

“TSSSA Scaled for Any Operation”

September 7, 2021

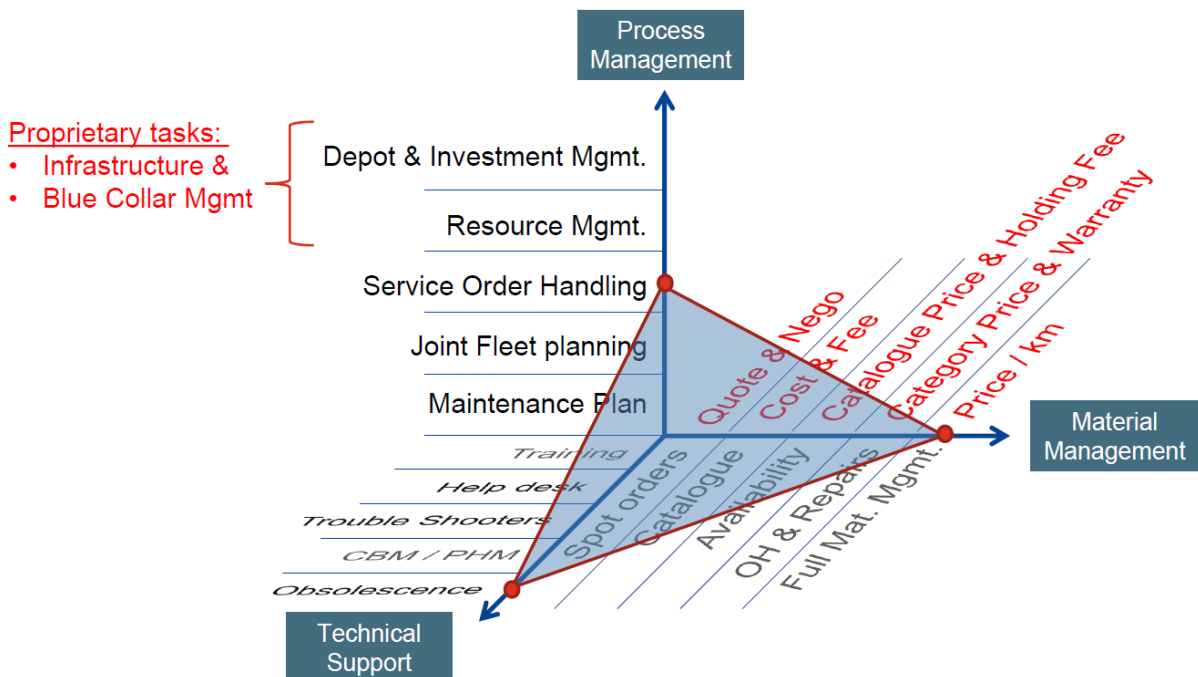
Revision 1

A TSSSA is a Technical Support and Spares Supply Agreement which is put in place as a contractual relationship between the equipment owner/operator and an OEM or third-party provider. Highly effective TSSSA’s are customized to the owner/operator’s expectations and designed to leverage a partnership between the providers strengths and the owner/operator’s legacy operations and risk tolerance. Risk tolerance should be defined by financial, labor, facilities, and operations constraints. TSSSA’s are intended to reduce variability of equipment long term life cycle costs as well as mitigate obsolescence risk with rapidly changing technology all while driving reliability, availability and performance over the intended operational life of the service. For a smooth implementation of a TSSSA, all roles and responsibilities should be clearly defined and tested to eliminate any confusion during the life of the contract.

A properly designed TSSSA is divided into three main components: Process Management, Technical Support and Material Management. Each of these legs can have progressive scopes that should be designed and scaled to the needs and expectations of the TSSSA objectives.

Below is a diagram outlining the various scopes that may be used in the creation of a TSSSA:

TSSSA as a Scalable Model



Mobilization Plan:

To assure the appropriate level of readiness in support of the new equipment, the contractor shall develop a mobilization plan which will address the following:

1. Equipment delivery
2. Deployment of the equipment
3. Recruiting and training of contractor personnel including timing for materials and availability
4. Numerous process and documentation submittals
 - a. Communication and TSSSA Process Plan
 - b. Data management systems deployment
 - c. Maintenance plan
 - d. Maintenance, reliability and availability tracking
 - e. Diagnostic and remote maintenance monitoring
 - f. TSSSA staffing plan
5. Warehousing and logistic arrangements including space requirements
6. Life-cycle maintenance schedules

The mobilization plan should be designed to provide the initial steps for a successful TSSSA; however, these key phases can and will be modified as the program continues. The key to the mobilization plan is understanding and accounting for all of the necessary elements that will lead to the overall success of the fleet.

Process Management:

The first major component of any TSSSA is Process Management. During the mobilization phase of the TSSSA, the contractor is responsible for developing necessary implementation, staffing, material controls, and management plans to establish the successful execution of the TSSSA for the duration of the contract. The process management component represents the critical building blocks for a successful TSSSA.

The process management component of a TSSSA may include any or all of the following: Maintenance Plan, Joint Fleet Planning, Service Order Handling, Resource Management and Depot & Investment Management.

Maintenance Plan:

The contractor shall be required to work in conjunction with the owner/operator to ensure that all maintenance activities are forecasted in a way to optimize maintenance and increase reliability and availability without affecting scheduled revenue service. The contractor shall develop and propose a comprehensive maintenance plan which shall be updated and submitted annually for review and approval by the owner/operator. The maintenance plan shall include all activities, schedules and documentation required by the contractor, regulatory agencies, and the owner/operator to maintain, inspect, and restore equipment to maintain intended design function over the design life of the equipment. The maintenance plan shall be a detailed documented process describing all maintenance activities that are required for the equipment throughout its life and must be reviewed and approved on

an annual basis against the actual performance of the equipment. The maintenance plan shall include the frequency and duration of each activity required and provide a scheduling tool to demonstrate how the equipment will be maintained throughout the life of the project. Ultimately, the maintenance plan shall fulfill the requirements of 49 CFR 238.107.

Joint Fleet Planning:

With a joint fleet planning agreement, the Contractor is responsible for supporting the owner's/operator's work force with material and technical support. It is envisioned that during this agreement, a clear set of roles and responsibilities are developed as to avoid any confusion with which party is responsible. Joint fleet planning requires that the contractor and the owner/operator work seamlessly to support the owner/operator's specific goals in terms of process management to further enhance the equipment's reliability and availability while maximizing maintenance productivity.

Service Order Handling:

The contractor shall develop a work order template for each maintenance activity which would be launched through the owner/operator's asset management system to create work orders. The creation and entry of work orders for maintenance activities into the owner's/operator's asset management system is critical to the success of the TSSSA.

The work order template shall include, at a minimum, the following types of information:

1. Description
2. Safety hazards and mitigations
3. Detailed work instructions
4. Labor requirements
5. Bill of Material
6. Tools
7. Maintenance Activity Periodicity
8. Quality Gates

The contractor needs to understand that up-to-date and correct work orders are of vital importance to operations. When work orders are not kept up-to-date or are incorrect, the owner/operator will incur additional labor costs, maintenance tasks are backlogged, and the owner/operator will suffer operational challenges. The contractor shall use due diligence and best efforts to ensure that all work orders are updated, revised or corrected as the need arises so that the work order can be completed as scheduled.

Resource Management:

With the resource management component of process management, the concept is that the contractor would supply the work force to inspect, test and repair the equipment while utilizing the owner's/operator's existing maintenance facilities to maintain the equipment.

If utilizing existing maintenance facilities and inventory warehouses, they should be modified to provide the easiest transition to the new equipment that would be serviced. A clear understanding shall be discussed with the contractor to understand the full requirements for maintaining the equipment which

shall include a plan for inventory management either on-site or off-site at a location determined by the contractor. Stocking strategies should be a key element in determining warehouse needs.

Depot & Investment Management:

Designing the proper facility to properly accommodate the equipment is also another key factor in a successful TSSSA; however, existing maintenance facilities may not fully accommodate the needs of the new equipment. With depot and investment management, the contractor is responsible for providing the maintenance facility as well as the resources to work on the new equipment. With this approach, the contractor bears the full responsibility of the availability and reliability of the equipment so the owner's/operator's operation can run as smoothly as possible.

Technical Support:

With a TSSSA, the contractor is expected to provide technical support at an agreed upon number of maintenance facilities on your property. On-site support technicians may support maintenance personnel in developing their skills in fault finding and fault rectification on any and all varieties of simple and complex faults.

The technical support component of a TSSSA may include any or all of the following: Training & Documentation, Help Desk, On-Site Support Technicians, Condition Based and Predictive Health Monitoring as well as preventing against Obsolescence.

Training & Documentation:

With a TSSSA, training can and should be required to be conducted by the Contractor. The Contractor shall be responsible for providing training classes and "Train the Trainer" sessions while developing a Training plan for all required shop locations. The initial development of the training plan shall be designed by working together on the job with site personnel in a continuous manner while participating in an annual review of all training materials associated with the equipment. The on-going training for any maintenance personnel will primarily be delivered through the on-site support technicians who will be responsible to investigate any Trainset failures, incidents and accidents, including derailments, anywhere on the network. The Contractor shall be responsible for providing content updates as necessary at no additional cost to the owner/operator while utilizing common or repeated maintenance errors in the shop to assist in the overall training program.

Additionally, the Contractor shall be responsible for updating all necessary manuals in an agreed upon time period to ensure that all maintenance personnel are equipped with all of the necessary tools to perform their duties to the best of their ability.

Help Desk:

The Contractor can also be required to provide Technical Support at the Help desk in support of any equipment that is experiencing en-route defects or failures. The Contractor's assigned help desk representatives will be able to provide backup to the TSSSA Project Manager in case of absence while also being the single point of contact for all issues identified with the equipment. The help desk representatives will assist in reporting train defects, as well as material issues by telephone, email and/or other electronic communications. It is advantageous for the TSSSA help desk representatives to have direct interaction with the main controllers of the railroad who communicate with train crews. It is

the expected duty of the TSSSA help desk representatives to record and log all issues, create Work Orders and communicate with the Program Team on any material issues.

On-Site Support Technicians:

The contractor is required to provide on-site support technicians that are located at all agreed upon maintenance facilities. Their main focus is to support existing maintenance personnel in developing skills in fault finding and rectification as well as conducting fault finding on more complex faults. On-site support technicians may provide physical assistance with some technical repairs. These technicians would also help generate key performance indicators and failure analysis reports to support continuous improvement.

Condition Based/Predictive Health Monitoring:

The contractor shall employ a detailed method of managing all relevant maintenance information. The method and system that is employed shall include integrated databases which are synchronized and interface with the existing systems that will be used to record, monitor and analyze all maintenance activities, material movements and updates to existing documentation. The contractor shall monitor the immediate and long-term health of various systems via on-board monitoring through a link with the contractor's diagnostic and monitoring database while shall include a data repository of condition-based monitoring results.

In order to provide predictive analysis to enable scheduling necessary maintenance activities and to avoid potential unscheduled maintenance, the contractor should implement a plan for gathering and interpreting remote diagnostic information from the equipment. The predictive software system must be capable of precise pattern recognition and statistical confidence levels that will be used to assess risks and identify early-onset conditions that are either abnormal or precursors to failure.

Obsolescence:

If material or software is no longer supported by the manufacturer or licensor and, the performance or availability of the Equipment will be negatively impacted by the failure of the manufacturer or licensor to support the material or software, the contractor shall develop a suitable succession plan, subject to approval, and develop a suitable replacement for the impacted material or software. The contractor is responsible for the design, development and replacement of any obsolete material or software to ensure the contractual performance of the equipment.

The Contractor shall be responsible for continuous observation and surveying of the market with periodic reporting to the owner/operator to mitigate any impact of obsolescence on the equipment.

Material Management:

The third major component of a proper TSSSA is Material Management. The contractor shall be responsible for all material management and shall plan material needs using material and maintenance projections which shall be developed by the Contractor. With a TSSSA, the full responsibilities of material management can reside with the contractor.

The material management component of a TSSSA may include any or all of the following: Inventory Management, Reliability & Availability, Overhauls & Repairs and Full Material Management.

Inventory Management:

The contractor is responsible for managing and adjusting material inventory and stocking locations based on feedback from service failures and onboard diagnostic and monitoring systems. With this responsibility, the contractor will provide daily reports describing any material issues affecting maintenance while also summarizing performance statistics (i.e. On-time delivery, etc.) showing the trends and driving improvement actions. The contractor shall manage the forecast and execution of the material supply process.

Material inventory levels will be based on the type and frequency of maintenance occurring at each maintenance facility. The inventory levels shall be closely monitored to ensure material delivery requirements are maintained and adapted to the Maintenance Plan in order to meet the overall performance guidelines.

Reliability & Availability:

When equipment is held for material, it usually causes a negative impact on the operations. To address this situation, performance guidelines (guarantees and possibly incentives) shall be developed in order to protect an owner/operator against this negative impact on the operation. The performance guidelines should be tailored to your specific operation including what impact losing equipment would represent to your passengers and your owner/operator as a whole.

As for reliability, the contractor shall understand the damages caused by equipment that is unable to operate due to material issues. Reliability targets (failures during a measurement period) shall be specifically tailored to your specific operation to protect the owner/operator against any shortcomings that would negatively affect the overall operation.

Overhauls & Repairs:

Material repairs and overhauls shall be coordinated with the owner/operator as scheduled maintenance on the equipment. The contractor shall include plans for how all repairs and overhauls will be performed as part of their overall maintenance plan for the equipment. The contractor shall be responsible for coordinating with the owner/operator prior to any scheduled repair work on the equipment by working with suppliers to perform necessary system and component repairs and overhauls.

The contractor could be responsible for performing regular testing before, during and after an anticipated failure date of a component. This regular testing detects components that are at risk of failing prematurely and prevents costly components from being replaced or overhauled too early or too late in their individual life cycles, thereby optimizing both performance and availability of the equipment.

Full Material Management:

Utilizing the full material management approach, the owner/operator makes the contractor fully responsible for the material management of the entire fleet. All of the components discussed above would be captured by the contractor. Daily and monthly meetings may still be held with the owner/operator to discuss the performance of the contractor, but the daily obligation of the contractor is to handle all materials for the fleet to ensure the highest level of availability. If the owner/operator

decides to implement this all-encompassing option for material management, performance guarantees shall be utilized to protect the owner/operator against any shortcomings that would be detrimental to the operation.