

## Safety Stock and Recalculating New Stock Levels

### Safety Stock

The objective of Safety Stock is to provide protection against fluctuations in demand. A company can have good and bad sales weeks, but overall the total demand for a number of periods, equals the planned total demand. On this basis, the overall forecast was good, BUT period by period there were fluctuations in demand. This is illustrated in the table and graph below.

To understand how GOLD calculates Safety Stock, it is important to understand the method behind the calculation.

### Mean Actual Deviations (MAD)

MAD aims to calculate the absolute deviations between actual sales and the forecast data. For example:

Period	Forecast	Actual	Deviation
1	100	80	20
2	120	90	30
3	120	110	10
4	130	120	10
5	150	140	10
6	150	160	10
7	150	160	10
8	150	165	15
9	160	165	5
10	150	160	10
11	170	140	30
12	160	170	10
<b>Totals</b>	<b>1710</b>	<b>1660</b>	<b>170</b>

$$\text{MAD} = \frac{\text{Sum of absolute deviations}}{\text{Number of periods}}$$

$$\text{MAD} = \frac{170}{12}$$

$$\text{MAD} = 14$$

This indicates that the average **difference** between forecast and actual sale of the specific item is 14, over a 12-month period. Using MAD, GOLD can now calculate the Safety, Maximum and Minimum stock levels.

## Calculating Safety Stock

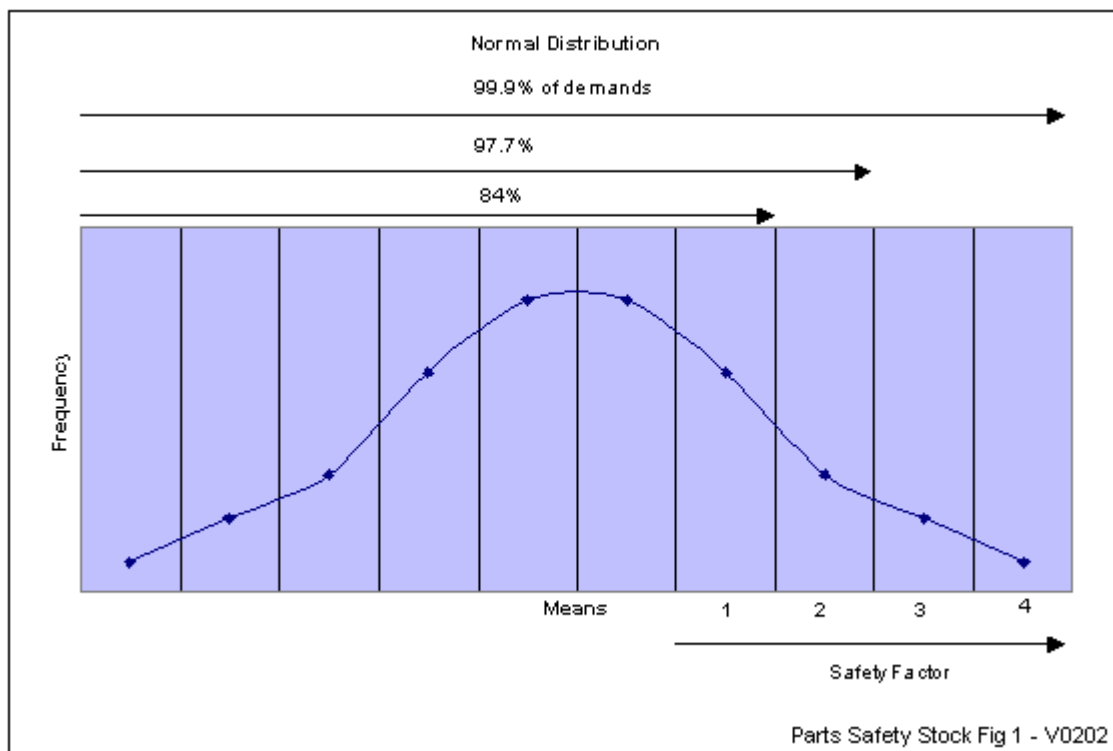
To calculate Safety Stock several variables must be taken into account:

- **Service Level Percentage** must be decided. That is how many times out of 100 would the stock be available to sell or use (demand). In the example a 97.7% Service Level would be expected.
- **Safety Factor**, which is fixed, in this case 2.0.
- **Lead Time**, which is the time in **months** to replenish stock, in this case 6.
- **MAD**, in this case 14.
- **Forecast Period**.

**Safety Stock = MAD \* 1.25 \* Safety Factor \* root of (Lead Time / Forecast period).**

Which is  $14 * 1.25 * 2.0 * \sqrt{6/1} = 86$

Thus a Safety Stock of 86 is required to stay within the 97.7% Service Level.



The above figure shows the importance of the Safety Factor in calculating the Safety Stock. If the Safety Factor is 2 then 97.7% of the demand will be met.

The Service Level is chosen and represented by a Safety Factor that is entered into the calculation.

### Calculating Minimum and Maximum Stock Levels

It is now possible to calculate the Minimum and Maximum Stock Levels to stay within a 97.7% Service Level.

The Forecast Sales for Period 1 (**current period**) must be determined from the following formula:

$$\text{Forecast} = \text{Total Sales History} / \text{Number of Months}$$

$$\text{Forecast} = 1660 / 12 \text{ (Periods 1 - 12)} = 138$$

This indicates that 138 parts will be sold in Period 1, based on Total Sales History for 12 months.

Gold can now calculate Minimum and Maximum Stock levels for Period 1.

$$\text{Minimum Stock} = \text{Safety Stock} + \text{Period Forecast}$$

$$\text{Minimum Stock} = 86 + 138 = 224$$

$$\text{Maximum Stock} = \text{Minimum Stock} + (\text{Forecast Stock} * \text{Order Period in Months})$$

$$\text{Maximum Stock} = 224 + (138 * 2) = 500$$

**NOTE:** In this case the order is for a 2-month period.

### Recalculating New Stock Levels

The Maximum and Minimum Stock levels can be recalculated using the Safety Stock formula, through the option in Supplier/Pricing/Reordering, Recalculate Stock Levels - SAFETY. It is recommended that this be initially processed as **Report Only**, to ensure that existing levels are not updated until a preliminary investigation has been completed. The program can be processed by Prefix, on selected Class Codes and Product Groups, if required. The table below is displayed to select Service Level.

Service Level	Safety Factor	Service Level	Safety Factor
50.00%	0.00	98.00%	2.05
75.00%	0.67	98.61%	2.20
80.00%	0.84	99.00%	2.33
84.13%	1.00	99.18%	2.40
85.00%	1.04	99.38%	2.50
89.44%	1.25	99.50%	2.57
90.00%	1.28	99.60%	2.65
93.32%	1.50	99.70%	2.75
94.00%	1.56	99.80%	2.88
95.00%	1.60	99.86%	3.00
95.52%	1.65	99.90%	3.09
96.00%	1.75	99.93%	3.20
97.00%	1.88	99.99%	4.00
97.72%	2.00		

Service Level **MUST** be entered exactly as specified in the table. An example of the screen is shown below.

### IMPORTANT

On the above screen, Lead Time is the number of **weeks**, delivery is expected to take, and Order Period is the number of **weeks** for which Stock cover is required. The program converts these values into **month** equivalents, to be used in the calculation formula. **DO NOT ENTER VALUES AS MONTHS.**

If run in Update mode, Maximum and Minimum levels will be reset. It is recommended that a back up of data be taken immediately before running the update, in case it is necessary to reset them back to the original levels.

### Set Emergency Level From Minimum

Where Stock Levels are recalculated from Stock History, the Emergency Level can also be updated. Using the Safety Stock method does not change Emergency, and if this is to be maintained in line with Minimum Stock, a program in Housekeeping, Parts 1 can be used. The option is called 'Set Emergency Level From Minimum', and allows the Emergency Level to be calculated as a percentage of Minimum. The table below indicates the rules used.

#### Percentage:

50%	will give emergency = minimum x 1.5
100%	will give emergency = minimum x 2
-50%	will give emergency = half minimum
-100%	will put zero in emergency field