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Spoilage, the Fourth Factor of Cost

BY FREDERIC W. KILDUFF

One of the many results caused by the present war has been the attempted production by many firms and corporations of a product concerning which they knew little or nothing. The result of this lack of knowledge and experience is reflected in many profit and loss statements by the small profits—where the accounting was correct accounting—or by fictitiously large profits—where the accounting was not correct. The loss of earnings was due to spoilage.

If one should take a small piece of steel and, after expending a given amount of labor on it and using a certain amount of power or oil or any other or all of the items that go to make up overhead, should then spoil it, the loss would not be the original cost of the material only. It would be the original cost of the material, plus the cost of the labor expended, plus the overhead expense incurred, less, of course, the small residual value that the material itself would have in the form of scrap.

Letting "a" equal the original cost of the material, "b" the cost of the labor expended, "c" the overhead incurred and "d" the residual scrap value of the spoiled piece of steel, then,

$a + b + c =$ the cost of the article up to the point where it was spoiled.

And as

$d =$ the residual value of the spoiled article,

then,

$(a + b + c) - d =$ loss due to the work's being spoiled, or "L."

It follows from this formula that the further the work progresses before being spoiled the greater "b" and "c" will have become; and as "a" remains the same (in cost) and "d" also (although "d" usually decreases), it follows that the nearer completion an article of production is before it is spoiled the larger "L" becomes.

During the process of making this article, a small amount of the steel is consumed in turning, shaping, planing, etc. This

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material is necessarily wasted to bring about the final product. Its value in the scrap bin we can designate as "W," which letter we shall now use in the following new formula:

$$(a+b+c)-(d+W) = "L," \text{ or absolute loss due to spoilage.}$$

In the above example of the piece of steel, suppose that the article is not spoiled but, instead, is completed in a satisfactory manner. Our entire debits to the goods-in-process account would then be $a+b+c$, while the credit would be "W," the account standing in this form:

Goods-in-process account

(a) material	(W) value of scrap
(b) labor	
(c) overhead	

If perhaps, as is most customarily done, "W," instead of being credited to the goods-in-process account, is finally closed into (c) overhead, the account would stand in this form:

Goods-in-process

(a) material	
(b) labor	
(c-W) overhead	

From the above, then, we see that in reality waste that is salable is a deduction from the total cost, since all material started is considered as the material cost. It would be possible, no doubt, to deduct, from the original material charge, the scrap value of the waste and treat the difference as the prime material cost, but practically and for economical reasons this is not done and instead it goes into the overhead account as a credit.

Waste, then, is that material necessarily consumed in the process of completing and finishing the product to be made. Its value as scrap is a credit to the overhead account.

So much for waste. Now let us refer to paragraph two and consider spoilage. Up to the point where the piece of steel was spoiled the account would be as follows:

Goods-in-process

(a) material	
(b) labor	
(c-W) overhead	

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At this point the piece of steel, one-half or three-quarters completed, is spoiled. Perhaps it is the workman's fault; perhaps it is the fault of the machine; but that does not concern us. What we want to know is how it affects the accounting. From an article of production the spoiled piece of steel has become so much scrap; from a value of $a+b+(c-W)$ it has been reduced to (d); the absolute loss is "L." As a result of this spoilage, our goods-in-process account must be reduced by the amount of the charges that have accrued on this spoiled piece. Hence a credit to the goods-in-process account and a charge to some expense account which we shall call spoiled goods account must be made. If now the spoiled piece was sold as scrap the accounts would perhaps look as follows:

	Goods-in-process	Spoiled goods	Cash
(a) material	(a)	(a)	(d) (d)
(b) labor	(b)	(b)	
(c-W) overhead	(c-W)	(c-W)	

What is to be done with this spoiled goods account at the end of a financial period? Is it to be closed into overhead and thus find its way back into goods-in-process account or is it to be kept entirely separate from overhead and thus be treated as a fourth factor of cost or a direct profit and loss charge? There are two answers to this question, each governed by the surrounding facts.

First, if the spoilage is normal, the loss "L" can be closed out of the spoiled goods account into the overhead account and thus back into the goods-in-process account. By normal we mean that the percentage of spoilage is nearly identical with that of experienced manufacturers of the same product.

Second, if the spoilage is abnormal and entirely out of proportion in its percentage when compared with other manufacturers, it is not good accounting to close the balance of the spoiled goods accounts into the overhead account whence it will get into goods-in-process, which in due course is bound to be absorbed in the cost of the finished product. If the accounting methods of a manufacturing plant permit of such a deferring of loss it is apparent even to the uninitiated that an inflated value is brought about.

Surely it is a fact that the product spoiled is worth only what the material will bring as scrap. Why, then, can we venture to deceive ourselves and allow the labor and overhead accumulated, up to the point where the product is rendered unfit, to be considered as having any value? But we do deceive ourselves, and we do consider labor and overhead on spoilage as at their original value—but in another form—if we allow our overhead account to absorb any portion of abnormal spoiled work other than the scrap value of the material only.

In one large manufacturing concern where there had occurred a tremendous amount of spoilage in munitions, it was found upon analyzing the overhead account that the loss on every piece of spoiled work had been charged to that account.

At this point one might suggest that even if the loss on abnormal spoilage did find its way into the goods-in-process account through the overhead account, and thence to the finished goods account, this additional cost would decrease the profits to the amount of the charge included. No doubt this would be true, but this reasoning is not a logical excuse for permitting the goods-in-process account or the finished goods account to be shown on the balance-sheet at inflated values. And again, so far as a reduction of profits is concerned, it would be taken care of when the loss occasioned by the spoilage was deducted directly from the profits or added as an additional cost before net profits were ascertained.

The reason for mentioning the alternatives—treating loss on abnormal spoilage as a profit and loss charge or as a fourth factor of cost—lies in the fact that there can arise two conditions, each one necessitating a different method of disposal. If a manufacturer producing commodities on a cost-plus-fixed-profit basis, by hiring inexperienced labor or by operating inferior machines, brings about a spoilage in product far above what is normal, it is a foregone conclusion that this extra charge or loss should never be considered as an element of cost, to say nothing of the profit, based on cost, that would accrue at its inclusion. The correct method of treatment in this case is to charge it directly to profit and loss.

Where the cost-plus-fixed-profit basis does not exist in a manufacturing concern, but the product is sold in the ordinary

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way on straight order and sale basis, the abnormal spoilage should be considered as an additional cost of production distinct from material, labor or overhead; and, although it can be shown on the income statement as an additional element of cost, in the ledger it should never pass into the goods-in-process account. Instead it should go directly to the profit and loss account, for there is no reason for deferring the charge to a later period. The loss—the measure of inefficiency—should penalize the period. The entire balance should be absorbed.

The fallacy of letting overhead absorb spoilage can perhaps be brought out more clearly if hypothetical cases be assumed. Three shells are started in process simultaneously. The first shell, cut down to a smaller size than allowance permits, is spoiled. The second one for another reason is rendered unfit for further work and is scrapped. As a result, the cost to the point where shells No. 1 and No. 2 are spoiled is absorbed in the overhead charge to No. 3. If now a financial statement were desired, would it be right or proper accounting to consider for balance-sheet purposes that No. 3 represented in value the charges made to it? Would the overhead charge to No. 3 represent actual value?

To sum up all the foregoing: waste and spoilage are not to be considered similar from an accounting standpoint, although in the final analysis both will represent the value of scrap. Spoilage is divided into normal and abnormal. Waste and normal spoilage are correct additions to manufacturing overhead. Abnormal spoilage is not, but instead passes directly into the profit and loss account in the ledger, while in the income statement it may be found in the profit and loss section when the business is on a cost-plus-fixed-profit basis or in the cost of goods section, as a fourth factor of cost, if the business is on the ordinary sales basis.