

CLCX[®] Technologies

► *CLCX is unique among locomotive builders in its approach to technology. CLCX intentionally avoids the use of proprietary components and software, where it's practical to do so, in order to make its locomotives easier and less expensive to maintain. OEM part numbers are provided in the well documented maintenance manual for each CLCX locomotive.*

► *CLCX is currently building its "third generation" Process Locomotives. The Process Locomotive line has been in production since 1995 and these "third generation" units offer "state of the art" technologies that are unsurpassed in the locomotive industry. PLC master microprocessors, HMI computers, CCTV systems, Remote Maintenance, GPS reporting, new CLCX low noise cabs, new emissions certified engines, high adhesion traction control, air conditioning, radio remote control, anti-climbing devices, reinforced frames, rewound D78 traction motors, LED and Halogen lighting, and stand-by power production are only a few of the features on current production Process Locomotives.*

► *CLCX builds four locomotive product groups as follows: (1) Remanufactured Process Locomotives of 1006 to 3300 BHP; (2) Remanufactured Process Locomotives of 400 to 1005 BHP; (3) Repower Conversion Kits for standard switchers and road switchers; (4) Standard Locomotive Rebuilds with original configuration engines and with or without upgraded PLC controls.*

► *CLCX builds single engine locomotives. It avoids the use of smaller multiple generator sets. Recent reports indicate that large single engine locomotives can save an average of 15% on fuel vs. multiple generator set locomotives of equivalent horsepower in the same application. The major manufacturers of locomotives in the US today are building single engine locomotives. They are using cooled exhaust gas recirculation, diesel particulate filters, and exhaust after-treatment to comply with US EPA locomotive emissions regulations.*

► *CLCX has its own patented high adhesion traction control system that provides up to 38% adhesion on dry track, up to 28% adhesion on wet track, and up to 35% adhesion on wet track with light sanding. This along with remanufactured EMD D78 traction motors, to maximize the continuous running tractive effort, results in the ability to move heavier trains than competitor locomotives. The traction motors are DC which are much less expensive and more readily available than AC traction motors. The advantage to*

AC traction is for Class I railroads in main line operations. DC traction is much more economical for short line railroads and industrial switching applications.

▶ *CLCX Process Locomotive avoid the use of complex water or Freon cooled inverters, rectifiers, IGBT resisters, and choppers. Instead they use air cooled rectified Marathon main alternators with SCR rectifiers controlled by the PLC. This is much simpler and more reliable than traction systems requiring special cooling.*

▶ *CLCX builds its own “open-architecture” control systems using Allen-Bradley PLC microprocessors running Rockwell RSLogix5000 software. CLCX supplies the proprietary application programs for the PLC and for other systems such as the PC computers and the CCTV system. Locomotive engines, electronics, controls, and software are constantly being updated; therefore, flexibility in making updates is critical to long term performance. CLCX “open-architecture” control systems make updating components and software easy and affordable. Competitor’s proprietary control systems can be very difficult and expensive to update and upgrade; because, the components and software are manufactured in small quantities. Hundreds of thousands of the Allen-Bradley PLC components and the Dell PC computers used on the CLCX locomotives are manufactured each year so it is easy to stay current.*

▶ *CLCX Process Locomotives are built to be maintained by small facilities that have limited to no locomotive maintenance capabilities. They can be maintained by the same maintenance personnel that work on heavy trucks and/or mobile equipment. They are designed to only require a small fraction of the maintenance required by standard locomotives. They generally require less maintenance than front end loaders, forklifts, or heavy trucks. The remanufactured Process Locomotives are built for an expected useful life of more than 30 years.*

▶ *CLCX Remote Maintenance is unique in the locomotive industry with regard to its significant capabilities and its low price. It provides a CLCX factory technician with full diagnostic capabilities to troubleshoot problems with all of the electrical and electronic components on the locomotive including the electronic control system on the engine itself. On units with CCTV it also allows for a live video feed from the locomotive to the factory technician. The locomotive owner’s local technician can thus connect directly to the factory for assistance with almost any problem that might be encountered on a Process Locomotive. This negates the need to wait for a factory technician to travel to the job site to diagnose a problem. That can avoid downtime and spending up to thousands of dollars for labor and expenses on a single field service call. Replacement parts can often be shipped overnight to the job site and upon their arrival the factory technician can talk the local technician through the repairs. Remote maintenance also*

includes the ability of the factory technician to make changes to the locomotive's PLC program and other programs remotely. Remote Maintenance far far exceeds the maintenance capabilities of GPS diagnostics systems. In fact, CLCX offers GPS diagnostic systems as a first alert system when a maintenance problem is detected by the PLC. The GPS systems are oriented to location tracking and limited operating parameters like fuel usage, coolant temperature, rail speed, etc. GPS diagnostic systems are not designed to do remote maintenance diagnostics.

► *CLCX specializes in building "real locomotives" by using older locomotive cores and repowering them with the latest in US EPA emissions certified engines for each horsepower rating. The engine exhaust emissions reductions can be between 60% and 90%; depending on the application. Recycling the cores saves several hundreds of thousands of dollars per locomotive and it allows the remanufacture of end-cab switcher units.*