

Article # 1113

Technical Note: Calculating Production Cost and Variances in Manufacturing

Difficulty Level: Intermediate Level AccountMate User

Version(s) Affected: AccountMate 9 for SQL, Express and LAN
AccountMate 8 for SQL, Express and LAN
AccountMate 7 for LAN

Module(s) Affected: MI, IC

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DESCRIPTION

The calculation of production cost and variances is important to assess cost effectiveness and production efficiency in a manufacturing firm. This document will explain the method by which production cost and variances are calculated in AccountMate and how these calculations affect the **Production Variance Report**.

SOLUTION

Machine and Labor Component Costs

Assume the following information in the **Bill of Materials** record for the parent item **Table LEG SCTN A11C**:

Machine and Labor

Step #	Item #	Component	Uptime Cost (Setup Time/Cost)	Downtime Cost (Teardown Time/Cost)	Qty per Hr	Machine/Labor Cost per Hr
1	Milling Machine1	Machine	0:05 - \$9.50/hr	0:05 - \$8.75/hr	15	\$8.75
1	Table Saw	Machine	0:05 - \$8.50/hr	0:05 - \$6.75/hr	15	\$6.30
2	Rotary Sander	Machine	0:05 - \$2.50/hr	0:05 - \$2.00/hr	15	\$2.80
2	Vibrating Sander	Machine	0:05 - \$2.00/hr	0:05 - \$1.50/hr	15	\$2.00
1	Milling Machine Operator	Labor	0:05 - \$22.00/hr	0:05 - \$17.00/hr	15	\$17.00
1	Sawyer	Labor	0:05 - \$12.00/hr	0:05 - \$10.00/hr	15	\$10.00
2	Sanding Labor	Labor	0:05 - \$15.00/hr	0:05 - \$12.75/hr	15	\$13.75

Inventory

Item #	Qty Required	Standard Cost	Average Cost
Walnut Stock 10x6x3	1	44	45.77

Procedure

1. Create a work order to manufacture one (1) unit of Table LEG SCTN A11C.
2. Explode the work order. Be sure to exclude the Uptime and Downtime costs.
3. Post Work-In-Process By WO # for the work order.
4. Post Finished Job By WO# for the Work Order; then, change the Mfg Time of Milling Machine 1 and Sawyer to 6 minutes.

Note: Standard and Actual Costs for machine and labor components are calculated on an hourly basis regardless of the number of units specified in the work order.

Calculation: Cost and Quantities

Based on the illustration above, the following values are calculated:

Standard Qty

Formula	With Substitutions	Interpretation
$\frac{60 \text{ (# of min per hour)}}{\text{Qty/Hr (per BOM)}}$	$\frac{60}{15} = 4 \text{ mins.}$	4 minutes of Milling Machine time is required to produce one (1) unit of Table LEG SCTN A11C.

Actual Qty

This is the value entered in the **Mfg. Time** column of the **Post Finished Jobs** function. If no changes are made in this column, the standard and actual quantities are the same.

Standard Cost

When a work order is created, AccountMate calculates the hourly standard costs using the quantities specified. The formula below is used to calculate standard cost:

$$\frac{[(\text{Upcost} * \text{Uptime} + (\text{Dncost} * \text{Dntime}))] + [\text{machcost} * (\text{mfgtime} - \text{uptime} - \text{dntime})]}{\text{Mfgtime}}$$

Where:

- Upcost = Uptime cost per BOM
- Dncost = Downtime Cost per BOM
- Uptime = Uptime per BOM
- Dntime = Downtime per BOM
- Machcost = Machine Cost per hour (Machine Maintenance function)
- Mfgtime = Standard Quantity

The standard cost for **Milling Machine 1** substituting the values in the formula above is:

$$\frac{[(9.5 * 0) + (8.75 * 0)] + [8.75 * (4 - 0 - 0)]}{4} = \$8.75$$

Note: The up and down times have zero values because, in our example, we exclude Uptime and Downtime costs when exploding the work order.

Actual Cost

The formula below is used in calculating actual cost:

$$\frac{\text{round}[(\text{Act. Mnfg Time} * \text{SC}) / 60] * 60}{\text{Act. Mnfg Time}}$$

Where:

Act. Mnfg Time = Actual Manufacturing Time (Actual Qty)
SC = Standard Cost

The actual cost for **Milling Machine 1** substituting the values above is:

$$\frac{\text{round}\left[6 * \frac{8.75}{60}\right] * 60}{6} = \$8.80$$

Inventory Component Costs

Inventory component costs calculation is not as complicated as that for machine and labor components. Please refer to the table below:

Cost/Qty	Derived From
Standard Cost	Standard Cost field of the Inventory Maintenance function.
Actual Cost	Average Cost field of the Inventory Maintenance function
Standard Qty	Qty Use column of the Bill of Materials function
Actual Qty	Qty Use column of the Post Finished Job function.

Calculation: Production Variances

AccountMate follows this basic production cost variance formula:

$$\text{Production Variance} = (\text{SQ} * \text{SC}) - (\text{AQ} * \text{AC})$$

Where:

AQ = Actual Quantity
AC = Actual Cost
SQ = Standard Quantity
SC = Standard Cost

Based on the illustration above, the following production variances are calculated:

Machine and Labor Production Variances

The formula below is used to calculate machine and labor production variances:

$$\frac{(\text{SQ per unit} * \text{Standard Rate per Hr})}{60} - \frac{(\text{AQ per unit} * \text{Actual Rate per Hr})}{60}$$

Production variance for **Milling Machine1** is calculated as follows:

$$[(0:04 * 8.75) / 60] - [(0:06 * 8.80) / 60] = \$0.30$$

Production variance for **Sawyer** is calculated as follows:

$$[(0:04 * 10.00) / 60] - [(0:06 * 10.00) / 60] = \$0.33$$

Inventory Production Variance

Using the formula, **Production Variance = (SQ*SC) – (AQ*AC)**, production variance for item #**Walnut Stock 10X6X3** is calculated as follows:

$$(1 * 44.00) - (1 * 45.77) = \$1.77$$

Cost Variance

Cost variance is calculated by obtaining the difference between the standard and actual rates per hour (SR-AR); hence, substituting the values given earlier, the cost variance for **Milling Machine 1** is as follows:

$$\$8.75 - \$8.80 = \$0.05$$

Production Variance Report

The production costs and variances calculated above are displayed in the **Production Variance Report** illustrated below.

Job #	Component #	Description	Step	Actual Qty	Standard Qty	Qty Variance	Actual Cost	Standard Cost	Cost Variance	Prod Variance
Work Order #: 100012										
1000000021	MILLING MACH OPER	Milling Machine Operator	1	0:04	0:04	0:00	16.95	17.00	-0.05	0.00
1000000021	MILLING MACHINE 1	Sorenson MM	1	0:06	0:04	0:02	8.80	8.75	0.05	0.30
1000000021	ROTARY SANDER	Ralston Rotary DeLux R31	2	0:04	0:04	0:00	2.85	2.80	0.05	0.00
1000000021	SANDING LABOR	Labor to sand parts	2	0:04	0:04	0:00	13.80	13.75	0.05	0.00
1000000021	SAWYER	Labor to cut wood	1	0:06	0:04	0:02	10.00	10.00	0.00	0.33
1000000021	VIBRATING SANDER	Acme VibroMaster 623A	2	0:04	0:04	0:00	1.95	2.00	-0.05	0.00
1000000021	WALNUT STOCK 10X6X3	10' x 4' x 3" Fine Walnut Stoc	1	1.00	1.00	0.00	45.77	44.00	1.77	1.77
100012: 7 Record(s)									Total for 100012 :	2.40
Report: 7 Record(s)									Total for this Report :	2.40

The sample calculations presented in this document are intended to help you better understand the method by which AccountMate determines the production cost and variances that appear in the **Production Variance Report**. This document may also serve as a guideline to help you identify the fields and settings in each item component that affects production cost and quantity, which become the basis for calculating the cost and production variances.

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