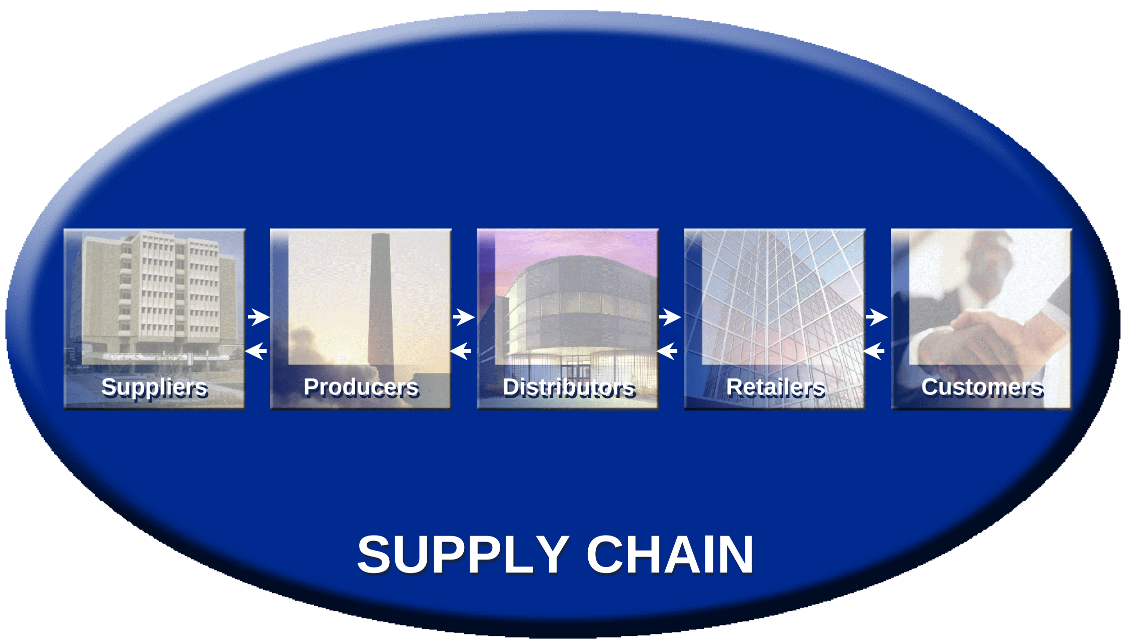
Supply Chain Council (SCOR) Supply Chain Operations And Management Awards for Excellence

Workload Planning Trial



HQ Air Force Materiel Command
Supply Chain Management Program

February 2002

Foreword

February 15, 2002

This document is the Air Force Materiel Command's (AFMC) submission for the 2002 Supply Chain Council (SCOR) *Supply Chain Operations and Management Award for Excellence*. The submission details the Workload Planning Trial developed at HQ AFMC and tested at the WR-ALC production depot.

The Workload Planning initiative is a product of HQ AFMC's Constraints Analysis Program that seeks to identify and attack constraint areas that prevent us from maximizing support to the warfighter. Through in-depth analysis of the Workload Planning constraint, we were able to identify that demand variability has a significant impact on AFMC's wholesale repair operations, and in-place workload planning processes did not address this issue. Consequently, we developed a methodology, based upon the classification of AFMC repair shop environments and proven industry best practices, to improve our workload planning capability.

We were extremely pleased with the trial results, as we saw marked improvements in the metrics that are most closely related to improved support to our warfighting customers. Based on these positive results, we are currently in the process of extending the Workload Planning concepts to appropriate depot maintenance facilities Command-wide.

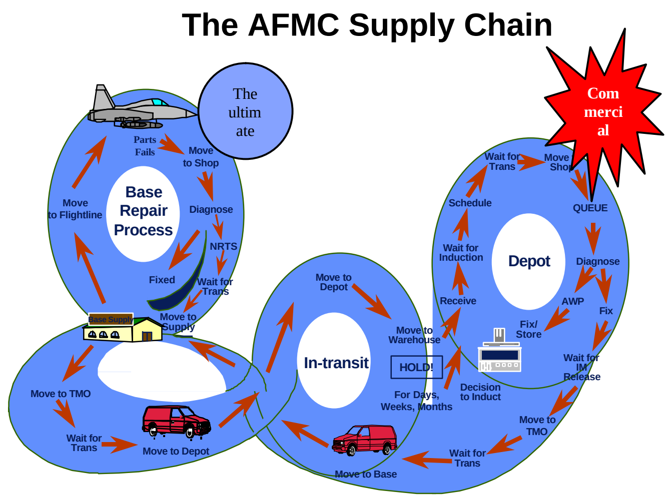
Contents

Section 1

General Information and Project Complexity

1.	Provide the name of the submitting organization:	Headquarters Air Force Materiel Command Logistics Directorate (HQ AFMC/LG) 4375 Chidlaw Road, Room A-135 Wright-Patterson AFB OH 45433-5006
2.	Identify the name of the responding organizational unit:	Headquarters Air Force Materiel Command Supply Chain Management and Analysis Branch (HQ AFMC/LGIL)
3.	Provide a brief mission statement of the organization:	The HQ AFMC/LG mission is to, "Provide policy, guidance and resources to fulfill the United States Air Force Logistics' needs in war and peacetime." In support of this mission, HQ AFMC/LGIL is responsible for implementing AFMC's Supply Chain Management (SCM) initiative, which incorporates the Constraints Analysis Program (CAP) and supporting decision support systems. Additionally, LGIL analyzes and reports Supply Management Mission Area (SMMA) Business Performance Indicators, is the lead for Supply Management business and strategic planning, and is AFMC's lead office for the USAF Spares Campaign, a major initiative to improve parts supportability of Air Force weapon systems.
4.	Indicate the award category of submission:	Award for Supply Chain Operational Excellence

5. Provide a brief description of the supply chain and the processes the submission spans:



The above figure depicts the AFMC Supply Chain. The Workload Planning trial is primarily concentrated around the Depot portion of the supply chain. The trial involves the identification of reparables for which future demand by the warfighting customer can be predicted with a high degree of confidence. Using this information to prime the repair lines with the right materials and worker skill sets, reparables are then proactively inducted in advance of customer demand. The end result is improved availability throughout the supply chain of the items the customer needs. Given that the advanced repair process addressed by this technique reaches all the way back to commercial suppliers and all the way forward to the warfighter, this submission spans the entire supply chain, but with special emphasis on the depot's customer repair loop.

6. Provide the names and number of people involved from each supply chain partner organization in the project (External):

KPMG Consulting – 5 participants
- Kevin Millspaugh
- Dennis Schultz
- David Morrow
- Belinda Hannah
- Guy Vanderman

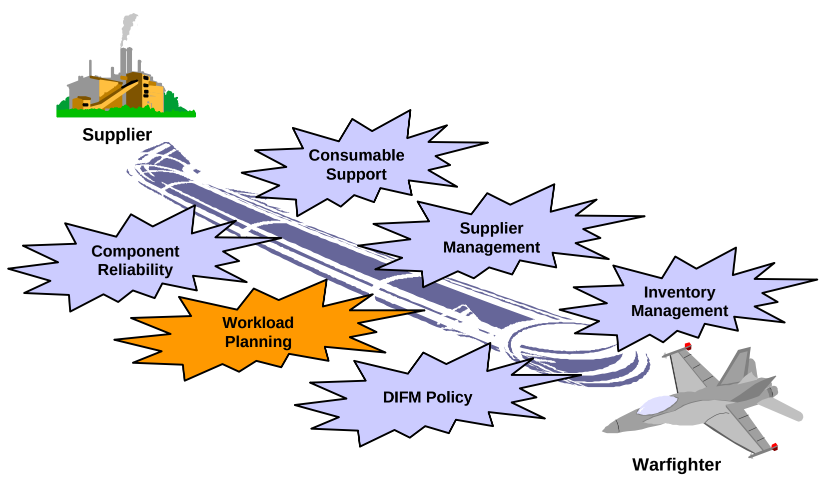
7.	Provide the names and the number of people involved from each functional organization and category of each organization (Internal):	HQ AFMC Supply Chain Management and Analysis Branch (HQ AFMC/LGIL) – 3 participants Wing Commander Andy Gell Capt Kieran Keelty Capt Ty Sills HQ AFMC Agile Logistics Policy Branch (HQ AFMC/LGPP) – 1 participant Marty DeWoody-Rowell Warner-Robins Air Logistics Center (WR-ALC) • Avionics-RADAR Section Production Support (WR-ALC/LYPOC) – 4 participants Mike Poole Carl Stone Jack Wilson Lt Mona Medley • Maintenance Supervisors, Schedulers & Technicians (WR-ALC/LYPMI) – 75 participants • Materiel Management Item Managers/Supervisors (WR-ALC/LYG) – 10 participants • Requirements Supervision Branch (WR-ALC/LYMM) – 1 participant Annie Roberts
8.	Provide a point of contact for each supply chain partner:	HQ AFMC/LGIL Wing Commander Andy Gell, (937) 904-0124 HQ AFMC/LGPP Marty DeWoody-Rowell, (937) 257-3194 WR-ALC/LYPOC Mike Poole, (478) 926-9946 WR-ALC/LYGI Patsy Rooks (478) 926-7612 WR-ALC/LYMM Annie Roberts, (478) 926-4267

Section 2
Implementation

(1) Explain why the supply chain initiative was undertaken and how it was selected.

The Air Force Material Command (AFMC) Supply Chain Management and Analysis Branch (LGIL) is leading the Command's efforts with regard to actions that must take place to improve logistics support to the Warfighter. This is a complementary effort to the AF/IL Logistics Transformation initiative, now a part of the USAF Spares Campaign, currently underway to improve the overall Air Force Supply Chain. In order to improve performance, AFMC has committed to adapting industry best practices of Supply Chain Management (SCM).

In June 1999, AFMC/LGIL briefed the AFMC Commander on backorder reduction initiatives that reduced customer backorders from 615,000 to 450,000 from December 1998 to April 1999. In addition, the team presented the results of a survey conducted to identify the systemic supply constraints inhibiting further backorder reductions. AFMC/CC directed further analysis of these constraints and as a result, the Constraints Analysis Program (CAP) was formed. The initial phase of the CAP, July to October 1999, identified six primary constraints inhibiting the flow of reparable assets from the supplier to the customer.



- Consumable Support
- Component Reliability
- Supplier Management
- Inventory Management
- Due-In From Maintenance (DIFM) Policy
- **Workload Planning**

The second phase of the CAP focused on identifying root causes for the six constraints and identified potential solution sets to eliminate them. The Workload Planning constraint identified that demand variability has a significant impact on AFMC's wholesale repair operations and that existent workload planning processes did not address this issue. Furthermore, under an earlier initiative known as the Agile Logistics concept, both supply and demand-side variability were supposed to be addressed via buffer inventories. It could be argued that the results desired and intended from these policies were not achieved, perhaps due to differences in interpretation during implementation at the ALCs. A less than complete implementation of Agile Logistics strategies resulted in minimal deployment of the Consolidated Reparable Inventory (CRI) and Consolidated Serviceable Inventory (CSI). Given the inadequate implementation of the CRI and CSI buffers, a great deal of pure demand and system variability is passed directly to the shop floor which has little flexibility to react in an efficient and timely manner.

Figure 1 graphically illustrates the impact of variability and the ineffectiveness of the CRI and CSI buffers to moderate demand variability at the shop level. The figure shows the actual workload induction and production levels for Warner Robins ALC/LYP as measured against targeted induction and production levels. The graphic illustrates the wide variation in the amount of actual inducted assets that were driven by EXPRESS[1] in order to meet the targeted production level. Additionally, this graphic represents the cumulative, monthly variability for over 600 individual stock numbers. Variability at the daily, item-level can be, and often is, much more dramatic.

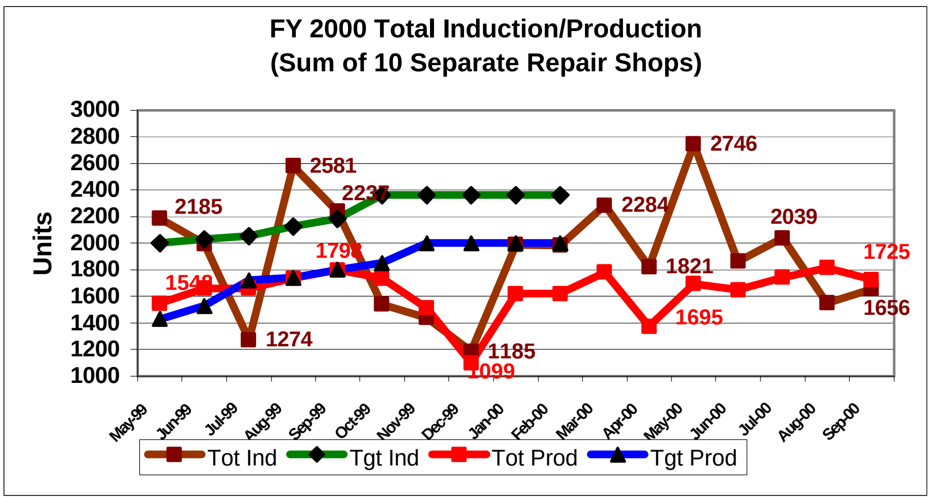


Figure 1: WR-ALC/LYP Induction and Production Breakout

A methodology was developed to improve workload planning based upon the classification of AFMC repair shop environments and the application of proven industry best practices that more closely align workload planning procedures to actual product environments and end item characteristics. Variability of customer demand, workload capacity and complexity of a repair shop's maintenance environment were found to be important factors impacting a repair shop's ability to generate optimum throughput. The ideal environment to test this methodology was determined by identifying several *medium* to *complex* shop environments within a product directorate and focusing on the high-demand, top items that account for a large portion of the historical shop volume. Using proactive inductions as a means to smooth demand and resulting induction variability is the premise of the Workload Planning methodology.

[1] The EXecution and Prioritization of REpair Support System (EXPRESS) is the AFMC process that acts to prioritize repair requirements. After prioritizing, the supportability process analyzes depot resource constraints and acts as a filter for determining what is finally acceptable for movement into repair.

(2) Indicate the duration of the project.

The Workload Planning trial was conducted for six months from Apr 01-Sep 01 with follow-on analysis and outcomes continuing into Jan 02. As detailed later in this submission, the measured outcome of the trial exceeded all expectations and the trial was declared a complete success. The 2002 phase aims to complete roll out at WR-ALC and establish embryo proof-of-concept sites at the USAF's other two depots at Oklahoma City (OC-ALC) and Ogden in Utah (OO-ALC).

(3) Describe, in detail, the process used to complete the initiative.

As previously discussed, the Workload Planning methodology was developed specifically to address the impact of demand variability within medium to complex repair environments. Daily demand variability is addressed by scheduling production of assets with an established, consistent demand history thereby leveling the daily variability across the entire monthly scheduling horizon. The additional benefit of a level demand for a select group of well established assets is that the repair shop can be more flexible regarding the other assets it repairs. Simply stated, by decreasing overall variability of demand on a shop's high-volume items, the shop can better respond to those instances of increased variability on other individual assets and, thus, is better able to support the customer. However, fundamental to this process is the ability to identify and forecast demand for those assets with a relatively high and stable demand pattern.

Early work suggested that a relatively simple forecasting tool could provide the Shop Supervisors/Schedulers and the Item Managers with a reasonably accurate forecast of the next month's anticipated workload requirements. Allowing such flexibility would not consume additional resources, but would simply adjust the timeframe in which the resources were consumed. As an additional control measure, EXPRESS outputs were compared to those being driven by the forecasting tool in order to provide a "sanity check" as well as to head off the development of "buggy whips" (items produced to go on the shelf, rather than to meet a genuine customer need and, as such, a bad item to produce within the concept of this trial).

The trial was conducted at Warner-Robins Air Logistics Center in Georgia and involved the LYP Avionics repair shops. The primary forecasting tool used in the Workload Planning test was Demand Solutions (DS). Demand data was imported into DS and it calculated a monthly forecast for each test NSN. The DS tool forecast was "capped" at a rate of 75% of the full forecasted requirement to limit the possibility of "over production". The resulting 75% production level, called "keep up", was added to a "catch up" amount which was used to target Backorder[2] reductions. The "catch up" and "keep up" amounts were then added together for an "agreed to" amount of monthly production.

[2] A Backorder is defined as a demand placed on the AF supply system that cannot be immediately satisfied.

The forecasting and scheduling process was intentionally kept simple and was easily executable. The test required that the Item Managers and Shop Schedulers take the forecasted demand, coupled with other relevant data such as backorders and reparable carcass status, and agree to a scheduled repair requirement consistent with meeting demands and reducing backorders. This “agreement” then became a scheduled repair execution “contract” for the coming month. This “agreement” pertained only to the high volume “test items”. All other items that the repair shops worked were inducted using the standard EXPRESS system. If at any time during the test actual customer demand for the test items, as articulated by EXPRESS, manifested itself at a higher rate than that “predicted” by the forecasting tool, the Item Manager and Shop Scheduler would convene and agree to produce at the higher rate. This arrangement prevented the “agreement” from limiting production if/when variability in customer demand drove a higher requirement.

The primary information tool for the test was an adaptation of a Warner Robins Avionics Branch tool known as “Profiles in Avionics at the Depot” (PAD). PAD was already being used in the Avionics Branch to gain greater visibility into asset position and the repair process. With minor adjustments to the PAD tool, information required for the workload test was included. PAD became the central repository for the history of prior demands, production levels, prior forecasts, cost to repair, backorders, asset positions, carcass status and other relevant information for the planning and execution of the Workload Planning methodology. PAD provided a common operating picture for both Item Managers and Shop Schedulers participating in the test and provided them with the necessary information to reach their repair execution “agreement”. Of course, to reach agreement requires communication and one of the most pleasing outcomes of the trial was a highly visible increase in dialog between the key players in the supply chain.

The execution phase of the Workload Planning test was not a significant departure from pre-test execution. The major difference was the means by which assets were driven into repair. EXPRESS continued to drive requirements as normal, however, the shop could induct additional test items when it deemed beneficial. The induction of assets into repair prior to customer demand is not normally authorized and for the purposes of this test a waiver to AFMC policy concerning fixer intervention, or manual inductions, was required.

(4) Identify significant challenges encountered, the process for resolution, and the solutions. Identify best practices.

Overcoming Organizational Stovepipes

One of the key challenges to address in an initiative that cuts across Maintenance and Materiel Management lines is to overcome organizational stovepipes. The success of the Workload Planning Trial depended upon bridging the communication gap between these two communities. To accomplish this, several important steps were taken. First of all, face to face meetings were conducted between Item Managers and Maintenance Schedulers to proactively determine the monthly production goals. This served the purpose of allowing the individuals to put "faces with names," and to better understand each other's challenges. For example, one Item Manager met with a Maintenance Scheduler at the repair depot and was able to see the item she managed for the first time. She saw how the size of the item limited the scheduler in the number of items he could induct into the shop due to available storage space. In addition to face to face meetings, the PAD tool enhanced the visibility of item status and maintenance actions resulting in better cross communication between maintenance and supply, and provided Item Managers with better insight to discuss support issues with their customers.

Impact of Readiness Base Leveling (RBL) Inventory Allocation

The Workload Planning trial was originally scheduled to begin Mar 01. In Feb 01, however, an unusually large re-allocation of assets impacted WR-ALC as a result of a "Readiness Base Leveling (RBL)[3] push". RBL pushes are routinely conducted to re-allocate assets in a manner that best supports the Warfighter. In this case, the re-allocation resulted in an extreme influx of items into repair at the test shops that threatened to mask the effects of the trial. Consequently, the trial was pushed back one month to Apr 01. Even though the test was delayed, it is still possible that the large RBL influx may have masked the test results.

Overcoming "Batching" and "Buggy Whip" Prejudice

Another challenge to overcome was the preconceived notion that working to a planned goal would lead to "batching" or the production of "buggy whips," both of which are viewed as unresponsive to the needs of the warfighter. It is critical to emphasize that this approach does not lend itself to either scenario and, in fact, is more responsive to the warfighter's needs. The batching argument presupposes that the Workload Planning method would allow maintenance to

[3] RBL is a system to centralize the computation of base and depot asset levels. By centralizing the level setting process, the Air Force is in a better position to have the assets in the location(s) they can be most readily utilized. The principal goal of RBL is to optimize the allocation of levels to minimize base level expected backorders.

ignore the EXPRESS prioritization system in favor of producing large batches of spares with a lower demand priority. This is simply not the case, as maintenance was still required to react to EXPRESS driven requirements. Furthermore, maintenance schedulers were encouraged to utilize a “mixed model scheduling” approach to level load a mixture if items through repair in an even manner rather than to produce large batches of items.

The production of “buggy whips” was not a concern as the methodology specifically focused on items that were in high demand by the warfighters. Additionally, the material managers maintained frequent contact with the maintainers throughout the process to adjust production goals according to changing demand.

(5) Indicate the metrics used to measure progress and success.

The metrics used to evaluate the Workload Planning test were the standard suite of HQ AFMC Supply Management Mission Area (SMMA) and Depot Maintenance Mission Area (DMMA) key performance indicators to include: MICAP[4] Hours and Incidents, Backorders, Logistics Response Time (LRT)[5], and Retail Issue[6] and Stockage[7] Effectiveness. The number of assets On Work Order (OWO)[8] was also monitored to assess the amount of work in process, reduced OWO being good. The same key metrics were collected for LY as a whole as well as for the entire Radar section to provide a basis for comparison of test results. The most important metrics were deemed to be those giving the best indication of impact or support forward along the supply chain to the warfighting customer. These were MICAPs, BOs and, through the insight it provides to how each shop is coping with demand, OWO. By tracking these common metrics throughout this test, the team was able to quantify the results. The results of this performance measurement exercise are detailed in the following section.

(6) Document and quantify cost and performance improvement benefits.

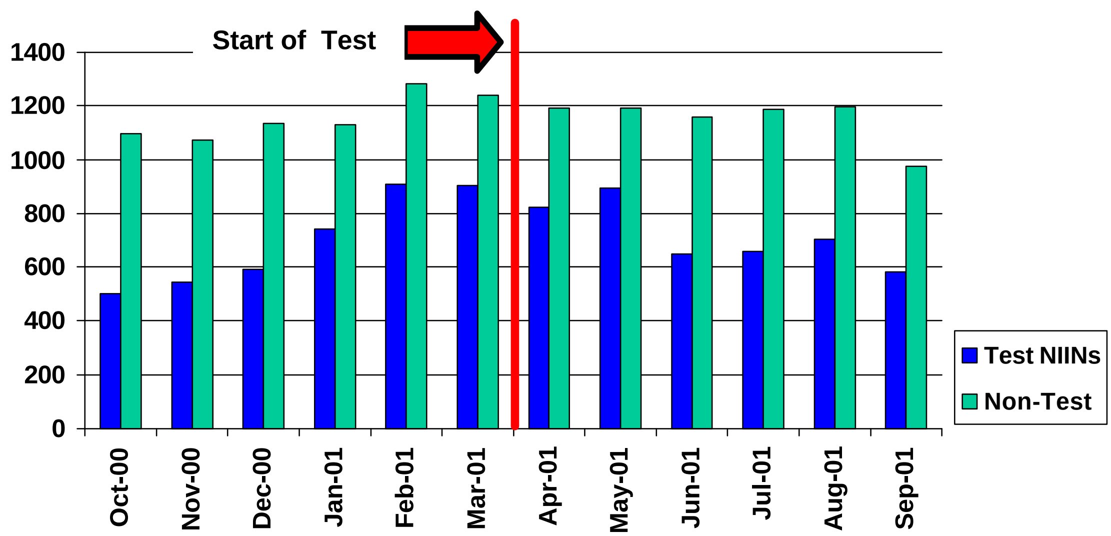
The Workload Planning test results support the hypothesis that inductions in advance of predicted customer demand are a viable means of mitigating the effects of demand variability in medium to complex shop environments and of providing better support to the warfighting customer. Accumulated test data metrics reveal improvements in the key metrics concerning the number of backorders (in the aggregate as well as Peacetime Operating Stock and Readiness Spares), and MICAP hours and MICAP incidents. A significant reduction in the amount of test NSN assets OWO was also a positive result. In addition, there were several non-quantifiable successes that resulted from the use of the Workload Planning methodology. It is important to

[4] A MICAP is defined as a Backorder that prevents a weapon system from achieving fully mission capable status.
[5] LRT is the time between initial base level requisition and customer receipt.
[6] Retail Issue Effectiveness is the percentage of the time that base supply issues a serviceable part when a demand is placed, regardless of stock level authorizations.
[7] Retail Stockage Effectiveness is the percentage of the time that base supply issues a serviceable part that it is authorized to stock.
[8] OWO are reparables inducted into maintenance awaiting repair or in various stages of repair. Also referred to as Work In Process (WIP).

note that the test team was alert to the danger of creating a "Hawthorne effect" and great care was taken throughout the test to ensure that non-test items were not disadvantaged in terms of resources or management attention.

Backorders

The aggregate total number of backorders for the test items showed a decline from 905 to 581 units during the test period as depicted in Figure 2. This decline of 324 units represents an improvement of 36%. Non-test items showed only a 252-unit decline in backorders, or a 21% improvement, while LYP as a whole showed only a 15% decline over the same period. Repair shop and materiel managers involved with the test stated that the "catch up" and "keep up" planning agreements provided an achievable target and allowed for a more level, efficient repair process for reducing backorders. As hypothesized earlier, the level induction of test items provided greater flexibility within the shops for repairing other assets helping to reduce backorders across the board.



	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01
Test NIINs	499	543	589	741	906	905	825	895	650	657	707	581
Non-Test	1099	1076	1133	1132	1282	1241	1190	1192	1160	1186	1197	976

Figure 2: Backorders

As illustrated in Table 1, Peacetime Operating Stock (POS) backorders declined by 26% and Readiness Spares Package (RSP) backorders declined 198, for a 49% reduction. MICAP backorders showed no change and AWP had no backorders for the year.

During the same period, POS backorders for non-test Items only showed a reduction of 6%, whereas all LYP items posted a 22% reduction, a decline of 1543 units. For backorders generated due to items placed into AWP status, LYP showed a decline of 144 units or 16%, while Radar non-test Items showed an increase of 31 units. Non-test items for Radar reduced RSP backorders by 99 units or 41% while LYP as a whole increased RSP backorders by 472 units or 26%.

Test NSNs	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Change	% Change
POS	213	270	225	263	482	478	407	363	349	331	375	352	-126	-26.36
AWP	0	1	1	0	0	0	0	0	0	0	0	0	0	0
MICAP	25	7	67	57	32	21	24	16	32	37	40	21	0	0
RSP	261	265	296	421	392	406	394	516	269	289	292	208	-198	-48.77
Totals	499	543	589	741	906	905	825	895	650	657	707	581	-324	-35.80

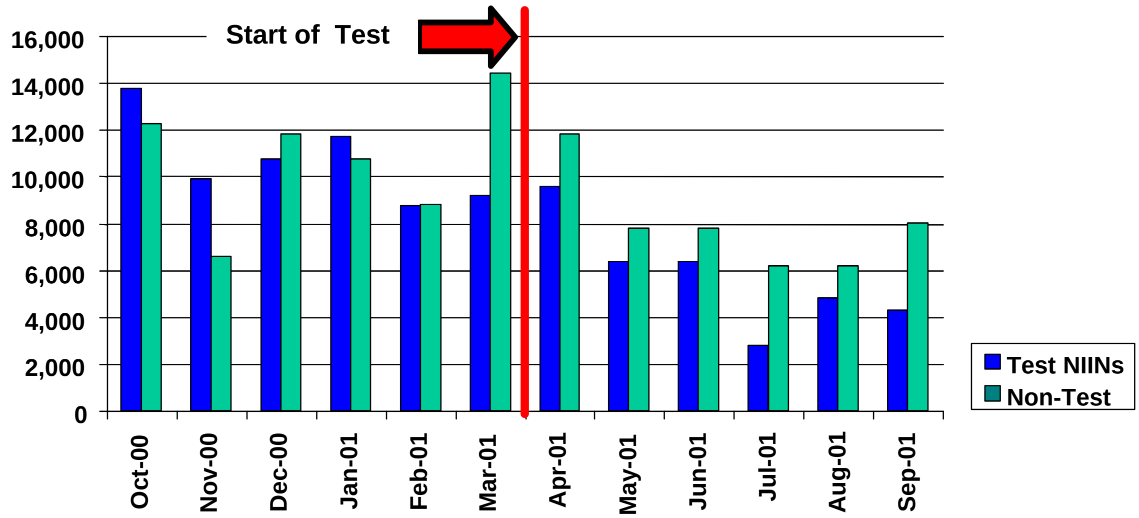
Non-Test	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01	Change	% Change
POS	574	808	485	499	650	632	658	673	694	662	682	595	-37	-5.85
AWP	60	64	69	68	69	67	62	69	77	82	92	98	31	46.27
MICAP	222	39	399	404	313	289	229	234	143	192	182	142	-147	-50.87
RSP	243	165	179	161	241	240	224	210	239	243	233	141	-99	-41.25
Totals	1099	1076	1132	1132	1273	1228	1173	1186	1153	1179	1189	976	-252	-20.52

Table 1: Test and Non-Test NSN Backorders by Category

The number of outstanding backordered requisitions for the test Items displayed a greater improvement than that of the non-test items in the Radar section and, as such, was a successful outcome of the trial. However, keeping weapon systems combat ready is the focus of the AFMC repair process, and MICAP hours and incidents are key measurements of that objective. These performance measures will be considered next.

Mission Capable (MICAP) Hours and Incidents

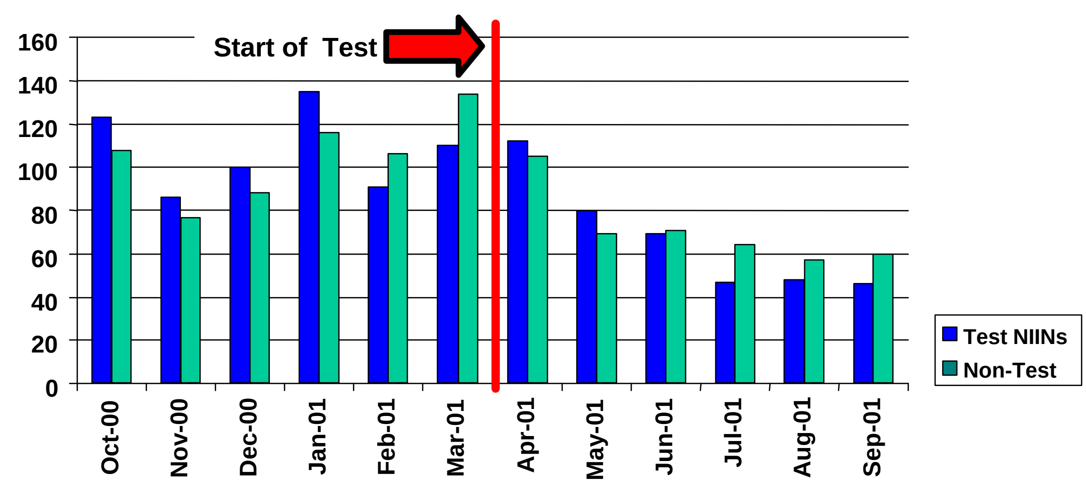
Total MICAP hours for the test items, Figure 3, showed a decline from 9,237 to 4,308 for the test period. This decline of 4,929 hours represents an improvement of 53%. The Radar non-test Items posted an improvement of 44% from 14,433 to 8,029 total hours.



	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01
Test NIINs	13,767	9,895	10,765	11,746	8,805	9,237	9,611	6,408	6,392	2,825	4,832	4,308
Non-Test	12,282	6,636	11,878	10,761	8,849	14,433	11,860	7,815	7,831	6,211	6,190	8,029

Figure 3: MICAP Hours

MICAP Incidents showed a similar decline for the test Items from a pre-test high of 110 in March to a September level of 46 for an improvement of 58%. MICAP Incidents for the non-test items showed a similar decline from 134 to 60 or an improvement of 55%. Once again, we see that the test items have out-paced the non-test Items.



	Oct-00	Nov-00	Dec-00	Jan-01	Feb-01	Mar-01	Apr-01	May-01	Jun-01	Jul-01	Aug-01	Sep-01
Test NIINs	123	86	100	135	91	110	112	80	69	47	48	46
Non-Test	108	77	88	116	106	134	105	69	71	64	57	60

Figure 4: MICAP Incidents

While the number of MICAP incidents is an important metric with regard to Warfighter support, the actual MICAP hour accumulation due to those incidents is a more critical measure of support effectiveness as it most closely correlates to aircraft availability. As Figures 3 and 4 indicate, an improvement in the test Items' performance did not negatively impact the non-test items. In fact, the opposite occurred. The actual Workload Planning test results demonstrate improved Warfighter support across the board, directly equating to improved combat capability for the Air Force. This improvement can be directly related to more aircraft able to fly in support of the USAF operations, including operation NOBLE EAGLE and ENDURING FREEDOM.

Manual Inductions into Repair (Fixer Intervention)

The amount of Fixer Intervention or manual inductions for the six-month test was also tracked to gauge how much proactive induction was required in support of the Workload Planning test. For the entire test period, 403 units were inducted for an average of 67 units per month. This represents 12% of inductions for the test items and approximately 6.7% of total inductions for the Radar section during the test period. While the prior five months' inductions were 283 units, the month of September alone saw manual inductions climb by 120 units. This significant rise in manual inductions for September was a proactive response to the terrorist attack and the pending surge requirement on the depot. This is viewed as a key finding as the Workload Planning process allows maintainers and material managers to "lean forward" in support of a pending surge rather than forcing them to be reactive. This improves the efficiency and flexibility of the supply chain and, as a consequence, its ability to meet the warfighting customer's needs.

On Work Order (OWO)

Prior to the start of the test, it was noted that "buffers" had developed, within the repair shop environment, as an unintended response to the repair system's need for some form of a variability cushion. These assets are "held" in the shop in OWO status, to mitigate demand variability and allow for some amount of flexible support for workload managers, regardless of EXPRESS driven requirements. Initially, it was noted that in some cases up to three months worth of "customer" demand requirements were held in repair shops under OWO status.

Consequently, the number of assets in OWO status was an additional metric tracked during the Workload Planning test. This measure identifies the quantity of items that were in the shop to be repaired. The importance of this measure is that it represents a consumption of Cost Authority (CA) required to support the repair process. If increased production is accomplished at the expense of accumulating more OWO, then more CA is committed to support the process. Since CA is a finite resource, such increased consumption would come at the expense of something else not being repaired. Moreover, as increased OWO is a sign that the shop is not keeping up with customer demand, controlled or reduced OWO is a key success criteria for the trial.

Prior to the beginning of the Workload Planning test in April 2001, OWO for the test items was 546 units. This amount was in line with the non-test items that had a total of 538 units OWO for the same period. Test NSN OWO numbers increased by only 97 units to a total of 636 units for the test period while the non-test Items gained an additional 530 OWO units to a total of 1068 units. The "buffer" represented by the units in OWO status saw only a marginal increase for the test items whereas the non-test NSN saw a substantial increase.

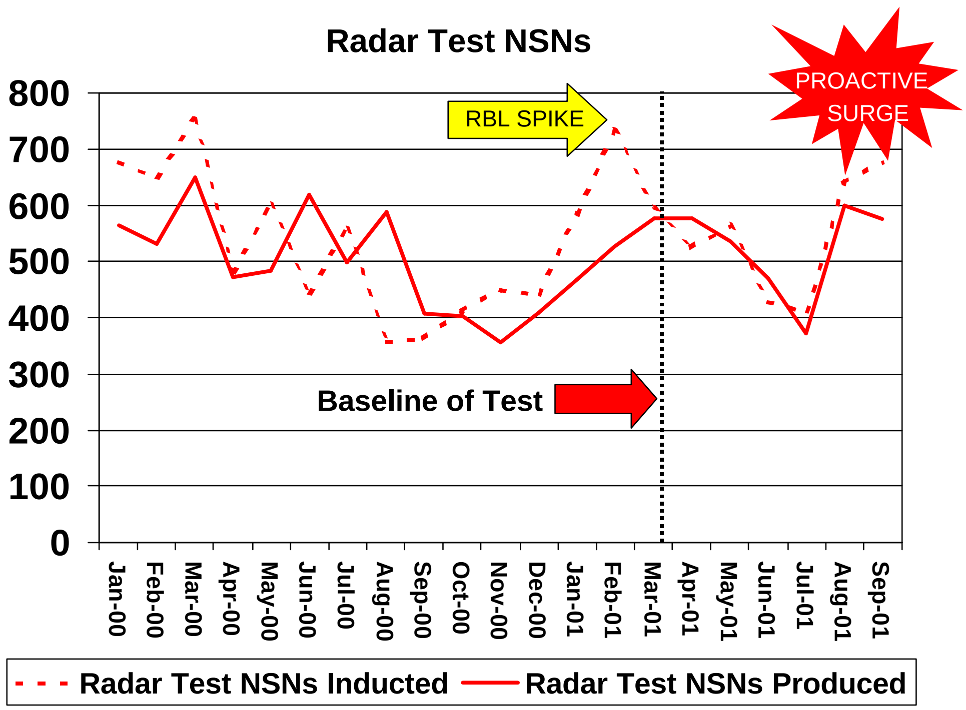


Figure 5: Radar Test NSNs

The induction and production levels for the test Items and non-test Items were also analyzed to gauge the effect the Workload Planning methodology had on smoothing demand variability. Figure 5 depicts the induction and production levels for the test Items. The variability in inductions and how poorly inductions relate to production levels prior to the test is clearly evident. After the test, a much closer relationship between inducted and produced levels is evident and illustrates another positive result from the test. The alternate Workload Planning techniques appear to control OWO growth by achieving a closer correlation between induction and production. Note also how the only period where inductions outpace production is in the Sep 01 time frame. This influx of OWO is a result of "leaning forward" to prepare for the impeding surge in response to the terrorist attack on 9/11.

An examination of the repair induction and production levels for the non-test Items shows no real change in the induction and production patterns. Production still seems to "chase" induction levels resulting in significant induction variability, and there is no flexibility to "lean forward" in support of surge actions. This contrast emphasizes the positive impact of the test on allowing production to step-up to the demand for induction.

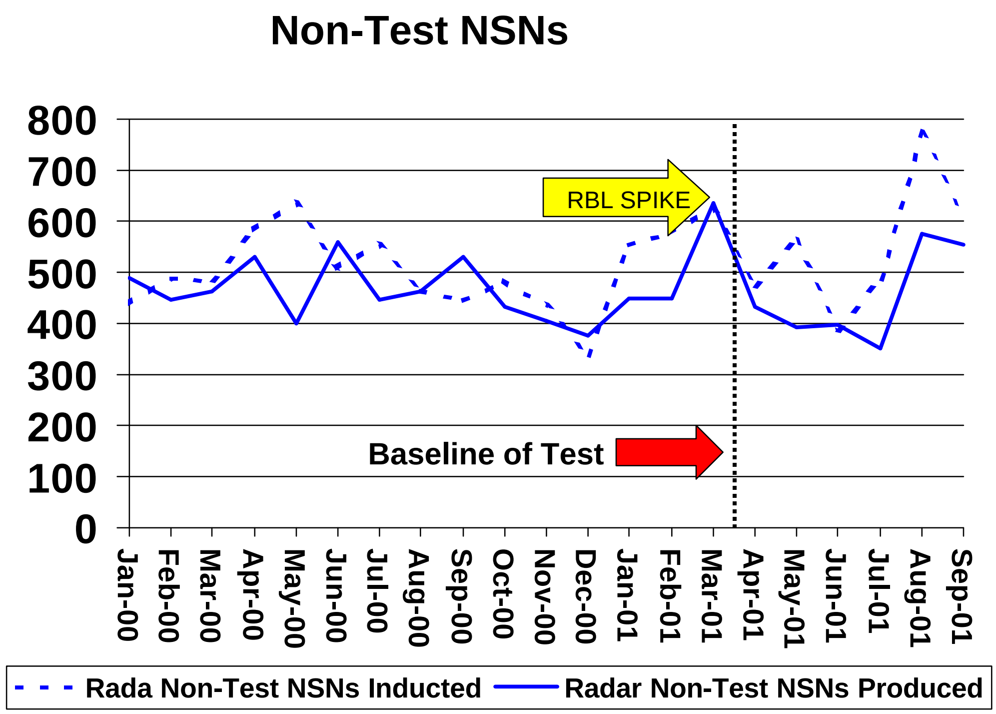


Figure 6: Radar Non-Test NSNs

Qualitative Assessment

In addition to the quantitative analysis performed during the Workload Planning test, there were also several qualitative successes observed. The most significant qualitative success was the increased communication between the Item Managers and the Shop Schedulers. All participants noted improved communication as a positive result of the test. Specifically, Item Managers stated that they were more informed as to the status of test assets and therefore could talk more knowledgeably with the customers and provide better overall customer support. The first meeting between the Item Managers and the Shop schedulers and Shop Supervisors was held in the actual repair shop and several Item Managers stated that this was the first time that they had actually seen the items for which they were responsible.

Increased communication also allowed for production plans to be changed as the need dictated. This communication provided a more direct link from the shop to the actual customers' needs. There were occasions during the test when agreements had to be altered in response to changes in demands from the Warfighter. This flexibility was a positive sign that the shops were willing to alter their planned production in order to meet the changing needs of the customers.

Shop personnel also stated that the monthly agreed to amounts for specific backorder reductions provided them with a production target. This target allowed for a more logical and systematic reduction in backorders as opposed to simply focusing efforts on reducing backorders for the item with the greatest number of backorders, or the “deepest hole”.

Clearly, increased communication is a key benefit of this approach. Both Maintenance and Supply participants in the study repeatedly voiced support for this methodology and believed that they were able to enhance support to the warfighter. In essence, the techniques were highly popular with those involved.

(7) Outline how the success of this effort supports the organizational objectives described in section 1, item 3.

The HQ AFMC/LG organizational objective is to, “Provide policy, guidance and resources to fulfill the United States Air Force Logistics' needs in war and peacetime.”

The key to supporting this objective is to “fulfill the United States Air Force Logistics’ needs in war and peacetime,” which, simply stated, is to improve parts support to the warfighter. The Workload Planning initiative came about through recognition that a key element in the USAF supply chain, the wholesale repair process, could be improved to make it more responsive to the customers’ needs. The techniques trialed here achieved dramatic results in improved aircraft availability through the impact of better repair output transmitted along the supply chain. Trial results indicated, as outlined in detail in the previous section, increased warfighter support through improvements in the most critical measures of customer responsiveness, such as reductions in customer backorders as well as MICAP hours and incidents. Additionally, results of the trial point to necessary fiscal policy amendments and highlight increased focus on existing processes and guidance that are paramount to maximizing warfighter support. A detailed discussion of suggested amendments to policy and guidance is presented below.

Impact on EXPRESS Planning Module (EPM)

While this Workload Planning test used the Demand Solutions commercial forecasting tool to predict short-term future demand, there are several Commercial off the Shelf (COTS) forecasting tools that could prove equally or more successful in the AFMC environment. We are currently examining the AFMC standard repair induction tool, EXPRESS and the EXPRESS Planning Module (EPM[9]) to evaluate its compatibility with the Workload Planning methodology. It is possible that we may incorporate the Workload Planning philosophy into our EPM tools.

[9] EPM is a prototype system used for workload forecasting that projects number of repairs needed for each NSN over various periods of time (month, quarter, year) based on available repair dollars and capacity.

A critical difference between EPM and the Workload Planning method is that EPM focuses on forecasting the resources needed in production, whereas Workload Planning focuses on planning for and inducting those significant few volume driving items. This critical aspect was echoed early in the test by a shop supervisor who stated that a forecast of demands was needed, but only if they were allowed to act upon the information. Both the forecast and the ability to proactively induct items are viewed as necessary for improving support to the customer within medium to complex shop environments.

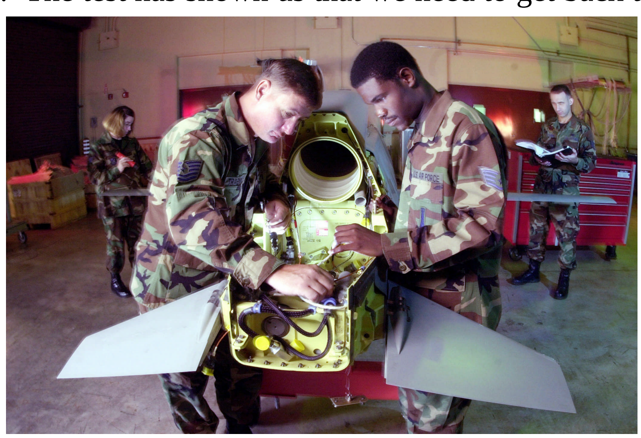
Thus the potential positive outcomes of the test extend to a review and possible amendment of existing policy, procedures and decision support tools.

Running EXPRESS in a Proactive Manner

Another suggested alternative to address any variability that may be created under the current repair induction process is to run EXPRESS proactively on a weekly and/or monthly basis. Weekly and monthly proactive EXPRESS repair prioritization lists might enable repair shops and materiel managers to gain the efficiencies that were demonstrated through the Workload Planning test. We would need to ensure, however, that the intangible benefits generated through the application of the Workload Planning techniques, such as improved communication, would not be lost through such changes in EXPRESS.

Utilization of Depot Repair Enhancement Program (DREP) Process

While the Workload Planning test results are positive and the test is consistent with the tenets of our internal DREP[10] policy, this research and analysis indicates that many of the non-quantifiable successes of the test were due to increased communication between Item Managers and Shop Schedulers/Supervisors. It was stated that much of the methodology used in this test has simply been a variation of the existing DREP process. The test has shown us that we need to get back to emphasizing the DREP process as it was originally intended. For example, DREP meetings were occurring as required by the AFMCI, however, the interaction between the Item Managers and the Shop Schedulers and Supervisors was found to be limited prior to the test and primarily reactive in nature. Workload Planning, on the other hand, encourages proactive interaction prior to the occurrence of a problem. During the test phase, Item Managers and Shop Schedulers met and discussed the test items on at least a monthly basis to solve repair production and demand problems. As the test progressed, this communication between supply and maintenance personnel steadily increased



[10] DREP (AFMC 21-129) is the standardized AFMC repair process used for all depot level exchangeable repairs.

and focused more and more on proactive problem solving. This proactive problem solving was facilitated by the Workload Planning methodology. By providing repair shop personnel visibility and control over high-volume demand drivers, via their forecasted demand rates, they were able to develop and complete an "agreed to" plan of action. Such communication is representative of the positive effects intended in the DREP process.

Modification of Fiscal Policy

Additionally, the current funding policies for the repair process, as defined in AFMCI 21-129, appear to be a limiting factor for proactively inducting items into repair. The DREP process dictates that DMAG will not place items into repair without a funded Project Order, which SMAG cannot generate without an actual demand for the item. This makes it difficult to repair "in anticipation" of a customer requirement, having to instead wait until that requirement actually materializes. Thus, an additional lesson learned is that fiscal policy will have to be modified in order for this Workload Planning methodology to be adopted as an ordinary course of action.

Section 3
Knowledge Transfer

(1) Describe the efforts to share lessons from this effort with other internal organizations.

The previous two sections highlighted the quantitative and qualitative benefits of the study, as well as the recommended policy changes to achieve them. It is our belief that these findings can be implemented in other applicable areas of the AFMC Supply Chain to achieve our ultimate objective of supporting our customer, the warfighter. To this end, we continue to strive to share lessons learned throughout our organization. We have briefed the trial results to internal decision-making forums, including the Logistics Business Board Tier III, the AFMC Supply Chain Management Conference, and the AF/IL led Spares Campaign.

Additionally, we have pioneered an SCM Training Course with the initial offering to be provided to a target audience of approximately 900 members across the Command in 2002. This training offers an excellent forum for sharing new ideas and lessons learned, and the Workload Planning initiative will be used as a case study in the course.

Finally, we intend to *actively* spread the lessons learned by implementing the trial in other applicable areas across the Command. This “roll-out” implementation of the trial is discussed in more detail in the following section.

(2) Explain how these results can be transferred to other organizations, and specify the likely candidates for transference.

The trial results are summarized into four distinct activities that support the continuation and expansion of the Workload Planning method across the Air Force Materiel Command.

Implement the Workload Planning methodology to suitable shops across WR-ALC. The success of the test at WR-ALC/LYP has proven that this method works to improve support to the warfighter. The roll-out across WR-ALC has been approved in principle by the WR-ALC/CC. The business case analysis for the next phase of implementation shows that WR/LN (Electronic Warfare Unique Items) as well as expansion across all WR/LY (Common Avionics Directorate) items meeting the complexity and predictability criteria described in the body of this text.

Implement/test the Workload Planning methodology at OC-ALC and OO-ALC. While the test has proven successful at WR-ALC, it needs to be validated at each of the other ALCs. Expansion of the Workload Planning methodology at OC-ALC and OO-ALC would validate its applicability within their repair environments and gain buy-in from each of the centers regarding this concept. At OO-ALC; the likely target repair shops are OO/LI (Landing Gear, Wheels, Brakes, Struts, and Weapons) and OO/LGF (F-16 Unique Items). At Oklahoma City, we intend to begin the import process in the area of OC-ALC/LI (Aircraft Accessories).

Consider waivers or amendments to DREP policy, where applicable, to allow for funded inductions in advance of demand. The current policy only allows for the "*reduction* of EXPRESS driven inductions" and does not allow for any increased inductions. This limits the shop's ability to proactively induct items prior to the EXPRESS driven requirement. To overcome this restriction, the test has operated under a HQ AFMC waiver. In addition, the current policy restricts the shops from inducting items that are not funded in a proactive manner. Current funding policy should be amended so that those shops utilizing this Workload Planning methodology are permitted to proactively induct items, albeit with strict monitoring and measurement criteria to avoid the "buggy whip' syndrome.

Re-emphasize focus on the DREP process through weekly proactive problem-solving meetings. One of the key elements of the Workload Planning process is communication and coordination and it amplifies the DREP process as it was originally intended. This back to basics approach is consistent with the DREP philosophy and we believe that by re-energizing the DREP process, we will be able to greatly enhance support to our warfighting customers.