No Stone Unturned™

BPCS Usage Assessment & Business Practice Review

prepared for

On-the-WayUp Manufacturing

prepared by

Unbeaten Path® INTERNATIONAL

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Click **here** *to return to No Stone Unturned professional services page*

Introduction

Unbeaten Path International (UPI) was asked to perform a BPCS System Usage Assessment for On-the-WayUp at their El Paso facility. The objective of the assessment was to identify practical ways to increase user satisfaction with and performance of installed BPCS products, with the emphasis being on manufacturing. The deliverable will be a list of recommendations geared to substantially improve the ROI realized by operating the facility with BPCS software.

Assessment Report Organization

Each of the subjects is presented in three sections: Findings, Implications, and Recommendations.

> The **findings** section reports the facts observed and information known to be true about BPCS software.
>
> **Implications** are a statement of our opinions and conclusions based on the reported findings. Our opinions are strongly influenced by our experience in other companies using BPCS.
>
> The **recommendations** suggest approaches to constructively address areas of opportunity identified in the implications section.

In most cases, each finding number will relate to the same-numbered implication and recommendation within a subject area.

Click **here** *to return to No Stone Unturned professional services page*

Findings, Implications & Recommendations

This section will address the key issues which came to my attention during the five-day assessment. The amount of detail and degree of substantiation in this assessment was constrained by the duration of my data-gathering activities and the availability of client personnel to work with me.

A. General Use of the BPCS Product

Findings

1. There are significant areas of manual data entry in general and redundant data entry in particular occurring throughout the organization.
2. The lack of a user-friendly report writer/query tool leads to unnecessary time delays processing requests through Information Services as well as some requests never being submitted. Users invent their own ways to obtain necessary information which may not provide consistently accurate results.
3. 90% of production comes from about 50 items. The frequently-made exceptional item list is not long either.
4. BPCS manufacturing planning, capacity planning and standard cost accounting have not been used in the past due to "bad data", meaning that accurate data was never loaded. There is no indication that these products would not work well here.
5. A lack of understanding of various BPCS standard functions became apparent in all areas of the business. This is causing unnecessary wasted time in manual workarounds to get the job done. A focused re-training effort should be done.
6. A complete information system security audit has not been done for at least five years. It is common practice to have such an audit performed at regular intervals of 3-5 years. Not doing so exposes the company to risk. An audit should be performed by professionals in that field, typically a third-party provider.

Implications

Great improvement opportunity exists for a very reasonable expenditure of effort since the above findings (points 1 - 5) are inter-related.

Recommendations

Get the improvement project going as soon as possible, Move forward on focused training, develop quality BPCS data for the several dozen most important items first, prototype the proposed new procedures, and acquire a user-friendly report tool and train key users.

Click **here** *to return to No Stone Unturned professional services page*

B. Forecasting

Findings

1. Production Planning is given a production forecast twice a year on a spreadsheet. This forecast is stated in monthly time periods by element (finished good item) number and quantity. It is not developed using standard sales forecasting statistical models, but is more of a qualitative management estimate of the future. During the second half, only budgets are adjusted based on market information.

   In general, the forecast is developed by taking the total historical sales dollars by region and dividing by the average sales price to get the quantity by product group for a 6-month period. Projects are identified. Base business is taken from historical trends plus expected growth. Historical trends are identified using the SAL185 report. This is further refined to achieve a monthly element forecast by quantity.

   The manual effort for the above process is 2 weeks every 6 months. Additionally, 2-3 days every 6 months is taken up preparing the spreadsheet for delivery to Production Planning.
2. Production Planning breaks the forecast down into equal weekly quantities and manually loads it into BPCS. Production Planning also deletes old forecast records from BPCS. Past due firm planned orders are also manually deleted.
3. A sales forecast expressed in dollars is also developed. This is qualitative in nature and may be designed to achieve management's desired financial objectives more than express historical sales patterns into the future.

Implications

1. Developing a production forecast (quantity by item) from a starting point of aggregate dollar analysis often masks historical sales patterns at the finished good level. Using statistical techniques to identify the patterns of each item's unit sales and then propagating them into the future will provide management with a better estimate of future sales as well as a basis for determining safety stock levels to achieve a desired level of customer service. These unit forecasts can then be converted to margin dollars, cost dollars, revenue dollars, etc. An approach like this will eliminate significant manual effort.
2. This represents manual effort that could be eliminated in the current business practice by a spreadsheet-to-BPCS interface. Old forecast records do not have to be deleted since they will not be used for any planning once they have become past due.

   Firm planned orders whose due dates are earlier than the planning start date can be automatically deleted by BPCS if this option is chosen in the parameter file for MRP operation. If it is not chosen, as it apparently is not here, such FPO's will have to be manually deleted to prevent them from continuing to show up as past due.

Click **here** *to return to No Stone Unturned professional services page*

B. Forecasting, *continued …*

Implications, continued …

3. A "top down" sales forecast is often used to indicate management's desires to grow the business or indicate the emphasis or de-emphasis of certain products or geographic markets. This is a useful tool when used in conjunction with the "bottom up" production forecast derived from statistical analysis of each items historical quantity sales. It acknowledges that the future may not be just like the past because management is taking an active role in altering the future.

   Decisions based on such a sales forecast are usually imposed on the production forecast by a series of changes made to the production forecast. It would be a good idea to track such changes. Once the future becomes history and actual sales quantities and dollars are known, an analysis can be made of the accuracy of both the production forecast and management's alterations.

Recommendations

1. Review the BPCS forecasting models for possible use. Alternatively, there are many quality PC-based forecasting products available that can be easily interfaced to BPCS. The product from Demand Solutions comes to mind, since I've worked with it in the past. It is quite flexible and can do "top down" and "bottom up" forecasting with comparisons and accuracy tracking. Beyond that, a more formal review of products currently on the market should be done based on a written requirements definition of the company's forecasting needs.
2. Purchase **Bucket Brigade** software to avoid manual effort; this is offered by Unbeaten Path.
3. Once a production forecast process is in place, this represents more of a policy and procedure task of defining, implementing and providing the basis for tracking management changes.

Click **here** *to return to No Stone Unturned professional services page*

C. Production Planning

Findings

1. Management isn't using the BPCS "yield percentage" in MRP because they feel it doesn't work. Users believe there may be a software error.
2. Production planning is done manually resulting in four separate spreadsheets representing different product groups. On-hand and on-order data is manually transferred from BPCS to spreadsheets. For each product group, a master production schedule spreadsheet is created by manually entering the build schedule based on "mental calculations" from the analysis of on-hand, on-order and demand (coming from a report: ORD021). These mental calculations attempt to accomplish what BPCS MPS is designed to do automatically.
3. The spreadsheet-developed master production schedule is manually input to BPCS as "firm planned orders" which the BPCS MPS/MRP generations cannot override. Old FPO's are manually deleted, which is unnecessary in BPCS if the MRP parameter setting is done correctly.
4. The production schedule for laminates is separate from the element production schedules. It is developed differently and no FPO's are loaded into BPCS as a result. Laminates are produced to meet higher-level production requirements.
5. MPS/MRP generations are done in BPCS for the use of buyers only. The process is executed to create demand for purchased items.
6. An "equivalent factor" is used to normalize all element items to the manufacturing load required to make an eight-inch inverted axis element.

   For example, element 4040-LHA-CPA2 requires .591 the capacity of an eight-inch element. These figures are loaded into BPCS routings for each element under "operation 888" going through work center 8888. This fictitious work center has been given a capacity of 750.75, representing the number of eight-inch elements that can be made in one day. Therefore, a form of capacity planning is done in the spreadsheets. The units of load and capacity are not "hours" but "equivalent eight-inch elements".

7. Below are the manufacturing planning time estimates given by the Master Scheduler. She does all the work mentioned above:

   - Element Master Scheduling: 8-10 hours per week-revisions take place once or twice a week
   - Equivalency factors update: 2 hours per week
   - Firm Planned Order update: 4-5 hours per week
   - Forecast Implementation: 6-8 hours per forecast release-usually twice per year
   - Laminate Master Scheduling: 4-5 hours per week
   - Quoting lead-times/BOM availabilities: 5 hours per week
   - RTM processing/scheduling: 2 hours per week
   - Scroll backlog update: 2 hours per week
   - Shop Floor Calendar implementation: *12 hours per year.*
   - Remainder time of day spent in meetings with Production, MCR, Management, training, MRP review with Buyers

Click **here** *to return to No Stone Unturned professional services page*

C. Production Planning, *continued ...*

Implications

1. In BPCS, the "yield percentage" represents parent reject rate. In a perfect manufacturing world where no parent item is rejected, the yield percentage would be 100%. If rejects do occur routinely, based on historical analysis, the yield percentage should be set to a number lower than 100%. Failing to use the yield percentage in BPCS when rejects actually do occur in some predictably standard frequency will cause MRP to understate component requirements, capacity resources and standard costs.
2. Immense time and effort is being misapplied by having a tool (BPCS) that can do all these things yet choosing to do them manually. Production planners should analyze plans resulting from BPCS material and capacity requirements generation programs and make intelligent adjustments. They should not have to create the initial plans manually. Maintaining the current approach is a dilution of resources into clerical functions best performed by a computer. Use experienced people to manage the resulting plan.

Recommendations

1. Running test data in BPCS resulted in no software errors. Rather, the problem was due to user's incorrect setting of the yield percentage field. For example, if the yield percent is 90%, the field must be loaded with "90.0", not "0.90". Ineffective training or prototyping are the causes here.
2. (through 7). Eliminate the current methods as soon as possible by addressing the standard elements that constitute the majority of the business volume. Then work outwards to the exceptions. This involves engineering, education, training and policy/procedure work.

   There exist load standards stated in "hours per element" for various manufacturing operations. This will allow BPCS to be set up with complete routings and work centers so it can perform capacity planning by work-center by day stated in standard hours.

   Bills of material should be analyzed to make sure they represent how elements are actually manufactured, accounting for all sub-assemblies. This will allow MRP to be useful to more than just buyers.

Click **here** *to return to No Stone Unturned professional services page*

D. Production Execution

Findings

1. Spreadsheets are used by Production Planning to communicate the build schedule to the shop floor. The shop floor never sees BPCS shop orders.
2. Shop orders are only used for elements (finished goods). No lower-levels of manufacture gets a shop order. Shop orders are initially opened at the "rolling" operation. A serial number is assigned to each element at this time. A BPCS lot master record is open for each serial number and the shop order entered into the record.
3. All components are back flushed (all issued at one time with one transaction) at the time the shop order is entered (the rolling operation). The cumulative manufacturing lead time for elements is 11-14 days. Not all components are consumed into the product at the rolling operation. There are operations occurring both before and after the rolling operation.
4. Real-time scrap and reject reporting is desired.
5. Value-added rejects is desired.

Implications

1. Without shop orders guiding and communicating production requirements to the floor, the shop is running against "the informal system." There is no assurance that components or operations defined in the engineering standards and used by shop orders are being adhered to, or even understood in detail. By having manufacturing standards communicated to the floor, operators and foremen can note common deviations from those standards, possibly indicating the need to change the standard, resulting in improved material, labor and costing information.
2. There are typically three or more levels of production involved in making elements. The cumulative manufacturing lead time is 11 – 14 days. If the intermediate sub-assembly part numbers are not defined as phantoms, BPCS assumes that they will be manufactured against their own shop orders, received into stock and subsequently issued as components to a higher-level shop order. This gives maximum inventory control, variance reporting opportunities and the ability to stock certain sub-assemblies in anticipation of future production needs.
3. Releasing a BPCS shop order for the parent item at the rolling operation indicates that significant manufacturing has taken place with no BPCS shop order in the system. The informal system is in complete control and BPCS cannot be used to measure or manage a significant portion of the business.
4. Given the cumulative manufacturing lead time and the fact that many components are consumed both before and after the rolling operation, the current procedure causes unnecessary inventory data integrity problems and disrupts MRP planning.
5. Capturing shop floor data into BPCS as reasonably close to its occurrence and by the individuals responsible for performing the manufacturing work is **always the best approach**. It eliminates errors caused by transaction timing, human error in transposition of numbers, etc.
6. By knowing the material, labor, machine and overhead cost of a parent item at every stage of its manufacture, more accurate accounting of rejects can be performed. Without this knowledge, analysis of manufacturing variances must be used to try to determine reject cost in general and in total.

Click **here** *to return to No Stone Unturned professional services page*

D. Production Execution, *continued …*

Recommendations

1. Consider adopting a much more formal use of shop orders for the purpose of guiding production and reporting actual material usage/labor.
2. Shop orders should be released ahead of production based on the quantities and dates for each manufactured item as calculated by MRP, with planner overrides as legitimately required.
4. BPCS has the ability to indicate the routing operation at which a given component is consumed. Loading the data in this way will allow time-phased requirements planning of shop order components as well as time-phased component issue based on production reporting to the shop order operation. **This method is highly recommended**. The existing project to expand use of bar coding and shop floor data collection will help reduce the manual effort required for the increased reporting requirements that this method requires. On the other hand, if you don't report in detail, you can't analyze in detail so opportunities for improvement can be missed.
5. The bar code/SFDC project will provide the technical backbone for providing this function. Make sure that this project encompasses all the data collection opportunities that BPCS affords with full shop order control occurring in the plant.
6. BPCS does not have value-added reject functionality. Neither does it determine the standard material, labor and overhead cost of each operation in the routing (a "routing cost roll-up"). It calculates these costs only at the item level, summarizing all operational costs for the item. Whenever a scrap transaction is submitted, BPCS costs it at the full standard cost of the item, regardless of what material or value-added labor has been applied up to the point of rejection.

   There is a way to modify BPCS to perform these functions. It involves an extension of the current cost calculation process. If requested, I can develop a detailed definition of the modification approach. Management can then assess the ROI of doing the mods.

Click **here** *to return to No Stone Unturned professional services page*

E. Cost Accounting

Findings

1. BPCS cost accounting was never implemented. Very few valid BPCS routings or work centers were ever entered. Some routings and work centers are entered but not fully utilized.
2. Standard cost calculations are currently done off-line. Costs are all maintained on a spreadsheet and uploaded into BPCS twice a year. Labor standards that BPCS would require in routing and work center records currently exist in the off-line costing. Some of this is in "bills of labor".
3. Actual production costs are all calculated using spreadsheets. The current time used for cost accounting includes:

   - 3 hours weekly production cost calculation for standard products.
   - 3 hours a month casting/laminate production cost calculation.
   - 8 hours reconciliation Raw, Supply, Finished Goods and Pressure Vessel valuation/accounts.
   - 3 hour Scraps, X-items, temporary labor cost reclassifications.
   - 2 hours Entering and posting of Journal entry from above calculations
   - 3 hours calculation and post of manufacturing variances (journal entries)
   - *4 8-hour days for standard cost calculation* after forecasts and budgets information have been collected.

Implications

There is no guarantee that your products are being engineered against the same standards to which they are costed. Based in above observations, they may not be manufactured using either the engineering nor costing standards since they are all on various non-integrated spreadsheets. All "core" data should reside in one system which controls bills, routings, work centers, manufacturing planning, execution and costing. Without this, it is extremely difficult to *know* that everyone is "on the same page."

BPCS can do this based on inventory and production reporting against shop orders, thus saving manual effort and providing better variance analysis. Significant manual effort can be eliminated, especially in the final bullet point above.

Recommendations

Similar to recommendation C.2. under "Production Planning," gaining value from BPCS standard costing is a very small incremental effort above that required to support material and capacity planning. Work center labor, machine and overhead rates must be established in BPCS, but a great deal of that data already exists in spreadsheets.

Rather than embark on an analysis of the correctness of that data, use it to cut over from spreadsheets to BPCS, validate the cutover and then work on validating the accuracy of the data. The validation project could be "funded" with some of the time saved by no longer managing a combination spreadsheet/BPCS system.

Make actual costing analysis a part of the project to cut over to BPCS shop orders as *the* vehicle communicating requirements and collecting production data on the floor. Load the routings and work-centers ASAP to take advantage of BPCS standard costing features. Review bills of material and certain item master fields for accuracy.

Click **here** *to return to No Stone Unturned professional services page*

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Point F about engineering data management and Point G about purchasing issues have been removed for confidentiality reasons.

H. Inventory and Materials Management

Findings

1. Available to Promise functionality is not working.
2. Bar coding for shipping and receiving is desired.
3. Alerts for over and under receipts is desired.
4. Sometimes, a PO doesn't exist at time of dock receipt. This problem is smaller than in the past.
5. A report showing "average flow rate" for all elements in a stocking location is requested. The "flow rate" is a specification of a serial numbered element.
6. A manually-developed shortage report is currently being used.

Implications

1. Not having this functionality reduces the ability to satisfy customer demand within the order entry process.
2. Bar coding will improve the speed and accuracy of reporting and provide a basis for automatic input into BPCS.
3. Without alerts, the possibility exists for receipts needing special management attention to go unnoticed.
4. Receipts without a corresponding PO is a symptom of the problem noted earlier in point 7 of the Purchasing section of this report. Such events tie up dock space, waste worker's time and possibly cause a miscellaneous receipt into stock which then has to be investigated. It may cause delays in making needed components available.
5. This information will assist in selecting elements for shipment to satisfy a customer's requirements.
6. Time is being wasted developing this report manually, but such a report is needed.

Recommendations

1. Determine the cause of this problem (data, programs, policy/procedure) and resolve it as soon as possible.
2. Keep the momentum going on the bar code/data collection project. This project is currently on hold pending RINGI approval. **It is imperative that this hold is resolved and the project continue to move forward.** Other solution recommendations are based on the premise of bar code/factory data collection technology being present to reduce the manual effort of collecting necessary information to acceptable levels.
3. Explore use of BPCS receiving tolerance settings to handle this requirement.

Click **here** *to return to No Stone Unturned professional services page*

H. Inventory and Materials Management, *continued …*

Recommendations, continued …

4. The problem can be resolved by forcing the use of BPCS automatic PO numbering, eliminating "manual PO generation" sometimes not followed up with a BPCS PO.
5. BPCS knows all serial numbered elements (BPCS lot records) in a given warehouse location. A simple report or query could be developed using the "flow rate" in the BPCS lot master record to provide the average flow rate for all elements in a location.
6. BPCS provides standard shortage reports. These should be considered for use. Materials personnel didn't know of these reports

I. Marketing and Sales

Findings

1. Available to Promise functionality is not working.
2. Advanced Shipping Notifications automatically sent to customers is desired. Also, customer account statements (not the same as "open receivables") is desired. The lack of user-maintainable reports and the ability to easily create "ad hoc" reports would be very useful.
3. Alternate item capability in order entry would be useful.
4. Customer order pricing is currently set up by item, customer and "price code". This is all done outside of BPCS. The price is manually looked up and entered into the BPCS customer order.
5. An item called "SPECIAL" is often used to book customer orders and subsequently manufacture product.
6. Two days per month of manual effort are spent updating a spreadsheet from BPCS data on changes to the previous month's bookings. This is due to the program which automatically updates the spreadsheet from BPCS. The program only takes the most recent month's bookings and ignores any changes to the previous month's bookings.

Implications

1. Not having this functionality reduces the ability to satisfy customer demand within the order entry process.
2. The current use of sales analysis report information to develop a "shipping acknowledgement" is unnecessarily time-consuming. A customer account statement would improve customer communications. Lacking the ability to get information when needed and as needed can lead to lost opportunities.
3. There are alternate items based on packaging. Determining what they are and their inventory availability within a customer order entry process is cumbersome.
4. Wasted time and the possibility of error are implicit in this approach.
5. Using "SPECIAL" as a catch-all to coordinate sales and production of exceptional products loses all item-specific analysis. MRP and CRP can't process it without a bill of material and routing developed for it.
6. The activity reported in point 6 above is totally unnecessary/wasted effort.

Click **here** *to return to No Stone Unturned professional services page*

I. Marketing and Sales, *continued …*

Recommendations

1. Determine the cause of this problem (data, programs, policy/procedure) and resolve it as soon as possible.
2. The E-forms product should be used by the IS Department to generate a PDF document for ASN's based on the BPCS "ship confirm" step and email it out to the customer. E-forms should also be used to develop the account statement. This product or ones more suited to user-developed reports should be acquired.
3. BPCS supports alternate items in customer order processing. By setting up allowable alternatives, including any quantity differences, BPCS can display alternatives to the order processor including available inventory.
4. BPCS has a pricing matrix that can handle On the Wayup's needs. The price per unit can be set for combinations of item, customer and "discount code", among other methods. The discount code used in pricing can be either the customer discount code, ship-to discount code or item discount code.
5. This is bad practice, similar to using "REWORK" to coordinate all that activity. Only book customer orders for actual items that already have bills, routings, standard costs, etc. defined. If this must occur after the customer indicates a need, book a customer quote. Convert it into an order after appropriate engineering, costing and pricing data have been developed.
6. Change the program that updates the spreadsheet to rebuilt it from scratch and not just add the most recent month's bookings.

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additional points about tracking quality issues, European operations, domestic financial operations and international finance subjects have been removed for confidentiality reasons.

Click **here** *to return to No Stone Unturned professional services page*

Conclusions / Key Insights

First of all, I would like to thank Eric, Pedro, Patricia and all the others I met for the time spent with me. The interest and candor shown indicate to me that the company wants to achieve the highest performance possible and will work hard at making the ERP improvement project a success.

A common thread of this assessment was the lack of BPCS training among current personnel. On-the-WayUp should consider a focused program of "remedial education and training" designed to increase knowledge with a minimum of time lost to the day-to-day business.

Training users in the "how BPCS works" aspects prior to *educating* them on the "why MRP is important theoretically" and "what does that mean to On-the-WayUp in general and my job in particular" would be a mistake. Typically when this is done, the value of the software training is lost.

There is opportunity for major manufacturing, costing and inventory improvements without major effort expended. Fixing the engineering data for the top several dozen standard items will immediately allow BPCS to be used for manufacturing planning, execution, standard costing, shop floor control. This represents tremendous leverage.

As part of preparing for the expanded use of BPCS in manufacturing and costing, prototype scripting should be considered. Scripting out exact procedural needs for all core business processes will assure a "no surprises" cut-over from existing "mixed" (spreadsheet and BPCS) operations.

Prototype scripting will shake out any short-comings in the software, data load decisions, training, job descriptions, policy and procedure. It would also be the basis for updating the procedural flowcharts supporting quality and the use of BPCS as ***the*** business system controlling operations. Use of off-line spreadsheets and databases should be restricted as much as possible to reporting tools..not business data processing tools which perform calculations and feed data back into BPCS.

On behalf of Unbeaten Path International, thank you for allowing us to be of service. Please contact us with any questions you may have regarding this report.

Click **here** *to return to No Stone Unturned professional services page*