

## Capsim Simulation: The Production Module

This capsule was updated July 14, 2012. In the Capstone (Capsim simulation) Course at Georgian Court University, Lakewood, NJ in summer session 2012, there are six companies: Andrews, Baldwin, Chester, Digby, Erie and Ferris (Computer). The industry simulation is the sensor industry. The teams play six rounds in the simulation. In this simulation the modules are: Research and Development; Marketing, Production and Finance. The Human Resources Module will be added in the third round.

We shall use Team Andrews in Round 1 as an example and review the Production Module. But first we check the Capstone Courier. Here is an example. Check the Traditional Segment in the Capstone Courier. The Traditional unit industry sales and actual unit sales are 9,000,000 Units that will be sold in Round 1. This segment is 33.0% of the total sensor industry. Note that these unit industry sales change each round. A team must check the Capstone Courier every round for all segments.

Next we go to the Marketing Module. In order to get our sales forecast for the Traditional Segment in the Marketing Module, we divide the (9,000,000 units by 6 teams which equal 1,500,000 units.) This is just a basic rule of thumb for a Sales Forecast in the Marketing Module. For Team Andrews, we type in the Marketing Module, **Your Sales Forecast** Box for Traditional-Able [1,500]. We follow this procedure checking the Capstone Courier for all five segments. For Team Andrews the sales forecast calculations are: Traditional- Able [1,500], Low End-Acre [1,700], High End-Adam [500], Performance-Aft [450] and Size-Agape [400].

Now we go to the **Production Module**. Under the **Schedule** heading, for Able we have Unite Sales Forecast [1,500] and Inventory On Hand [189]. Therefore calculate (1,500 minus 189 equals 1,311). In the Production Schedule Box for **Able we type in [1311]**. We proceed and do this calculation for each segment subtracting the Inventory On Hand from the Unit Sales Forecast. Acre (1,700 – 39 type in [1661]); Adam (500-40 type in [460]); Aft (450 – 78 type in [372]); Agape (400 – 62 type in [338]). The simulation calculates a Production after Adjustment Number and Totals all segments.

Under the Production **Margins** heading the simulation calculates: 2<sup>nd</sup> Shift Production %, Labor Cost/Unit, Material Cost/Unit and Total Unit Cost. Finally the simulation calculates the Contribution Margin. The Contribution Margin is defined as (Price minus Unit Cost minus Inventory Carry Cost divided by Price), or (Price minus Variable Cost divided by Price). In the Production Module the Inventory Carrying Cost is set to zero therefore the Contribution Margin is (Price minus Unit Cost divided by Price). The simulation instructions state it is good to have each segment's Contribution Margin above 30.0%. However, as the game proceeds round by round it is difficult to maintain a 30.0% Contribution Margin for all segments. A more conservative estimate is to keep each segment above 25.0%. In our example Andrews has the following Contribution Margins: Able 29.9%; Acre 27.4%; Adam 34.2%; Aft 25.1%; Agape 32.0%.

In the Production Module, **Physical Plant** section we have first shift capacity. For instance Acre's Production after Adjustment is 1,645. The first shift capacity for Acre is only 1,400. Therefore a small second shift complement of workforce will be necessary. Remember that a second shift workforce gets paid time and a half. We previously wrote a lesson on Buy/Sell Capacity. Team Andrews is not going to Buy or Sell Capacity. But what Team Andrews will do is increase Automation from 5.0 to 5.5 for Low End Product Acre. Therefore in the next round Labor Costs will decrease because Andrews' automated the plant for the Low End Product Acre.

There is a high cost for automation. In this case Andrews pays \$2,800,000 to upgrade the plant automation by 0.5 points. Automation costs \$4.00 per point of automation. Since Andrews is automating by 0.5 the cost is \$2.00 times 1<sup>st</sup> shift capacity of 1,400,000 units or \$2,800,000. Note that Automation affects R&D positioning on the Perpetual Map. This upgrade in automation takes effect the next round.

**Next we come to the final section Workforce.** At the end of Round One, Workforce for Andrews' displays Last Year's Complement [700], Needed Complement [699], This Year's Percent Complement (which should be 100%), This Year's Complement [699], the 1<sup>st</sup> Shift [660], 2<sup>nd</sup> Shift [39] and Overtime [0.0%]. There is a Maximum Investment Box number, that the simulation automatically calculates and an Accounts Payable Lag Box that should be 30 days.

**UPDATED:** At the end of Round Two, the Human Resources Module will be in effect for Round Three. Check, that **This Year's Percent Box is 100% and Green. If the box is Red a red line through the 100% you must make a calculation change.**

Thus we completed Round Two and Last Year's Complement is now [900] and Needed Complement is [793]. You must divide [793] by [900] which is  $(793/900 = 88.11\%)$ . You then enter [88%] in This Year's Percent Box. **The Box should now turn Green without any red lines.**

Note the Overtime Box: At the end of Round Two for Team Andrews we have an Overtime Percent of 14.2%. This means the percentage of first shift workers is performing overtime on average is 14.2%. Remember that overtime increases employee turnover and decreases productivity.

There are graphs at the bottom of the Production Module. Check Production versus Capacity and Price versus Unit Cost. Each Team has their own strategy, so Production will vary according to the objectives of the team members.