the shift type configuration).

B: Direct Hours: The adjusted labour mins for direct activities associated with to a job.

C: Indirect Hours: The adjusted labour mins for indirect activities that are not associated with a job.

D: Unaccounted Time: The paid hours less hours accounted for by direct or indirect activity. (D=A-B-C)

E: Utilisation %: The proportion of paid hours that is booked to direct activity. (E=B/A)

F: Recoveries: The standard time of work that has been completed (see below for details of recovery calculations).

G: Rework: The adjusted labour mins booked to rework activity.

H: Gross Recoveries: The total time recovered including rework minutes and work that is subsequently scrapped. (H=F+G)

I: Speed Loss: The time lost due to not achieving standard times. (I=H-F)

J: Performance %: A measure of speed of production compared to standard times. (J=H/C)

K: Scrap Loss: The recoveries of work that was completed and subsequently scrapped.

L: Quality Loss: The lost time due to scrap and rework. (L=K+G)

M: Net Recoveries: The overall labour value of the work completed. (M=H-G-K)

N: Quality %: The proportion of Gross Recoveries that are not lost to scrap or rework. (N=M/H)

O: Overall Labour Productivity %: The overall labour value of the work completed as a proportion of the paid working hours. This is equal to Utilisation % x Performance % x Quality % (O=M/A=E x J x N)

Adjusted Labour Minutes

Labour performance calculations are made complicated by the fact that an operator may book to more than one job concurrently. For example if an operator books to two jobs at the same time for the duration of an 8 hour shift, it would not be appropriate to calculate productivity on the basis that they had worked 16 hours.

The adjusted labour minutes is a calculation for how actual hours are apportioned between jobs when a person books onto more than one job at the same time. It forms the basis for the productivity calculations. In the diagram above, the times displayed are based on the adjusted minutes not the elapsed minutes.

If a person is booked to multiple concurrent jobs, we divide the adjusted labour minutes between the two jobs in proportion to their standard time.

If the standard times for the two jobs were identical, they'll be divided 50/50. If for example, the standard time for job 1 was 10 minutes, and for job 2 was 60 minutes, and I booked on for an hour, then the actual time will be divided in the ration of 1/7 (for job 1) to 6/7 (for job 2).

Labour Recoveries

Labour recoveries are a measure of the labour value of work done and are used as a basis for productivity/efficiency reporting and analysis. Typically the value of the work done is based on the standard time for the operation completed and not the actual time spent on the job. For example, if an operation has a standard time of 10 minutes to complete and you complete it in 5 minutes, the user completing the operation would "recover" 10 minutes. Their performance would be calculated as the recovered minutes/actual minutes, i.e., (10/5)*100 = 200%.

Recovery Modes

The recovery modes define how credit is allocated for work completed and how to distribute it among workers where they work on the same job. You can specify the recovery modes on a workflow version when you create or edit a workflow.

Operation Completion

Operators are working together on a quantity. An example of this mode is where multiple operators over multiple shifts are contributing to a complex assembly, e.g., an industrial turbine.

Credit for completed work is shared among all people who booked time to the job, regardless of who recorded the operation completion. This means if multiple people worked on a job, the standard hours earned are divided proportionally based on their time booked. No one earns recoveries until the operation is fully completed.

In this recovery mode, you have to wait for the whole operation to be completed so it's not suitable for long-running jobs. It looks like you've earned no value of work until the operation is completed.

Actual Hours

Recoveries are earned for all actual hours accrued as soon as a period of activity is completed. This mode is appropriate for time and material jobs such as repairs, where all time spent is billable and credited.

Actual Hours up to Std Hours (Full)

This can be used for time and material jobs. Each person earns credit for the actual hours they book as they book it, up to the operation’s standard hours. Once the standard hours are reached, no further recoveries are earned, even if more time is booked. If the operation is completed before reaching the standard, the remaining credit is distributed at completion. So you're always earning the standard hours.

The correction that happens at the end of the operation, it doesn't only recover any leftover standard minutes, it also re-allocates between users. For example, operator 1 books 10 hours and gets 10 hours of credit, then operator 2 books 10 hours and gets 10 hours of credit, then operator 2 works a further 10 hours on the job because it's not finished yet. When the operation is finished, it works out what the completions would have been under the Operation Completion mode then it adjusts as follows: Operator 1 will get a negative recovery (as they were assigned to much credit at the time), and operator 2 will get a positive recovery (as they were not assigned enough recovery at the time). The whole operation will then be adjusted 1/3 to 2/3.

In this recovery mode, if a job exceeds standard hours hours, it assumes that people are 100% productive up to the standard hours. Beyond that, it appears as if they're 0% productive.

Actual Hours up to Std Hours (Limited)

This can be used for time and material jobs. Each person earns credit for the actual hours they book as they book it, up to the operation’s standard hours. Once the standard hours are reached, no further recoveries are earned, even if more time is booked. If the operation is completed before reaching the standard hours, the remaining credit is not distributed at completion.

In this recovery mode, people are motivated to leave their machine booked onto a job when they're not doing any work otherwise they do not get the full credit for it.

Item Completion Job Estimates

Recoveries are earned based on the "Unit Build Minutes" that are configure against the scheduled job. This overrides the standard times configured in the workflow. Recoveries are earned when an item/batch is completed and are credited to all users who booked time to the job in proportion to the actual hours accrued.

This mode is rarely used as typically a job-specific workflow would be configured to hold job-specific standard times.

No Recoveries

No labour recoveries are credited for the operation. This mode would typically be applied to rework or non-conformance workflows.

Op Qty Completion

Recoveries are earned as soon as a quantity for an operation is completed. The recovery is credited to the user who performs the completion. The first user to book a completion for an operation also earns recoveries for the standard set up time. This would be appropriate where operators all working on the same job concurrently and each operator is working independently on their own quantity. For example, one operator assembled a hundred, and the other assembled fifty.

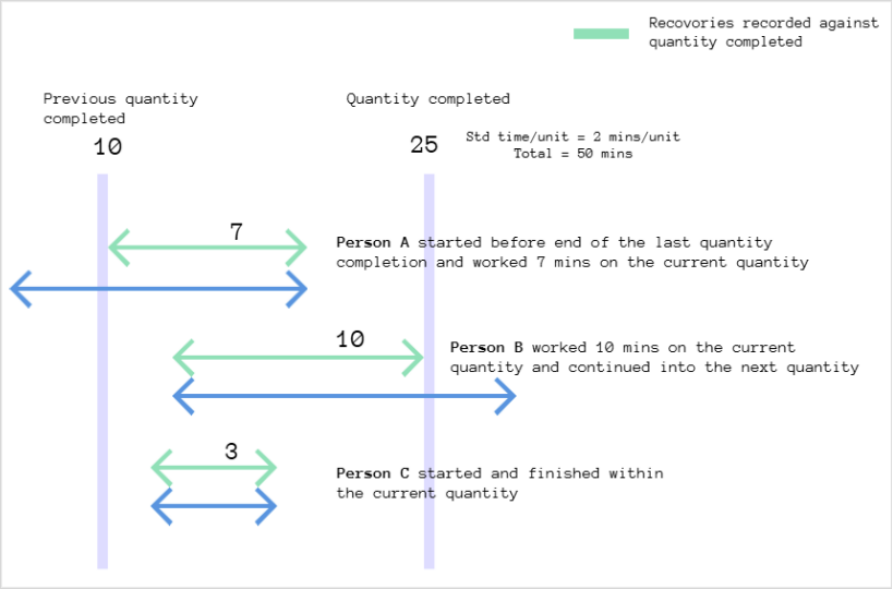
Op Qty Completion (Shared)

Operators are working together on a quantity. An example of this mode is where two operators are manning a single machine. The operators might change from shift to shift, but the operators during the shift are sharing the work.

This mode allows you to share recoveries amongst the people who worked on the quantity completed. Recoveries are earned as soon as a quantity for an operation is completed. The recovery is credited to all users who booked activity to the operation since the last quantity completion in proportion to the actual time accrued. The image below describes how recoveries are shared for this mode:

The image below describes how recoveries are shared where 3 people worked a total of 20 minutes on the quantity completed.

The total labour minutes recorded between the two partial completions (10 and 25).



The following calculations are based on the diagram above:

- Std time/unit = 2 mins/unit
- Total recoveries for the 25 items completed = std time * qty complete = 2 * 25 = 50 mins
- Recoveries distributed between all the people working on those 25 items are as follows:
- Recoveries per person:
    - Recoveries for person A = (time worked by person A between qty completions) / (total labour for all people between the qty completions) * Total Recoveries

      Person A = (7 / (7+10+3)) * 50 = 17.5 mins
    - Person B = (10 / 20) * 50 = 25 mins

- Person C = (3/20) * 50 = 7.5 mins
