The importance of record accuracy

- Why have accurate records?
- What accuracy do we need?
- Identifying the objectives
- How to measure accuracy
- Accuracy targets
- Record pro formas

Why have accurate records?

The changes to leaner business over the last few years have necessitated major improvements in efficiency, leading to better communication and low inventories with requirement for more timely and more accurate data. Businesses are striving for better quality in all products, and processes and inaccuracies can no longer be hidden by extra stockholding. The data accuracy problem has become a major challenge. This is an area where continuous improvements must be made and standards increased.

Records accuracy is the responsibility of those who control the physical inventory, not only for their own benefit but also for that of the whole organization. Departments far from the source of the records are making decisions assuming that the data on the records is correct – they have to trust the accuracy of those records, since it is highly inefficient (and therefore costly) to have to check each time before acting.

Gradually systems have become more integrated, and the use of any piece of data is now more universal and automatic. Separate records for each inventory area have been melded together, so that in a supply chain there may be a view of many stages of supply. These could be (and often are) different companies at different locations. Each relies on data received from elsewhere to support the next stage in the supply chain. There is little room for incorrect information if demand is to be satisfied effectively.
The development of integrated logistic and manufacturing planning systems (including JIT, DRP, ERP, MRP and APS) has to rely on large numbers of records being correct. Without a high level of accuracy the whole planning process could become invalid, and a large amount of extra work ensue in reacting to problems. Improving the accuracy is a normal, continuous process, starting with the ‘worst’ records and employing a variety of techniques that have been developed by the author to give effective results.

**What accuracy do we need?**

What is the problem? If the records are inaccurate and it is not causing a problem, then it is not worth improving accuracy until it becomes a significant issue. Normally it is in fact an issue, but people have learned to live with it. Record inaccuracy manifests itself when:

- there is no inventory available to service the customer
- someone lights upon a large quantity of items which no-one knew were there
- there is a stocktake discrepancy which displeases the auditors.

Often the impetus for accuracy improvement results from financial discrepancies at stocktaking, rather than from operational people who are used to living with the situation.

The need for accuracy stems from one of these three causes. Initially the aim is to make the data sufficiently accurate so that they do not hamper the operations of the business. We always aim for perfection, but in the short term we will make do with ‘much improved’!

A purist will argue that records need to be exact. For many items this is true: if the number of playing cards in a pack is not 52 plus jokers, then for many games the pack is useless. For some items the situation is less than clear. How much sugar do you have in your drink? The answer may well be ‘one spoonful’. The response is unlikely to be either ‘I need to know the spoon
Improving Inventory Record Accuracy

size before I can tell you’, or ‘23704 grains of 0.15 mm diameter’. The latter answer could be essential for making a product like sandpaper, but in the context of making a beverage we are not that exact. Why? Because it is not necessary. The user has a band of acceptability (tolerance), and as long as the quantity falls within that band, then there is no problem.

The first objective is therefore to ensure that the accuracy of the records meets the current requirements for customer service, financial control of investment, and losses arising when unidentified excess stocks are discovered and written off.

Identifying the objectives

Once it has been agreed that there is a requirement to improve record accuracy, the first step is to establish the objectives of the development. Then we have to quantify how much improvement is needed where, and by when.

If accuracy is measured by value, the result is an averaging of individual discrepancies across all inventory items. This means that there can be major discrepancies on each item, which may balance out. (The accountancy balancing of stock values is discussed in Chapter 8.) The focus for proper accuracy control should therefore be to maintain correct records at item level. In practice, experienced inventory controllers will exert more effort on ensuring the accuracy of high turnover value lines because of the normal inventory policy and the effect on customer service.

In order to determine whether the records are good enough, the first step is to decide what is meant by record accuracy. The practical answer may differ from the theoretical one. It could be:

- the least number of discrepancies
- the least size of discrepancies
- the least value of discrepancies.

In reality the best measure is a combination of all three, which is achieved by classifying items into bands (big, medium and small) or into finer sections.

There is also the question of what is really meant by accurate records. Is it:

1. Having everything exactly the same in the records as in the stores?
2. A general agreement in the value of recorded and physical stocks?
3. Ensuring that major items have record agreement?
4. Allowing a margin of error but not major discrepancies?
5. Having records that enable sufficiently correct data to be used for the business?
6. Avoiding adverse comment by auditors or the need for re-checking?
7. Ensuring that customers are fulfilled on time, or on time in full?
8. Having a working environment where auditing is unnecessary?

Measure accuracy to suit the business operations – not to suit the auditors.

The basic requirement for record accuracy is to be able to operate the activities of the company with a negligible amount of disruption from inaccurate records. If the system is poor and inventories are high, inaccurate records may be accepted – although, of course, the company may well run out of cash as a result. With better systems, professional recording of inventory is required and accuracy needs to be good for everyone to have confidence in the data. In most businesses there has been increased competitive pressure, leading to a reduction in stock levels and a greater need for accurate records. At the same time, the number of people available for controlling and checking has been reduced.

One of the major causes of panic in inventory management arises when the store is empty but the record says there are still plenty of goods. For the distribution chain, the identification of which goods are available and provided to each customer can be a challenge. For manufacturers, the mis-recording of batch quantities means that they are constantly overriding the plan, so the capacity planning and shop priorities are not defined properly. In the worst cases, the whole system becomes driven by shortage lists – all because the records are not good enough.

Of the options suggested above, the required accuracy option (5) is probably the best. Option (1) is overkill, and option (6) might be good enough for the shareholders, but not good enough to meet the demand for a specific item. Example 1.1 provides an illustration of the suitability of various accuracy options.

Example 1.1

A builder's merchant had a wide variety of stocks to be managed, one of which was sand, which was bought by the lorry load and sold by the bag. Examining the heap was not very helpful in defining the amount in stock, since the weight and shape of the heap depended on whether it had rained recently; the weight delivered varied for the same reason. The process of issuing sand was either to use a spade
How to measure accuracy

The principle to adopt is to have records where accuracy is high enough to be very satisfactory for the users, but without wasting resources on minuscule differences. The approach used for the heap of sand in the above example would have been somewhat different if the material in question were gold dust! It is very likely that, having improved the accuracy of
records, other aspects of the operations can also be improved. As a result there is a benefit to efficiency, and the onus is again to gain greater accuracy.

It is stated that, for successful operation of the closed-loop systems for supply and control of inventory (including ERP), records have to be 95 per cent accurate. What does this mean, and how should it be measured?

The measurement of record accuracy should be based upon the focus of interest (see (1) to (8) above). The specific measurements can be based on:

- value inaccuracy
- problems arising on issues (e.g. stockouts)
- stock-check discrepancies.

In our measurement of availability for customers (delivery-on-time performance), analysis should identify the proportion of stockouts that are caused by inaccurate records. This is the important measure, since it focuses on the items that are really required by the customers – and thus will have the most detrimental effect on the business.

More commonly, accuracy is measured by discrepancies during stock checking – especially if perpetual inventory checking is being carried out (for a discussion of perpetual inventory checking, see Chapter 9).

The ultimate is to have 100 per cent accuracy during stock checks. What is 100 per cent accuracy? Zero defects. The discussion of the sand heap exemplifies the need for a concept of ‘tolerance’. When measuring or manufacturing anything, there is a ‘margin of error’. A signpost may say ‘Picnic site 100 m’. It could be 1 mm more than that, but there is an accepted tolerance. If a measure is 10 m, there is an inferred tolerance of, say, 1 m. In engineering, the ‘tolerances’ are agreed or stated explicitly – e.g. ‘±0.001 mm’.

The same principle can be used in measuring stock quantity. The tolerance allowed for stock can be considered as an absolute quantity (e.g. ±5 units) or as a percentage of the stock quantity (e.g. ±3 per cent). A percentage discrepancy will automatically compensate for the problems with high volumes of products. Taking an example where any stock within 1 per cent is to be considered ‘accurate’, then:

- a stock of 40 items needs to be dead on
- a stock of 100 items needs to be within ±1
- a stock of 1000 items needs to be within ±10
- a stock of 100,000 items needs to be within ±1000.
Which is the best method of allowing tolerance is open to discussion, since it may be better to have records that are more accurate as stock is used up (which the percentage tolerance measurement does do). This reflects our real concern about running out of stock. The smaller the stock, the more accurate the count needs to be in practice. (This technique has less appeal to the accountant, who wants to reflect the total value of stock investment – not the risk of failing to meet demand.)

Consider a sample stock check of 25 items, which gives the results shown in Table 1.1. Which is the worst discrepancy? It depends on whether it is value, customer service, usage rate or some other factor that is most important (e.g. item 19 has a 30-week supply lead time).

<table>
<thead>
<tr>
<th>Check no.</th>
<th>Part no.</th>
<th>Physical stock</th>
<th>Recorded stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
<td>819</td>
<td>853</td>
</tr>
<tr>
<td>2</td>
<td>34</td>
<td>56</td>
<td>55</td>
</tr>
<tr>
<td>3</td>
<td>35</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>4</td>
<td>54</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>56</td>
<td>12</td>
<td>58</td>
</tr>
<tr>
<td>6</td>
<td>66</td>
<td>1</td>
<td>-1</td>
</tr>
<tr>
<td>7</td>
<td>67</td>
<td>1040</td>
<td>1132</td>
</tr>
<tr>
<td>8</td>
<td>67</td>
<td>446</td>
<td>445</td>
</tr>
<tr>
<td>9</td>
<td>68</td>
<td>468</td>
<td>468</td>
</tr>
<tr>
<td>10</td>
<td>71</td>
<td>774</td>
<td>774</td>
</tr>
<tr>
<td>11</td>
<td>89</td>
<td>650</td>
<td>661</td>
</tr>
<tr>
<td>12</td>
<td>131</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>13</td>
<td>234</td>
<td>342</td>
<td>356</td>
</tr>
<tr>
<td>14</td>
<td>245</td>
<td>184</td>
<td>200</td>
</tr>
<tr>
<td>15</td>
<td>320</td>
<td>50</td>
<td>54</td>
</tr>
<tr>
<td>16</td>
<td>321</td>
<td>124</td>
<td>24</td>
</tr>
<tr>
<td>17</td>
<td>388</td>
<td>51</td>
<td>50</td>
</tr>
<tr>
<td>18</td>
<td>456</td>
<td>196</td>
<td>210</td>
</tr>
<tr>
<td>19</td>
<td>600</td>
<td>520</td>
<td>500</td>
</tr>
<tr>
<td>20</td>
<td>676</td>
<td>644</td>
<td>644</td>
</tr>
<tr>
<td>21</td>
<td>729</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>22</td>
<td>774</td>
<td>1100</td>
<td>1973</td>
</tr>
<tr>
<td>23</td>
<td>811</td>
<td>2625</td>
<td>2549</td>
</tr>
<tr>
<td>24</td>
<td>872</td>
<td>87</td>
<td>91</td>
</tr>
<tr>
<td>25</td>
<td>983</td>
<td>61</td>
<td>66</td>
</tr>
</tbody>
</table>

In practice, there is a standard approach to measuring accuracy once a stock check has been done:

1. The items are classified by their turnover value into three or more classes. This takes into account the cost and usage rates of the items (see next section and Chapter 9).
THE IMPORTANCE OF RECORD ACCURACY

2. Next, the size of the discrepancy is measured as a percentage of quantity

\[
\% \text{ Discrepancy} = \frac{\text{Quantity on record} - \text{Quantity in stock} \times 100}{\text{Quantity on record}}
\]

3. To back this up there is a limit on value discrepancy for each line, where:

\[
\text{Value discrepancy} = \text{Unit stock value} \times (\text{Quantity on record} - \text{Quantity in stock})
\]

If the value discrepancy is greater than a figure agreed by the accountants, then it is treated as a problem.

(As was pointed out previously, some stock will be greater than the record quantity and some lower; as the errors compensate, the financial view of stock accuracy is more positive than the operational view.)

Keep a regular sample check for accuracy.

The process for measuring stock accuracy is therefore to create records of significant discrepancies regularly, using either picking or inventory checking as a basis (or both), and to measure the quantity and size of inaccuracies observed. These should be totalled by category so that an overall figure of accuracy can be measured.

**Accuracy targets**

Once the objectives for accuracy and methods of measuring have been established, the criteria need to be quantified. An overall measure of the inventory accuracy should be maintained as a management key performance indicator. This in turn should consist of sub-targets for different classes of inventory.

Items are initially classified in terms of turnover value (unit cost multiplied by usage quantity). Normally three classes are identified:

A. A few highest turnover value items – minimal errors allowed
B. Medium turnover value items – small tolerance
C. Low turnover value items (most of the items) – reasonable tolerances allowed (the majority of items will fall into this class).

(The definition of ABC is given in more detail in Chapter 9.)

The rationale behind the tolerances is that, with a limited amount of time available, it is better to concentrate on the valuable items, because these
have the greatest effect on stock value and customer service. The purchase of extra C-class stock (such as sand, if it is not used in great volume) reduces the need for very accurate records without significant additional cost. There are two aspects of stock accuracy to consider:

1. How wide are the tolerances?
2. How many records are within the tolerance?

These two ‘degrees of freedom’ mean that the results could be viewed in many ways. Figure 1.1 illustrates this, using the data from Table 1.1. If the tolerance is set at ±30 per cent, then 21 of the records are within tolerance, and so the records are 84 per cent accurate (see Table 1.2). This is rather a generous tolerance, but if the acceptable range is ±2 per cent, then only 44 per cent of the records are correct.

![Figure 1.1 Stock accuracy: the ‘two degrees of freedom’](image)

**Table 1.2** Analysis of sample accuracy

<table>
<thead>
<tr>
<th>Tolerance (%)</th>
<th>No. of items included</th>
<th>Accuracy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exact</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>±2</td>
<td>11</td>
<td>44</td>
</tr>
<tr>
<td>±5</td>
<td>16</td>
<td>64</td>
</tr>
<tr>
<td>±10</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>±30</td>
<td>21</td>
<td>84</td>
</tr>
<tr>
<td>±100</td>
<td>23</td>
<td>92</td>
</tr>
<tr>
<td>&gt;100</td>
<td>25</td>
<td>100</td>
</tr>
</tbody>
</table>

This is a situation where continuous improvement is essential. If the tolerances are set too tightly, then so many records are wrong that it is difficult
to start correcting them. Thus, initially the tolerances should be set wider so that work can start on the really bad ones and remedial action initiated. Therefore the targets set for accuracy depend upon how accurate the records are at present. The idea is to set targets that can be achieved in the next few months, and then gradually tighten the targets.

**Set targets which are practical but challenging.**

With the records in Table 1.2, the initial aim could be to get 90 per cent of records within 5 per cent of the stock quantity. As the requirement is dependent on item class, then the targets for stock should be of the form shown in Table 1.3.

<table>
<thead>
<tr>
<th>Class</th>
<th>Tolerance (%)</th>
<th>Items within tolerance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1</td>
<td>97</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>90</td>
</tr>
<tr>
<td>C</td>
<td>5</td>
<td>80</td>
</tr>
</tbody>
</table>

The record accuracy assessment is then given by:

\[
\% \text{ Record accuracy} = \frac{\text{No. of records within limits} \times 100}{\text{Total no. of records counted}}
\]

The assessment can be made on a sample, during a stock check, on the issues, or in any other way. A significant number of different lines should be used in quantifying the accuracy – normally 20 is taken as a minimum, but the more data used, the more accurate the result. It is usual to choose different items to count each time, otherwise there may be a few accurate records and many uncounted and inaccurate ones. It is not necessary to concentrate entirely on the high value stock, since the causes of inaccuracy are probably the same throughout all inventory items and the aim is to detect and eliminate the causes of error.

Measurement needs to be made regularly and analysed each time to give the performance indicator. Then trouble should be taken to find the cause of the errors so that they can be avoided.

Once the accuracy target has been achieved or exceeded for several weeks, it can then be tightened. This should be done either by increasing the number of items required to fulfil the tolerances (e.g. in Table 1.3 increasing the 90 per cent of B-class items within tolerance to 95 per cent)
or tightening the tolerances (e.g. in Table 1.3, decreasing the tolerance on A-class items from 1 per cent to 0.5 per cent).

Record pro formas

The process of recording and analysing inventory accuracy should be a formal system. If it works properly and is not over elaborate, then the formal system should be the most efficient way to operate.

The system needs:

1. An inventory checking sheet
2. A programme for planning what items are checked when
3. An analysis of accuracy
4. An action sheet showing progress on improving accuracy
5. A process description of how to carry out the tasks involved and who should do it.

Typical layouts are shown in Tables 1.4 and 1.5, and Figure 1.2.

Table 1.4  Stock check record

<table>
<thead>
<tr>
<th>Date</th>
<th>Item code</th>
<th>Item description</th>
<th>Location 1 Qty</th>
<th>Location 1 Pack size</th>
<th>Location 2 Qty</th>
<th>Location 2 Pack size</th>
<th>Location 3 Qty</th>
<th>Location 3 Pack size</th>
<th>Total</th>
</tr>
</thead>
</table>

If the system is set up conveniently, then the information of what to count, the item codes, descriptions and locations will be pre-printed on the record (Table 1.4). The checker then has only to fill in the quantity and pack size. It is better if this information is then fed back in the raw state into a computer system, which then calculates the total from this data. It is important that the recorded quantity is not on the checking sheet.

It is no use measuring accuracy if you are not going to do anything about it.

The form shown in Table 1.5 should be used to monitor this process. Obtain and fill in the current data, then set achievable targets that should be monitored and reviewed regularly, and reset (tightened!) at the date indicated.
Table 1.5 What accuracy do you want?

<table>
<thead>
<tr>
<th>Type of item</th>
<th>Tolerance of accuracy %</th>
<th>Within tolerance %</th>
<th>Date to be achieved by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current value</td>
<td>Target value</td>
<td>Current value</td>
</tr>
<tr>
<td>A  Major turnover value items:</td>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>(high value/high volume)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B  Medium turnover value items:</td>
<td></td>
<td></td>
<td>B</td>
</tr>
<tr>
<td>(high value/low volume)</td>
<td></td>
<td></td>
<td>(low value/medium volume)</td>
</tr>
<tr>
<td>C  Low turnover value items:</td>
<td></td>
<td></td>
<td>(low value medium movers)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(high value occasional use)</td>
</tr>
<tr>
<td>O  Non-movers:</td>
<td></td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>Obsolete items</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The analysis should then be illustrated on a graph (similar to Figure 1.2) and used as the basis of investigation (see Chapter 11).

![Graph](Figure 1.2 Stock analysis graph)

**Summary**

- Decide whether you are sufficiently unhappy with record accuracy to do something about it.
- Work out what you would like to achieve.
- Determine how to measure accuracy.
- Decide what the working tolerances will be.
- Measure accuracy on an ongoing basis.