



CONSTRUCTION CONCEPTS

Expediting Exceptional Performance®

Our Vision of Operational Excellence and How to Achieve It

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Imagine, for a moment, a construction company in which every crew on every project effectively and efficiently achieves a daily crew production goal each and every day without an accident or defect. What's more, the work of all crews on all projects is completed within a tightly connected, reliable and predictable flow of work throughout the life of the project enabling project completion in the shortest possible period of time to the complete satisfaction of the owner. That is our vision of the future state of construction production. Like any vision, the pursuit of the vision is a journey never to be completed, but to be relentlessly pursued. All the above is included in a production concept we call **Daily Crew Production Flow (DCPF)**.

Daily Crew Production Flow requires the daily output of each crew's production to match a specific production goal that was planned for in detail, sized, sequenced, and coordinated with the work of other crews to ensure the work of all crews is routinely performed predictably, reliably and without interruption or disruption. Daily Crew Production Flow simply will never be achieved using conventional construction project management systems. But the vision of Daily Crew Production Flow should not be dismissed because the achievement of it will require hard work and a new approach to project production management.

For many years now we have been developing and continuously upgrading a **Construction Project Production System (CPPS)** designed with the intention of achieving Daily Crew Production Flow. The CPPS provides a strategy, structure and a package of prescribed components that any contractor can use as the bridge to get them from the current state of their project production efforts to their envisioned future state of production management. Over a three to five year transformational initiative, the CPPS enables clients to:

- Achieve significant breakthroughs in safety, quality, effectiveness and efficiency within nearly all the major operations on their construction projects,

- Reduce the overall project construction cycle and the associated general conditions,
- Grow the competence and confidence of the project team, and
- Do a much better job in their efforts to satisfy the expectations of the customer.

The **Construction Project Production System** was designed in the spirit of Breakthrough as envisioned by Joseph Juran years ago as he struggled with the industrial base of post-WWII Japanese economy. It is rooted in the early methods improvement work of Professors Parker and Oglesby of Stanford University, the twenty five years of construction operation engineering at Construction Concepts, and the Lean Project Delivery System developed by Ballard and Howell of the Lean Construction Institute.

While the CPPS is similar to other “lean” production solutions, we believe our history and expertise in the area of operation engineering and the design of high performing construction operations sets us apart from most other approaches to lean construction. Over the years we have found through the application of our operation engineering and design that most construction operations underperform their potential by a factor of four or five to one, including those that are “meeting budget”. Therefore, if most of the operations within a traditional “lean” parade of operations are performing at estimated production rates, you may well have reliable and predictable flow and still have significant waste within each individual operation. We believe there is simply no reason to only practice passing off the baton within a relay team if all four runners are fat and out of shape.

The **Construction Project Production System** is a major breakthrough in construction project production management. We genuinely believe it, and others like it, create a new paradigm for the management of production on construction projects. All around the world, projects are experiencing unbelievable breakthroughs in safety, production, quality and profitability as new theory and concepts are applied to the management of construction project production. Just as aviation experienced a major breakthrough in performance as it moved from propellers to jet engines for propulsion, construction projects can achieve a similar breakthrough in performance relative to safety, quality, productivity and customer satisfaction. The pursuit of Daily Crew Production Flow through the application of the Construction Project Production System will, over time, ensure such a breakthrough.

Any serious pursuit of Daily Crew Production Flow requires the achievement two critical objectives every day for each and every crew on the project. These objectives are:

- A very high quality daily work assignment and production goal that is understood and committed to by the crew and is the result of detailed operation engineering, operation production planning and production engineering (the sequencing and control of predecessor and successor operations).
- A safe and ergonomically engineered work area in which all assembly inputs are present and the area shielded from interruptions and disruptions through a relentless production control effort.

We believe this will only be consistently achieved through the use of a five-step production planning and control system in which the inputs of a package of contract documents and an estimate are gradually processed and transformed into a continuous stream of the daily crew assignments just described. Similar to a quarry operation, in which large boulders are gradually refined into piles of prescribed aggregates, the five steps of the Construction Project Production System gradually break the project down as the level of understanding, detail and planning is increased and the creation of a delay free workarea is completed. Thus, the product of the five steps is a steady stream of high quality daily crew assignments that will

enable Daily Crew Production Flow. Every organization must learn how to modify or expand their existing production management system to ensure the outputs of the five steps described below are achieved. The purpose of this material is not to specify methods to be used, but rather to define the steps to be taken and outputs to be created if Daily Crew Production Flow is to occur. These five steps are:

- **Pre-construction Production Planning** – Pre-construction Production Planning is a step often overlooked on most projects. That is not to say an activity described as preconstruction planning does not occur within most companies. Unfortunately, much of the initial “planning” effort is often related to risk and project management tasks such as schedules and contracts. In this case, Pre-construction Production Planning is a process of identifying critical operations and major “chunks” of work (value streams) requiring special planning very early in the life of the project. It presupposes the need to perform initial production planning of key operations to attain calculated or engineered durations and supply needs that can be fed into the initial project schedule and purchase orders and subcontracts. It is within the Pre-construction Production Planning step that a Production Planning Calendar is created and the required production planning meetings of all key operations and value streams are defined and scheduled.
- **Value Stream Production Planning** – Like Pre-construction Production Planning, Value Stream Production Planning is often skipped or not even considered. Value Stream Production Planning is the step in which the sequence and flow of the operations within a major chunk of work or a series of operations leading to the accomplishment of a major project milestone are collectively and collaboratively planned as a production unit. It is here that the flow of work is planned for by defining the sequence, batch size, initial production rates and “completion requirements” of all operations and the manner in which work will be completed and turned over to successor operations. Using As-Late-As-Possible (ALAP) scheduling techniques individual operation start dates and buffers between operation completions are established.
- **Operation Production Planning** – the outputs of Value Stream Production Planning become the inputs to Operation Production Planning. It is here that the details of individual operation production plans are finalized in response to the calculations of operation engineering and the flow requirement of production engineering. Final details include the definition of specific safety and quality requirements, detailed work area diagrams depicting flow and material movement, specific sequential production goals, and the identification of remaining MakeCertain! tasks required to assure production control. The resulting individual daily crew production goals are then pulled onto the Assured Production Planning and Control boards where they will be refined in preparation of the assignment to a crew.
- **Assured Production Planning and Control** – During the last few weeks prior to a crew assignment being issued, all MakeCertain! tasks are completed within a two to three week window as the assignment work their way through the Look-Ahead Production Schedule and are ultimately pulled onto a Weekly Production Plan. The Weekly Production Plan is then monitored and adjusted slightly each day as the events of the week unfold. Thus within this critical step, production planning and production control merge as the final sequence and production goal of each assignment are finalized and the completion of all remaining MakeCertain! tasks are assured within the two to three week Look-Ahead Production Schedule timeframe. Then as work unfolds during the week in which the assignments are

issued, the completion of each assignment is monitored and minor adjustments made as required, assuring production is achieved as planned.

- **Implementation and Follow Through** – By the time an individual crew assignment is issued, a tremendous amount of production planning and control effort has been expended. However, there is no real assurance that the work will start and continue as planned. Each assignment and the overall operation production plan must be performed as planned to assure the efficiency and effectiveness of the work itself and the adherence to the flow of crew parade as defined within the Value Stream Production Plan. The only way to “stay right” is to first “start right”. Using tools such as Before and After Action Reviews, project leadership support, purposive discovery by an Operation Engineer and the process of root cause analysis and problem solving, every effort is made to get the operation started right and to learn from the start-up how to better plan and control future operations. In this way, Implementation and Follow Through assures both immediate production “control” and a continuously refreshed Retained Learning Library from which future projects can be planned and controlled.

The persistent and patient application of the Construction Project Production System provides a well-designed structure and strategy for any company wanting to start the journey in the pursuit of Daily Crew Production Flow and the breakthrough in performance it promises. Each and every company will, no doubt, add their own special customized approach to this endeavor. But it is the difference between a company’s current state of production management competence and the future state production management system eventually aligned to that defines both the path and the relative length of the journey. The speed with which any organization moves down that path, however, is defined by the extent to which senior operational leadership understands and commits to lead the process, and, the rate at which outside learning and expertise is injected into the organization.