SITRA FOCUS

Vol : 27 July 2009 No. 2

# BREAK-EVEN ANALYSIS FOR SPINNING MILLS

**Introduction**

Break-even analysis is a specific way of presenting and studying the inter-relationship between costs, volume and profits. It revolves around the break-even point, which means a particular point in the level of activity at which a company just breaks even without getting any profit or incurring any loss.

It is a known fact that the profit margin in a spinning mill, under normal trading conditions, is on the average not higher than 2% to 4% of the sales turnover. A combination of factors – operational as well as commercial, governs the profitability of a spinning mill, some of which vary with volume of production. Among the various factors that influence the conversion cost of fibre to yarn, ring frame utilisation is perhaps the most important. This is because not only a high spindle utilisation leads to a reduction per unit production in every item of conversion costs – overheads, depreciation, interest, stores, power and wages – but also increases profits consequent to the higher volume of production and sales turnover. The ring frame utilisation is affected by a number of factors, more particularly workers shortage, power shortage, mechanical / electrical repairs, adverse trading conditions etc.

This 'Focus' covers the following aspects:

- break-even point utilisation under normal trading conditions.
- impact of power cost per unit on profits and break-even utilisation.

**Break-even point**

The break-even point utilisation is estimated as given below:

$$\text{Break-even point} = \frac{\text{Fixed cost (Rs)}}{\text{Contribution (Rs)}} \times \text{spindle utilisation (\%)}$$

$$\text{Cash break-even point} = \frac{\text{Fixed cost (Rs)} - \text{depreciation (Rs)}}{\text{Contribution (Rs)}} \times \text{spindle utilisation (\%)}$$

Where,

Contribution = Sales turnover - variable cost

**Variable cost and fixed cost**

The cost which changes with volume of out-put is called as variable cost. The cost items that are considered under fixed and variable costs are given below:

| Variable cost | Fixed cost |
|---|---|
| Raw material cost | Part of wages cost |
| Part of wages cost | (wages of indirect operatives) |
| (wages of direct operatives) | Part of power cost |
| Part of power cost | (lighting and humidification) |
| Packing materials cost | Interest cost on term loans |
| Interest cost on working capital | Depreciation cost |
| Selling expenses | Overheads |
| 50% of stores cost | Salaries cost |
| | 50% of stores cost |

**Count-wise cost of production and profits under normal trading conditions**

The cost of production and profits, under normal trading conditions, have been estimated for 6 popular cotton counts (20s, 30s, 40s, 60s C, 80s C and 100s C) and the details are consolidated in Table 1. The various assumptions made to estimate the cost of production are given in Table 2.

**Table 1** Count-wise cost of production and profits (Rs/spindle/year)

| Particulars | 20s | 30s | 40s | 60s C | 80sC | 100sC |
|---|---|---|---|---|---|---|
| A. Sales turnover | 21115 | 14804 | 11521 | 10649 | 9142 | 7736 |
| B. Cost of production | | | | | | |
| 1. Raw material cost | 14077 | 9310 | 6598 | 5698 | 4501 | 3588 |
| 2. Wages cost | | | | | | |
| - up to spinning | 757 | 549 | 419 | 374 | 317 | 267 |
| - Cone wdg tenters | 162 | 98 | 67 | 48 | 30 | 21 |
| - Cone wdg. others | 40 | 40 | 40 | 33 | 33 | 33 |
| - Packing | 50 | 31 | 21 | 14 | 9 | 7 |
| - Non-prodn. oper. | 93 | 93 | 93 | 93 | 93 | 93 |
| Total | 1102 | 811 | 640 | 562 | 482 | 421 |
| 3. Salaries cost | 160 | 160 | 160 | 160 | 160 | 160 |
| 4. Power cost | | | | | | |
| - Spinning | 1043 | 959 | 943 | 970 | 940 | 884 |
| - Prep. & Post spg. | 825 | 658 | 587 | 468 | 385 | 323 |
| - Others | 304 | 263 | 250 | 234 | 216 | 197 |
| Total | 2172 | 1880 | 1780 | 1672 | 1541 | 1404 |
| 5. Stores cost | 350 | 350 | 300 | 300 | 280 | 280 |
| 6. Pkg. materials cost | 377 | 229 | 157 | 102 | 70 | 49 |
| 7. Overheads | | | | | | |
| - Selling expenses | 211 | 148 | 173 | 213 | 183 | 155 |
| - Others | 633 | 444 | 403 | 532 | 549 | 464 |
| Total | 844 | 592 | 576 | 745 | 732 | 619 |
| 8. Interest cost | 1056 | 740 | 691 | 639 | 640 | 541 |
| 9. Depreciation cost | 633 | 444 | 346 | 426 | 366 | 309 |
| Total cost of prodn. (B1 to B9) | 20771 | 14516 | 11248 | 10305 | 8772 | 7371 |
| Operating profit (A - B1 to B7) | 2033 | 1472 | 1310 | 1409 | 1376 | 1215 |
| Gross profit (after interest) (A - B1 to B8) | 977 | 732 | 619 | 770 | 736 | 674 |
| Net profit (A - B1 to B9) | 344 | 288 | 273 | 344 | 370 | 365 |
| - As % of sales | 1.6 | 1.9 | 2.3 | 3.2 | 4.1 | 4.7 |

**Table 2** Assumptions made to estimate count-wise cost of production

| Particulars | 20s | 30s | 40s | 60s C | 80sC | 100sC |
|---|---|---|---|---|---|---|
| 1.Yarn selling price(Rs/kg) | 84 | 97 | 110 | 157 | 195 | 235 |
| 2.Cotton cost (Rs/kg) | 49 | 54 | 57 | 64 | 74 | 84 |
| - Yarn realisation (%) | 85 | 86 | 87 | 69 | 69 | 69 |
| - Raw material cost (clean material) (Rs/kg/of yarn) | 56 | 61 | 63 | 84 | 96 | 109 |
| 3. Prodn./spl./8 hrs.(g) | 252 | 153 | 105 | 68 | 47 | 33 |
| 4. Operatives / day* | | | | | | |
| - Up to spinning | 325 | 235 | 180 | 161@ | 136@ | 114@ |
| - Autocone wdg.tenters | 70 | 42 | 29 | 21 | 13 | 9 |
| - Cone wdg.'Others' | 17 | 17 | 17 | 14 | 14 | 14 |
| - Packing | 22 | 13 | 9 | 6 | 4 | 3 |
| - Non-prodn.operat. | 40 | 40 | 40 | 40 | 40 | 40 |
| Total | 474 | 347 | 275 | 242 | 207 | 180 |
| 5. Power consumption (units / kg of yarn) | 2.16 | 3.08 | 4.25 | 6.16 | 8.22 | 10.66 |

** As per standard labour productivity for a 30000 spindle mill*

*@ including combing department*

**Other assumptions**

i) No.of working days per year : 350

ii) Spindle utilisation (%) : 95

iii) Wage rate (Rs) : 200 / day / operative including fringe benefits

iv) No. of staff per day : 40

v) Staff salary (Rs) : 10000 / month / staff including fringe benefits

vi) Power cost per unit (Rs) : 4

vii) Consumable stores cost (Rs/spindle/year) : 350 – 20s / 30s
300 – 40s / 60s C
280 – 80s C / 100s C

viii) Packing materials cost (Rs) (for bag packing) : 1.50 / kg of cone yarn

ix) Overheads, interest and depreciation costs
(all values are expressed as % of sales)

| Particulars | 20s | 30s | 40s | 60s C | 80sC | 100sC |
|---|---|---|---|---|---|---|
| Selling expenses | 1 | 1 | 1.5 | 2 | 2 | 2 |
| Other overheads | 3 | 3 | 3.5 | 5 | 6 | 6 |
| Total overheads | 4 | 4 | 5 | 7 | 8 | 8 |
| Interest cost | 5 | 5 | 6 | 6 | 7 | 7 |
| Depreciation cost | 3 | 3 | 3 | 4 | 4 | 4 |

It is seen from Table 1 that the average net profit of a high productivity mill, under normal trading conditions, is about 3% of sales, ranging from 1.6%in 20s to 4.7% in 100sC counts.

**Break-even point utilisation**

For the 6 popular counts shown in Table 1, the break-even point utilisation has been estimated (Table 3).

Under normal trading conditions, a high productivity mill manufacturing 40s yarn can break-even at about 84% spindle utilisation (Table 3). The break-even point utilisation ranges from 79% in 100s to 85% in 20s counts. In other words, when the utilisation falls below these levels, the mills would incur net losses. This underlines the importance of maintaining the utilisation at high levels. Cash break-even point, which is also an important parameter in financial decision making, is relatively low at 65% to 70% in different counts.

**Impact of power cost on profitability and break-even point**

During the periods of power cut, towards maintaining the spindle utilisation at high levels mills have to use captive power. The extent of use of captive power would depend up on the proportion of power cut imposed.

**Table 3** Break-even point utilisation

| Particulars | Amount (Rs/spl./year) | | | | | |
|---|---|---|---|---|---|---|
| | 20s | 30s | 40s | 60s C | 80sC | 100sC |
| 1. Sales turnover | 21115 | 14804 | 11521 | 10649 | 9142 | 7736 |
| 2. Variable cost | | | | | | |
| a) Raw material cost | 14077 | 9310 | 6598 | 5698 | 4501 | 3588 |
| b) Wages cost (variable component) | 591 | 403 | 298 | 249 | 198 | 161 |
| c) Power cost (variable component) | 1868 | 1617 | 1530 | 1438 | 1325 | 1207 |
| d) Stores cost (50%) | 175 | 175 | 150 | 150 | 140 | 140 |
| e) Packing materials cost | 377 | 229 | 157 | 102 | 70 | 49 |
| f) Interest cost on working capital | 528 | 370 | 346 | 319 | 320 | 271 |
| g) Selling expenses | 211 | 148 | 173 | 213 | 183 | 155 |
| Total variable cost | 17827 | 12252 | 9252 | 8169 | 6737 | 5571 |
| 3. Contribution [ (1) - (2)] | 3288 | 2552 | 2269 | 2480 | 2405 | 2165 |
| 4. Fixed cost | | | | | | |
| a) Wages cost (fixed component) | 512 | 408 | 342 | 313 | 284 | 259 |
| b) Power cost (fixed component) | 304 | 263 | 250 | 234 | 216 | 197 |
| c) Overheads | 633 | 444 | 403 | 532 | 549 | 464 |
| d) Stores cost (50%) | 175 | 175 | 150 | 150 | 140 | 140 |
| e) Interest cost on term loans | 528 | 370 | 345 | 320 | 320 | 270 |
| f) Depreciation cost | 633 | 444 | 346 | 426 | 366 | 309 |
| g) Salaries cost | 160 | 160 | 160 | 160 | 160 | 160 |
| Total fixed cost | 2945 | 2264 | 1996 | 2135 | 2035 | 1799 |
| 5. Break-even point utilisation (%) | 85 | 84 | 84 | 82 | 80 | 79 |
| 6. Cash break-even point utilisation (%) | 67 | 68 | 69 | 65 | 66 | 65 |

An inter-mill study conducted recently by SITRA shows that out of 141 participant mills, about 80% have diesel gensets. As high as 40% of the mills have 100% captive power (diesel gensets) generating capacity. The number of units of power generated by these gensets, on the average, is about 3.3 per litre of diesel oil. However, the high cost of diesel oil (Rs 33 / litre) becomes a hindrance to utilise the gensets. Average cost per unit of power generated from the diesel gensets is more than 2 times the average EB power cost per unit. In the event of mills utilising the diesel gensets, the overall power cost per unit would increase significantly.

The impact of high power cost per unit on profits and break-even point utilisation has been worked out for the 6 popular counts, for which the cost of production has been furnished in Table 1 and the details are given in Table 4.

**Table 4** Impact of power cost on profits and break-even point utilisation

Mill size : 30000 spindles

| Particulars | 20s | 30s | 40s | 60sC | 80sC | 100sC |
|---|---|---|---|---|---|---|
| Avg. power cost - Rs 4 per unit | | | | | | |
| Net profit (Rs in lakhs / year) | 103 | 86 | 82 | 103 | 111 | 110 |
| Break-even point utilisation(%) | 85 | 84 | 84 | 82 | 80 | 79 |
| At 5% increase in power cost-Rs 4.20 per unit | | | | | | |
| Net profit (Rs in lakhs / year) | 71 | 58 | 55 | 78 | 88 | 88 |
| Break-even point utilisation (%) | 88 | 88 | 87 | 85 | 83 | 81 |
| At 10% increase in power cost-Rs 4.40 per unit | | | | | | |
| Net profit (Rs in lakhs / year) | 38 | 30 | 29 | 53 | 65 | 68 |
| Break-even point utilisation (%) | 91 | 91 | 91 | 88 | 86 | 85 |
| At 15% increase in power cost - Rs 4.60 per unit | | | | | | |
| Net profit (Rs in lakhs / year) | 5 | 2 | 2 | 28 | 42 | 46 |
| Break-even point utilisation (%) | 94 | 95 | 95 | 91 | 89 | 88 |
| At 20% increase in power cost - Rs 4.80 per unit | | | | | | |
| Net profit (Rs in lakhs / year) | -27 | -26 | -25 | 3 | 19 | 25 |
| Break-even point utilisation (%) | 98 | 98 | 99 | 95 | 93 | 91 |
| At 25% increase in power cost - Rs 5.00 per unit | | | | | | |
| Net profit (Rs in lakhs / year) | -60 | -55 | -52 | -22 | -5 | 4 |
| Break-even point utilisation (%) | 102 | 103 | 104 | 98 | 96 | 94 |
| At 30% increase in power cost - Rs 5.20 per unit | | | | | | |
| Net profit (Rs in lakhs / year) | -92 | -83 | -78 | -47 | -28 | -17 |
| Break-even point utilisation (%) | 106 | 108 | 109 | 102 | 100 | 98 |

*Note: '-' sign indicates loss*

Since power cost is the second largest component, next only to raw material cost in the total cost of production, even a marginal increase in the power cost per unit would have a significant impact on the profit margin and break-even point utilisation. For instance, when the power cost per unit is Rs 4, under normal trading conditions, for a 30000

spindle mill manufacturing 40s count the expected net profit will be Rs 82 lakhs per year and the break-even point utilisation will be 84%. When the power cost increased to Rs 4.20 / unit (ie 5% increase) there will be a drop in the net profit by about Rs 27 lakhs per year while the break-even point utilisation will be high at 87%.

For every 10 paise increase in the power cost per unit

- ⇨ the drop in savings for a 30000 spindle mill will be Rs16 lakhs per year in 20s to Rs 11 lakhs per year in 100s C.
- ⇨ the break-even point utilisation would increase by 1.5 to 2.0 percentage points

It can also be seen from Table 4 that, for the set of working conditions assumed in Tables 1 and 2, when the increase in power cost per unit exceeds 20%, the spindle utilisation required to break-even will be more than 100% which is impracticable in the spinning industry. Normally spinning mills can maintain the spindle utilisation up to 98% consistently. Therefore, Table 4 implies that the mills must take all efforts towards maintaining the power cost at optimum level.

Conservation of energy is one of the means to reduce the power cost to some extent. Energy auditing is the first step in all energy conservation programmes in order to investigate and quantify the potential areas of energy saving. Mills must initiate measures to conserve energy by way of reducing energy loss in electrical system, modifications in manufacturing machines and optimising energy consumption of ancillary or supporting system. SITRA has been conducting energy audits for textile mills in India and abroad for more than two decades. Over 300 audits have been conducted so far. Mills can utilise the services of SITRA in this area.

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