

VEGA ASSEMBLY TECHNIQUES

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THANK YOU, AND GOOD MORNING.

I'M GOING TO GIVE YOU AN OVER-VIEW OF THE GENERAL MOTORS LORDSTOWN FACILITY. THIS COMPLEX HOUSES 3 OPERATIONS: (1) THE FISHER BODY METAL FABRICATING PLANT, (2) THE VEGA ASSEMBLY PLANT, AND (3) THE CHEVROLET TRUCK PLANT, WHERE VAN, PANEL AND SPORT VAN VEHICLES ARE ASSEMBLED. THE OVER-ALL SITE ENCOMPASSES OVER 900 ACRES, OF WHICH 334 ACRES ARE UTILIZED FOR EXISTING FACILITIES, INCLUDING PERIPHERAL AREAS, SUCH AS PARKING LOTS, DRIVEWAYS, THE ANCHOR MOTOR LOT, RAIL SHIPPING AREAS, POWER HOUSE, WASTE TREATMENT, AND OTHER MISCELLANEOUS BUILDINGS. THESE AERIAL VIEWS ADD COMPREHENSION TO THE SIZE OF THE OPERATIONS. THE FABRICATING PLANT HAS 2.1 MILLION SQUARE FEET, THE VEGA ASSEMBLY PLANT 2.2 MILLION SQUARE FEET, AND THE TRUCK PLANT 700,000 SQUARE FEET.

IN PREPARATION FOR WHAT YOU'LL SEE, WE ASK THAT YOU FORGET ABOUT ANY OTHER CAR ASSEMBLY PLANT YOU'VE EVER SEEN BEFORE -- ANY PLACE IN THE WORLD.

LORDSTOWN IS UNIQUE AND IT'S MORE THAN JUST A MATTER OF DEGREE OR A FEW MORE MACHINES. THIS IS AN ENTIRELY NEW CONCEPT OF VEHICLE ASSEMBLY, DEVELOPED SPECIFICALLY FOR THE VEGA 2300, ALLOWING THE HIGH PRODUCTION RATE OF 1,600 JOBS PER DAY TO BE FEASIBLE WITHOUT COMPROMISING THE "GM MARK OF

EXCELLENCE."

THE BASIC ELEMENTS OF THIS CONCEPT ARE THESE:

1) A METAL FABRICATING PLANT IMMEDIATELY ADJACENT TO THE ASSEMBLY PLANT, WITH MATERIAL FLOWING BY AN ENCLOSED CONVEYOR FROM THE FABRICATING TO THE ASSEMBLY AREAS.

2) DESIGN OF THE VEHICLE, WITH EASE OF ASSEMBLY AS A PRIME CONSIDERATION.

3) EXTENSIVE USE OF AUTOMATED EQUIPMENT IN SELECTED AREAS, SUCH AS, THE BODY SHOP, WHERE PRECISION WELDING ENHANCES THE QUALITY OF THE VEHICLE.

4) OPERATOR FUNCTIONS ON THE LINE HAVE BEEN SIMPLIFIED AND MADE FAR MORE CONVENIENT THAN ANYTHING EVER ATTEMPTED BEFORE IN THE INDUSTRY.

5) NEW SUPPORT SYSTEMS FOR THE MAIN LINE AND PRE-ASSEMBLY INSPECTION PROCEDURES ENHANCE THE DESIGNED-IN QUALITY OF THE VEGA AND CONTRIBUTE TO THE OVER-ALL EFFICIENCY OF THE ASSEMBLY CYCLE.

THIS SLIDE SHOWS THE FLOW OF THE VEGA BODY ASSEMBLY OPERATIONS. THE BROKEN LINE INDICATES THE TRAVEL OF THE BODY THROUGH OUR WELDING AND TRIM OPERATIONS. THE BLACK LINES IN THE UPPER LEFT CORNER REPRESENTS THE FLOW OF MATERIAL FROM THE METAL FABRICATION PLANT.

WILL DEPART FROM SCRIPT HERE BRIEFLY TO EXPLAIN SLIDE.

THE FIRST POINT OF INTEREST IS THE MATERIAL TRESTLE,

APPROXIMATELY $\frac{1}{3}$ OF A MILE LONG, THAT CONNECTS THE FABRICATING

PLANT AND THE ASSEMBLY PLANT. THERE ARE 4 LOAD OR UNLOAD STATIONS WITHIN THE ASSEMBLY PLANT AND THEY HAVE THE CAPACITY OF HANDLING 20 LOADS PER STATION EACH HOUR. SEVENTY (70) PER CENT OF THE METAL REQUIRED FOR THE PRODUCTION OF THE VEGA IS PRESENTLY FURNISHED BY THE FABRICATING PLANT; AND, INCIDENTALLY, THIS IS THE ONLY INSTALLATION OF ITS KIND IN GENERAL MOTORS. THIS SYSTEM REDUCES OUR FREIGHT COSTS, ELIMINATES HANDLING DAMAGE, AND IMPROVES THE QUALITY OF OUR BODIES.

AT THIS POINT, THE IDENTITY OF THE BODY BEING PRODUCED IS ESTABLISHED. THE TECHNICAL NAME UTILIZED IN OUR BUSINESS FOR THIS PARTICULAR BODY IS CALLED A "UNITIZED BODY" WITH NO FRAME.

DURING THIS CRITICAL ASSEMBLY, WHERE THE FRONT SUSPENSION AND MOTOR MOUNTING INSTALLATION IS REQUIRED -- COMMONLY REFERRED TO AS THE "SHOCK TOWER" -- IT IS ESSENTIAL TO MAINTAIN QUALITY AUTOMATICALLY THROUGH PROBING STAGES. THE UNDERBODY PRESSES ESTABLISH THE WIDTH AND "DOG-LEGGING" OF THE JOB, AND ALSO PERFORM STRUCTURAL WELDING, WHICH MEANS THAT WE CANNOT BUILD A JOB OUT OF TOLERANCE.

THERE ARE 3 STYLES OF FLOOR PANS, AND THE OPERATOR SELECTS THE STYLE REQUIRED INDICATED ON THE BODY BUILD SHEETS SUPPLIED BY THE COMPUTERIZED SCHEDULING SYSTEM. THIS INFORMATION IS TRANSFERRED TO ALL STAGES OF THE PRESS WHICH

PROBES TO INSURE THAT CORRECT PANELS ARE LOADED AND WELDED INTO THE ASSEMBLY.

THERE ARE 3 TYPES OF REAR COMPARTMENT PANS AND 2 TYPES OF UNDERBODY REAR END PANELS THAT ARE SUB-ASSEMBLED CONVENTIONALLY BY THE OPERATORS AFTER BODY STYLE DETERMINATION. FROM THIS POINT ON, THE WELDING PROCESS IS AUTOMATIC AND THE ASSEMBLY IS TRANSFERRED TO THE PRESS WELDER WHERE THE FRONT END ASSEMBLY, FLOOR PAN, AND THE REAR COMPARTMENT ASSEMBLY ARE ALL JOINED TOGETHER INTO ONE COMPLETED UNIT.

AT THE END OF THIS OPERATION, THE UNDERBODY IS LOADED FROM THE PRESS TO THE POWER AND FREE MONORAIL CONVEYOR WHICH HOLDS APPROXIMATELY 56 JOBS AHEAD OF OUR MAIN ASSEMBLY CONVEYORS.

FROM THE POWER AND FREE MONORAIL CARRIERS, THE UNDERBODY IS LOADED ONTO A PRECISION BODY BUILDING TRUCK AS PRE-SCHEDULED BY THE MAN LOADING THE UNDERBODY PRESS. THE AUTOMATIC CLAMPER INSURES THAT THE UNDERBODY ASSEMBLY IS PROPERLY LOCATED PRIOR TO WELDING.

CONCURRENT WITH THE SET-UP OF THE UNDERBODY IS THE PRODUCTION OF THE INNER REAR QUARTER PANEL AND WHEEL HOUSE ASSEMBLY.

THE INNER AND OUTER QUARTER PANELS AND FRONT BODY HINGE PILLARS ARE DELIVERED BY CONVEYOR, IN SEQUENCE, TO THE SIDE FRAME ASSEMBLY. PARTS ARE LOADED INTO THE PRECISION SIDE FRAME FIXTURE COMMONLY KNOWN AS A "GATE."

THE LOADING AND SEALING OPERATIONS ARE MANUAL; HOWEVER, THE PROBING FOR PARTS POSITIONING, THE OPENING AND CLOSING OF CLAMPS, AND WELDING ARE ALL AUTOMATIC.

THE GATE IS TRANSFERRED TO THE MAIN CONVEYOR AND LOCKED INTO POSITION ON THE BODY BUILDING TRUCK. THE USE OF THESE FIXTURES INSURES THE PROPER RELATIONSHIP OF SIDE FRAME ASSEMBLY TO THE UNDERBODY ASSEMBLY.

SCHEDULING FROM THE STORAGE AREA, THE ROOFS ARE INSTALLED AUTOMATICALLY BY A ROOF LOAD FIXTURE WITH BOTH SIDE GATES STILL ATTACHED TO THE BODY BUILDING TRUCK.

THE TACK WELDER ON THE BODY FRAME LINE PERFORMS A CRITICAL OPERATION BY WELDING ALL CRITICAL JOINT AREAS TO INSURE PROPER BODY OPENINGS PRIOR TO THE REMOVAL OF THE "GATES."

THE PRINCIPLE OF CONSTRUCTION FOR THE VEGA IS TO TACK THE BODY TOGETHER WHILE HELD BY PRECISION FIXTURES. THE SIMPLICITY OF THE VEGA'S DESIGN PERMITS ITS PRODUCTION IN EITHER A SEMI-AUTOMATED OR NON-AUTOMATED PLANT.

WE HAVE A TOTAL OF 26 UNIMATES THAT PERFORM 30% OF ALL WELDING OPERATIONS IN THE ASSEMBLY PLANT. AN ADDITIONAL 55% OF OUR WELDING IS PERFORMED BY CONVENTIONAL AUTOMATIC WELDERS, AND THE REMAINING 15% IS PERFORMED MANUALLY.

FOUR (4) OF THE UNIMATES ARE UTILIZED ON THE SIDE FRAME LINE, AND THE REMAINING 22 UNIMATES ARE UTILIZED ON THE BODY BUILDING LINE.

THE 22 UNIMATES IN THIS AREA PERFORM A TOTAL OF 428 SPOT WELDS IN SPECIFIED LOCATIONS ON THE BODY. THE UNIMATE WELDERS ARE PROGRAMMED TO PERFORM A SPECIFIC WELD FUNCTION BY BODY STYLE. WHEN THE BODY ENTERED THE UNIMATE LINE, A PROBING DEVICE TRANSMITTED THE BODY STYLE INFORMATION TO ALL THE UNIMATE MEMORY BANKS.

THE AUTOMATIC DOOR HANGING FIXTURES ARE LOADED MANUALLY AND THEN THE FIXTURE AUTOMATICALLY INSTALLS THE DOOR ON THE BODY.

AT THIS STAGE, THE BODY IS STRUCTURALLY SOUND, WHICH PERMITS UNCLAMPING OF THE BODY AND TRANSFER FROM THE PRECISION BUILDING TRUCK TO THE STANDARD CARRYING TRUCK.

THIS SLIDE SHOWS A DOOR FITTER AND AN INSPECTOR IN THE DOOR BUY-OUT AREA. THIS IS TYPICAL OF THE PROGRAM FOLLOWED IN THE ASSEMBLY OF FRONT FENDERS, HOODS, AND REAR COMPARTMENT LIDS. THIS PROGRAM INSURES A COMPLETED QUALITY JOB AT THE POINT OF INSTALLATION, SINCE ALL OPERATIONS PERFORMED IN EACH AREA ARE INSPECTED AND CORRECTED IF NECESSARY WITHIN THAT ONE AREA. THIS PHILOSOPHY EXTENDS THROUGHOUT THE ENTIRE ASSEMBLY COMPLEX.

AT THIS POINT, THE BODY IS DELIVERED TO THE PAINT DEPARTMENT. A BANK OF 78 JOBS PROVIDES FLEXIBILITY BETWEEN BODY AND PAINT OPERATIONS.

THE BODY IS WIPED WITH OLEUM SPIRITS PRIOR TO ENTRANCE TO

THE BONDERITE SYSTEM. THIS INSURES A CLEAN BONDING SURFACE FOR PAINT MATERIALS.

THE BODY IS COMPLETELY IMMERSSED IN PRIMER MATERIAL. THE PRIMER IS APPLIED THROUGH AN ELECTROPHORESIS PROCESS INSURING COMPLETE COVERAGE. IN THIS PROCESS THE BODY HAS A POSITIVE CHARGE AND THE PAINT HAS A NEGATIVE CHARGE, THUS ATTRACTING PAINT INTO EVERY NOOK AND CRANNY OF THE BODY. THE UNIT TRAVELS THROUGH 3 ZONES AND RECEIVES A ONE MINUTE FULL CHARGE IN ZONE 2 OF 440 VOLTS, 1,200 AMPS. THIS TANK CONTAINS 68,000 GALLONS OF PRIMER MATERIAL.

AFTER COMPLETION OF THE ELPO PROCESS, THE BODY ENTERS A DRYING OVEN AT 350 DEGREES FOR 20 MINUTES.

THE FOLLOWING PAINT OPERATIONS ARE PERFORMED AFTER ELPO:

1) PRIMER SURFACER IS APPLIED TO THE BODY SURFACE PREPARATORY TO COLOR.

2) ALL BODY JOINTS ARE SEALED TO PREVENT DUST AND WATER LEAKS.

3) THE ENTIRE BODY IS WET-SANDED TO PROVIDE A SMOOTH SURFACE.

THE COLOR COAT IS APPLIED BY HAND AND MACHINE, RESULTING IN A DURABLE MIRROR-LIKE FINISH.

AT THIS POINT THE BODY IS READY TO BE DELIVERED TO THE TRIM DEPARTMENT. A BANK OF 30 JOBS PROVIDES FLEXIBILITY BETWEEN PAINT AND TRIM OPERATIONS.

AFTER THE BODY IS TRANSFERRED FROM THE POWER AND FREE CONVEYOR TO A TRIM CARRYING TRUCK THE INTERIOR AND EXTERIOR TRIM IS INSTALLED AND INSPECTED FOR APPEARANCE, CLEARANCES AND FUNCTION. INCLUDED ARE SUCH ITEMS AS BODY WIRING, DOOR HANDLES AND LOCKS, EXTERIOR MOLDINGS, WEATHERSTRIP, GLASS AND HEADLINING MATERIAL.

IN THE GLASS MAKE UP AND INSTALLATION AREA, THE PROPER MIXTURE OF A SEALANT IS APPLIED TO THE EDGE OF THE WINDSHIELD AND BACK WINDOW GLASS. THIS PRODUCES A BOND BETWEEN METAL AND GLASS, AND REQUIRES APPROXIMATELY 1/2 HOUR AIR DRYING TIME. THE GLASS NOW BECOMES A STRUCTURAL PART OF THE BODY.

THE FINAL TRIM PROCESS AREA OPERATION INCLUDES THE FINAL INSPECTION OF THE BODY, REPAIR (IF NECESSARY), AND THOROUGH CLEANING.

THE FOLLOWING ARE THE 4 BODY STYLES CURRENTLY BEING PRODUCED AT LORDSTOWN:

- (1) 77 STYLE - GT HATCHBACK
- (2) 11 STYLE - SEDAN
- (3) 15 STYLE - STATION WAGON
- (4) 05 STYLE - PANEL EXPRESS

THE BODY IS THEN TRANSPORTED BY CONVEYOR TO THE MOTOR DIVISION FOR CHASSIS AND FINAL ASSEMBLY OPERATIONS.

THE UNITS COME FROM FISHER BODY WITH HOOD, FENDERS, REAR BUMPERS, HEADLIGHTS, BEZELS AND VARIOUS INTERIOR HARD TRIM

COMPONENTS -- SUCH AS THE HEATER AND BRAKE AND CLUTCH PEDALS -- ALREADY IN PLACE.

AS YOU MAY KNOW, THESE ITEMS ARE USUALLY INSTALLED ON THE CHEVROLET SIDE. THE CHANGE WAS MADE IN THIS CASE FOR BETTER ASSEMBLY LINE SEQUENCING AND, HERE AGAIN, IT HAS A DIRECT RELATIONSHIP TO QUALITY AND OPERATOR CONVENIENCE ON THE JOB.

FOR EXAMPLE, THIS CHANGE MAKES POSSIBLE A MEANINGFUL 100 PER CENT, ON-LINE WATER TEST THAT LASTS A FULL FOUR-MINUTES USING INSTALLED COMPONENTS INSTEAD OF MASKING FIXTURES. THIS TEST IS FAR WORSE THAN ANY RAINSTORM, REQUIRING SEVEN (7) TONS OF WATER PER JOB, A SPECIAL DYE IS USED IN THE WATER WHICH IS HIGHLY VISIBLE UNDER ULTRAVIOLET LIGHT.

EACH BODY ALSO COMES TO US WITH ALL INTERIOR SOFT TRIM IN PLACE EXCEPT SEATS, SEAT BELTS AND CARPETS. THIS IS ANOTHER CHANGE IN THE USUAL PROCEDURE, CHEVROLET INSTALLS THESE ITEMS NEAR THE END OF THE ASSEMBLY LINE, WHICH ALLOWS BETTER OPERATOR ACCESS TO THE VEHICLE'S INTERIOR THROUGHOUT THE ASSEMBLY PROCEDURE. IT ALSO VIRTUALLY ELIMINATES SERIOUS TRIM SOILAGE THAT MAY HAVE PREVIOUSLY REQUIRED REPAIR OR REPLACEMENT BEFORE CUSTOMER DELIVERY.

THE BODY IS RECEIVED ON THE SECOND FLOOR OF THE PLANT FROM AN IN-LINE STORAGE BANK. IT IS PICKED UP BY A FOUR-POST BODY CARRIER WHICH IS SUSPENDED FROM A THREE-RAIL OVERHEAD CONVEYOR. THE CARRIER TAKES THE UNIT ALL THE WAY THROUGH THE CHEVROLET SYSTEM UNTIL THE NEARLY COMPLETED UNIT IS UNLOADED ON A FINAL LINE FLAT-TOP CONVEYOR.

EVEN THE CONVEYOR SYSTEM AT LORDSTOWN IS UNIQUE. IT HAS FOUR ELEVATIONS AND VARIES IN HEIGHT FROM 14 - TO 72-INCHES, ACCORDING TO ASSEMBLY SEQUENCE, IN ORDER TO BRING THE JOB CLOSER TO THE OPERATOR AT EACH STATION. IT'S A ROLLER COASTER THAT ALSO INCLUDES SIXTEEN 90 DEGREE TURNS. IN THIS WAY, WE HAVE A TOTAL MAIN LINE THAT MEASURES 1.26 MILES IN A PLANT LESS THAN HALF THE LENGTH.

THE BODY FIRST COMES DOWN TO THE MAIN FLOOR FOR A PASS THROUGH THE TRIM AREA. HERE, FOR EXAMPLE, THE ROCKER PANEL IS 14-INCHES FROM THE FLOOR WHICH IS A CONVENIENT WORKING HEIGHT FOR INSIDE AND OVER-THE FENDER WORK.

FROM THIS POINT ON, EACH SUPERVISOR'S AREA IS LAID OUT IN A STRAIGHT LINE NOT MORE THAN 20 CARS LONG. THIS WAS DONE TO PROVIDE MAXIMUM SUPERVISORY EFFECTIVENESS AND ALSO TO SIMPLIFY COMMUNICATIONS BETWEEN THE FOREMAN AND HIS PEOPLE. EACH AREA ALSO HAS ITS OWN INSPECTORS, REPAIRMEN AND RE-INSPECTORS FOR THE WORK DONE IN THAT DEPARTMENT.

FIRST INSTALLATION ON THE CAR IS A PAIR OF MOLDED PLASTIC COVERS FOR THE FRONT FENDERS. THESE STAY ON THE CAR UNTIL THE END OF THE LINE TO PROTECT AGAINST PAINT DAMAGE AND MARS DURING ASSEMBLY OPERATIONS ABOVE THE BELT-LINE.

NEXT, A NUMBER OF TRIM ITEMS ARE INSTALLED, INCLUDING THE INSTRUMENT CLUSTER WHICH MERITS SPECIAL MENTION.

THE INSTRUMENT CLUSTER IS INSTALLED AS A COMPLETE, SELF-CONTAINED UNIT. THIS GREATLY IMPROVES EASE OF ASSEMBLY FOR THE OPERATOR AND ALSO MAKES POSSIBLE PRE-ASSEMBLY INSPECTIONS

THAT ABSOLUTELY ELIMINATE GUESSWORK. WE KNOW THAT IT IS RIGHT WHEN IT GOES ON THE JOB.

THE CLUSTER -- INCLUDING INSTRUMENTS, GAUGES, CONTROL SWITCHES, RADIO, ASHTRAY AND OPTIONAL ITEMS -- IS SUBASSEMBLED ON A FEEDER CONVEYOR. IT HAS ITS OWN SEPARATE WIRING HARNESS.

A COMPLETE PRE-ASSEMBLY ELECTRICAL CHECK IS PERFORMED WITH A NEW SOLID-STATE, COMPUTERIZED TESTER. IT CHECKS ALL CIRCUITS, PROVIDES READINGS ON THE FUEL AND TEMPERATURE GAUGES AND TACHOMETER, AND GIVES FRONT PANEL READOUTS ON BULBS TO MAKE SURE THEY ARE GOOD ONES. IT ALSO DIAGNOSES DEFECTS AND INDICATES DIRECTLY WHETHER A PROBLEM IS THE RESULT OF AN OPEN CIRCUIT, A DEAD SHORT OR A GROUND. THIS MAKES THE INSPECTION FASTER AND MORE ACCURATE AND SIMPLIFIES REPAIRS BY PINPOINTING THE PROBLEM.

THE WIRING HARNESS FOR THE INSTRUMENT CLUSTER IS CONNECTED TO THE MAIN INSTRUMENT PANEL HARNESS THROUGH A SINGLE MULTIPLE PLUG RATHER THAN MANY INDIVIDUAL CONNECTORS AS THE CLUSTER IS INSTALLED.

OUTSIDE OPERATIONS CONTINUE IN THE ENGINE COMPARTMENT DURING THIS TIME AS THE FRONT WIRING HARNESS, EVAPORATIVE EMISSION VAPOR STORAGE CANISTER AND WINDSHIELD WASHER SYSTEMS ARE INSTALLED.

THE NEXT TRIM PASS INCLUDES INSTALLATION OF THE HEATER OR AIR-CONDITIONING CONTROL HEAD, INSTRUMENT PANEL PAD AND CLUSTER TRIM BEZEL AND A FULLY ASSEMBLED STEERING COLUMN, COMPLETE WITH STEERING WHEEL.

THEN ANOTHER COMPLETE ELECTRICAL CHECK IS PERFORMED THROUGH THE MAIN FIREWALL FUSE BLOCK.

NOW THE CAR ENTERS THE THIRD TRIM PASS BY MAKING A 180-DEGREE TURN OVER AN AISLE. YOU WILL BE INTERESTED TO KNOW THAT THE CAR STAYS IN A HORIZONTAL POSITION THROUGHOUT THE SYSTEM. THIS IS DUE TO THE THREE-RAIL OVERHEAD CONVEYOR DESIGN.

WHEREVER THE CONVEYOR IS AT THE 48- OR 72-INCH HEIGHT, SPECIAL FLUORESCENT LIGHTS ARE SET INTO THE FLOOR, COVERED WITH THICK PLASTIC LENSES, TO PROVIDE SIGNIFICANTLY IMPROVED OPERATOR VISION UNDERNEATH THE CAR.

INSTALLATIONS AT THIS POINT INCLUDE TRIM ITEMS ON THE ENGINE COMPARTMENT SIDE PANELS ALONG WITH FRONT SUSPENSION UPPER CONTROL ARMS. THESE ARE FIXTURED AT CURB HEIGHT AND TIGHTENED.

THEN THE CONVEYOR MOVES UP TO ITS FULL HEIGHT OF 72-INCHES FOR INSTALLATION OF UNDERBODY PARTS -- FUEL, VAPOR AND BRAKE PIPES, REAR SHOCK ABSORBERS AND FRONT SUSPENSION LOWER CONTROL ARMS.

THE CAM BOLT ATTACHMENTS ARE PUT ON LOOSELY AT THIS TIME AND TIGHTENED LATER WHEN CASTER AND CAMBER ARE SET.

THE FUEL TANK IS INSTALLED AFTER BEING SUB-ASSEMBLED IN AN OFF-LINE AREA.

THE TANK IS THEN PRESSURE-TESTED UNDER WATER FOR LEAKS IN THE SAME AREA, AND A PRESSURE-DIFFERENTIAL TEST IS PERFORMED ON THE FUEL VAPOR EMISSION CONTROL SYSTEM.

REAR AXLE UPPER CONTROL ARMS ARE INSTALLED BEFORE THE VEGA GOES INTO ITS FOURTH TRIM PASS FOR FRONT SUSPENSION COMPONENTS, INCLUDING DISC BRAKE HUB ASSEMBLIES AND FRONT COIL SPRINGS.

A DRESSED ENGINE -- COMPLETE EXCEPT FOR FAN AND AIR CLEANER -- IS DELIVERED TO THE INSTALLATION POINT ON AN OVERHEAD POWER-AND-FREE CONVEYOR.

EVEN THE ENGINE DRESS LINE HAS DIFFERENT ELEVATIONS -- THREE TO BE EXACT -- TO PUT THE ENGINE AT THE MOST CONVENIENT WORKING HEIGHT FOR OPERATIONS TO BE PERFORMED. OIL AND TRANSMISSION FLUIDS ARE INSTALLED WHILE THE ENGINE IS STILL ON THE DRESS LINE.

THE REAR AXLE IS ALSO SUBASSEMBLED ON ITS OWN CONVEYOR. IT GOES TO THE INSTALLATION POINT COMPLETE WITH LOWER CONTROL ARMS AND BRAKE PIPES. ITS LUBRICANT IS INSTALLED WITH THE PINION NOSE AT A 20 DEGREE UP-ANGLE. THIS SLIGHT OVERFILL ASSURES THAT THE LUBRICANT WILL FLOW OUT TO THE WHEEL BEARINGS.

VEGA DRIVE TRAIN INSTALLATION IS UNIQUE. THE FULL WELDED BOX CONSTRUCTION AT THE FRONT PRECLUDES INSTALLATION OF THE ENGINE TRANSMISSION FROM ABOVE DUE TO PRODUCTION RATES AND THE FRONT-HINGED HOOD. SO, IT WAS DESIGNED TO BE INSTALLED FROM UNDERNEATH. HOWEVER, IT CAN BE REMOVED FOR SERVICE AND REINSTALLED FROM ABOVE BY DISCONNECTING THE HOOD HINGE PINS.

IN ORDER TO ACCOMPLISH THE OVERHEAD INSTALLATION AT A CONVEYOR SPEED OF 30 FEET PER MINUTE, A MERRY-GO-ROUND FLOOR CHAIN IS SYNCHRONIZED WITH THE THREE-RAIL CONVEYOR FOR THE FIRST

200 FEET OF THE FIRST CHASSIS LINE. THE FLOOR CHAIN PULLS AIR-OVER-HYDRAULIC LIFT DOLLIES ROLLING ON CASTERS WHICH RAISE THE ENGINE AND REAR AXLE ASSEMBLY INTO POSITION UNDER THE BODY. EACH UNIT IS FULLY SELF-CONTAINED. ONE CHARGE OF 100 PSI COMPRESSED AIR IN THE TANK IS SUFFICIENT FOR THREE FULL CYCLES. EACH UNIT IS CHARGED ONCE ON EACH REVOLUTION OF THE MERRY-GO-ROUND, MAKING IT UNNECESSARY TO HAVE EXTERNAL POWER, AIR OR ELECTRICAL CORDS WHILE THE UNITS ARE IN USE.

THE ENGINE IS LOADED ONTO ITS DOLLY DIRECTLY FROM THE DELIVERY CONVEYOR, AS IS THE REAR AXLE ASSEMBLY, ON THE RETURN SIDE OF THE MERRY-GO-ROUND. AS THE CORRESPONDING BODY APPEARS AT THE HEAD OF THE LINE, THE DOLLIES CARRYING ITS ENGINE AND AXLE TURN IN UNDERNEATH AND IN SUBSEQUENT OPERATIONS THE ENGINE IS RAISED INTO POSITION AND MOUNTED TO THE ENGINE COMPARTMENT SIDE PANELS AND ATTACHED TO THE BODY WITH A SHORT CROSSMEMBER AT THE REAR.

THE AXLE IS RAISED INTO POSITION, CONTROL ARMS ARE CONNECTED, THEN THE SPRINGS ARE POSITIONED AND COMPRESSED USING THE LIFT DOLLY AS A COMPRESSOR; THE DOLLY STOPS LIFTING AT THE CURB HEIGHT POSITION, THE CONTROL ARM BUSHING BOLTS ARE TORQUED, AND THE BODY-MOUNTED SHOCK ABSORBERS ARE ATTACHED TO THE AXLE TO HOLD EVERYTHING IN PLACE UNTIL THE CAR IS ON ITS WHEELS LATER.

WHEN ALL OPERATIONS ARE COMPLETE, THE DOLLIES ROLL OUT FROM

UNDER THE CAR AND RETURN FOR ANOTHER DRIVE TRAIN WHILE THE OVERHEAD BODY CONTINUES IN A STRAIGHT LINE, STILL AT THE 72-INCH HEIGHT FROM THE FLOOR.

NEXT, THE DRIVESHAFT AND EXHAUST SYSTEM ARE INSTALLED, FOLLOWED BY THE PARKING BRAKE SYSTEM AND CLUTCH CABLE OR AUTOMATIC SHIFT LINKAGE. THE STEERING GEAR IS ATTACHED TO THE BODY AND THE END OF THE STEERING COLUMN, AND THE STEERING LINKAGE IS ATTACHED TO THE GEAR AND FRONT HUBS. THIS ESSENTIALLY COMPLETES CHASSIS OPERATIONS, FOLLOWED BY FILL, BLEED AND TEST OF THE BRAKE SYSTEM.

A GREAT DEAL OF EMPHASIS WAS PLACED ON THE QUALITY ASSEMBLY AND TESTING OF THE BRAKE SYSTEM AND THIS INVOLVED THE DEVELOPMENT OF SPECIAL EQUIPMENT FOR THE VEGA.

FOR EXAMPLE, FLUID IS USUALLY FORCED INTO THE MASTER CYLINDER WHILE THE WHEEL CYLINDER BLEEDERS ARE OPENED AND BLED THROUGH VACUUM HOSES TO DRAW FLUID THROUGH THE SYSTEM. CONSIDERING THE PRODUCTION RATE, AVAILABLE CYCLE TIME, HOUSEKEEPING PROBLEMS CAUSED BY DRAWN-OFF FLUID AND OTHER REASONS, WE WORKED WITH A SUPPLIER TO DEVELOP A SELF-CONTAINED EVACUATOR UNIT. IT DRAWS ALL THE AIR FROM THE ENTIRE BRAKE SYSTEM THROUGH AN ORIFICE ONLY .026" IN DIAMETER AND THEN CHARGES IT WITH HIGH-PRESSURE FLUID THROUGH THE MASTER CYLINDER WITHOUT EVER OPENING A WHEEL CYLINDER OR CALIPER BLEEDER SCREW. BRAKE TESTING HAS BECOME AN EXACT SCIENCE IN CHEVROLET AND

GENERAL MOTORS. WE ARE CONSTANTLY SEEKING IMPROVEMENTS IN OUR HIGHLY-RELIABLE TECHNIQUES AND EQUIPMENT PROCEDURES.

HERE IS ANOTHER BREAKTHROUGH FOR THE VEGA. AN ENTIRELY NEW CONCEPT IN BRAKE SYSTEM TESTING WAS DEVELOPED FOR THE VEGA BY THE GENERAL MOTORS MANUFACTURING DEVELOPMENT SECTION. THE NEW DEVICE NOT ONLY APPLIES 2,000 P.S.I. PRESSURE TO THE SYSTEM, BUT IT ALSO COMPENSATES FOR HOSE AND SEAL EXPANSION BY USING A TWO-STAGE TEST WITH AN INTENSIFIER UNIT, A STABILIZING CYCLE AND AUTOMATIC OPERATION.

THIS PROCEDURE IS SUPPLEMENTED BY FUNCTIONAL TESTING OF THE BRAKES DOWN THE LINE, AFTER THE JOB IS A COMPLETED DRIVABLE UNIT.

THE BODY, STILL IN ITS OVERHEAD CARRIER, IS ON AN ELEVATED PLATFORM WHILE ALL THE BRAKE SYSTEM WORK IS GOING ON IN THE SECOND CHASSIS PASS. THIS PERMITS ASSEMBLY WORK TO CONTINUE UNDERNEATH THE CAR AS THE FRONT CROSSMEMBERS AND OPTIONAL FRONT AND REAR STABILIZER BARS ARE INSTALLED.

IN THE NEXT STAGE, THE VEHICLE ENTERS AN ELEVATED BOOTH WHERE A FULL POUND OF SOUND-DEADENING UNDERCOAT MATERIAL IS SPRAYED INTO EACH OF THE FOUR WHEEL WELLS. THIS IS SIMILAR TO THE INTERIOR UNDERBODY SPRAYING WHICH IS DONE IN THE FISHER BODY PAINT SYSTEM, GIVING THE VEGA 2300 A COMPLETE UNDERBODY COATING OF SOUND DEADENER, INSIDE AND OUT.

WHEELS AND TIRES ARE INSTALLED AFTER THE UNIT LEAVES THE SPRAY BOOTH.

TO INSURE A RELIABLE FLOW OF WHEELS TO THE MAIN LINE AT A RATE OF AT LEAST 550 ASSEMBLIES PER HOUR, ANOTHER TOTALLY NEW SYSTEM WAS DESIGNED.

A "SILO" STORAGE UNIT 27- FEET IN CIRCUMFERENCE AND 22- FEET HIGH WAS BUILT. IT CAN STORE 200 PAINTED RIMS IN SEQUENCE. THE RIMS ENTER AT THE TOP OF A BELT CONVEYOR, ROLL BY GRAVITY FEED NINE TIMES AROUND THE INSIDE OF THE SILO ON BALL-BEARING ROLLERS AND EMERGE AT THE BOTTOM WHERE THEY ARE FED INTO AN AUTOMATIC VALVE-STEM INSERTER TWO AT A TIME.

THE INSERTER SPINS THE RIMS AND USES PHOTOELECTRIC CELLS TO SPOT VALVE STEM HOLES. THIS PERMITS AUTOMATIC INSERTION OF THE VALVE STEM BY AN AIR-OPERATED RAM WHICH IS FED FROM A VIBRATOR HOPPER. THE HOPPER PROPERLY ORIENTS THE STEMS AND FEEDS THEM TO THE RAM. A MANUAL OPERATION REQUIRING A HIGH DEGREE OF CONSISTENT DEXTERITY WOULD HAVE BEEN NEAR IMPOSSIBLE IN THIS CASE.

THE RIM THEN MOVES FROM THE "STEMMER" TO THE MOUNTER WHERE IT MEETS THE PROPER TIRE WHICH HAS BEEN PRE-LUBRICATED AND IS READY FOR ASSEMBLY INTO A COMPLETED UNIT.

THE TIRES ARE THEN INFLATED BY BLOWING AIR IN BETWEEN THE TIRE AND RIM, AUTOMATICALLY BALANCED AND WEIGHTED, TWO AT

A TIME, AND CONVEYED TOWARD DELIVERY CHUTES.

THEN THE TIRES ARE DISTRIBUTED TO THE RIGHT OR LEFT SIDE OF THE MAIN LINE SOME 250 FEET AWAY. THE SPARE TIRE IS SENT FURTHER DOWN THE LINE TO BE INSTALLED WHEN THE CAR IS AT A MORE CONVENIENT WORKING HEIGHT.

AS THE WHEELS ARE INSTALLED, THE FAN AND AIR-CONDITIONING EQUIPMENT, IF ORDERED, ARE PUT IN PLACE.

THE PLASTIC GRILLE IS INSTALLED IN THE SAME SEQUENCE.

THEN THE CONVEYOR IS LOWERED SO THAT THE SPARE TIRE AND JACK UNIT CAN BE INSTALLED IN THE TRUNK. ENGINE COMPARTMENT WORK IS BEING DONE AT THIS SAME TIME.

IN THE NEXT AREA, INSTALLATIONS INCLUDE THE RADIATOR, WHICH IS PUT IN OVER THE FENDER, THE AIR CLEANER AND MANIFOLD HEAT PIPE.

THE SHIFT LEVER IS ATTACHED TO THE TRANSMISSION.

ANOTHER ELECTRICAL CHECK IS MADE OF THE BATTERY BEFORE IT IS INSTALLED IN THE CAR AND THEN A COMPLETE VEHICLE ELECTRICAL CHECK IS MADE USING THE CAR'S OWN BATTERY POWER.

THE VEHICLE IS LOWERED AND UNLOADED ON ITS WHEELS AS THE CARRIER'S FOUR ARMS ARE DISENGAGED FROM THE BODY.

AS THE CAR MOVES DOWN THE FINAL LINE, OPERATORS IN THE CENTER PIT ATTACH THE FRONT BUMPER.

PARKING LIGHTS AND FRONT AND REAR PLASTIC VALANCE PANELS ARE ATTACHED FROM BOTH THE CENTER PITS AND HALF-DEPTH SIDE PITS, AND A SET OF PRECISION BUBBLE GAGES ARE ATTACHED TO

THE UPPER AND LOWER BALL JOINTS ON EACH SIDE, CONNECTED BY A TRAM BAR. THE LOWER CONTROL ARM CAM BOLTS ARE TURNED BY THE PIT OPERATOR UNTIL BOTH THE CAMBER AND CASTER BUBBLES ARE CENTERED ON BOTH SIDES, THEN THE ATTACHING NUTS ARE TORQUED AND THE INSPECTOR VERIFIES THE SETTING BEFORE THE GAGES ARE REMOVED. THE GAGES ARE CHECKED DAILY TO A MASTER CALIBRATING FIXTURE, WHICH IN TURN IS CORRELATED WITH AUDIT DATA FROM THE VISUALINER IN FINAL PROCESS.

NEXT, CARPETS AND SEATS ARE INSTALLED. THE FRONT BUCKET SEATS ARE LOADED INTO THE CAR TOGETHER AND ATTACHED FROM UNDERNEATH THE CAR, RATHER THAN BEING BOLTED TO THE FLOOR FROM THE INSIDE AS IN THE PAST. REAR SEATS AND SEAT BELTS ARE INSTALLED JUST PRIOR TO FRONT SEAT LOADING. HEAVY KRAFT PAPER PROTECTORS ARE PLACED OVER THE CARPET AND ARE SECURED UNDER THE SILL PLATES TO PREVENT CARPET SOILAGE.

IF THE CAR IS EQUIPPED WITH AIR-CONDITIONING OR POWER STEERING, THE SYSTEMS ARE EVACUATED AND FILLED WITH FREON OR POWER STEERING FLUID IN THE SAME MANNER AS WERE THE BRAKES.

FUEL IS PUMPED INTO THE FUEL TANK AS THE COOLING SYSTEM IS EVACUATED AND FILLED AT THE FRONT. THE COMPUTER-PRODUCED PRICE STICKER AND VEHICLE CERTIFICATION LABEL ARE APPLIED TO THE VEHICLE, AND IT IS STARTED AND GIVEN ANOTHER FUNCTIONAL ELECTRICAL CHECK. A ROLL TEST INSPECTOR GIVES

THE CAR A VISUAL CHECK, VERIFIES FLUID LEVELS AND DRIVES IT OFF THE LINE READY FOR TESTING.

EVERY VEGA RECEIVES FOUR SEPARATE FUNCTIONAL CHECKS BEFORE BEING RELEASED TO THE FINAL PROCESS AREA.

THE FIRST IS ANOTHER PRODUCT OF THE MANUFACTURING DEVELOPMENT SECTION OF GM ENGINEERING STAFF -- A ROAD SIMULATOR OR CAR SHAKER MACHINE. IT CONSISTS OF FOUR PLATFORMS ONTO WHICH THE CAR IS DRIVEN, ONE PLATFORM FOR EACH WHEEL.

EACH HAS ITS OWN SEPARATE DRIVE UNIT, AND ALL CAN BE PROGRAMMED TO IMPART SHOCK LOADS TO THE WHEELS. THE AMPLITUDE AND FREQUENCY OF THE SHOCKS CAN BE VARIED IN ANY DESIRED MANNER INDEPENDENTLY AT EACH CORNER TO SIMULATE ANY CONCEIVABLE TYPE OF ROAD SURFACE. SINCE THE CAR IS STATIONARY AND QUIET, THE INSPECTOR IN IT CAN EASILY DETECT SQUEAKS AND RATTLES THAT ARE NOT AUDIBLE DURING THE CONVENTIONAL ROLL TEST. THIS SEQUENCE ALSO SERVES TO "SHAKE DOWN" THE SPRINGS AND SUSPENSION BUSHINGS FOR GREATER TOE-IN SETTING ACCURACY.

AFTER COMPLETING THE SHAKE TEST, THE JOB IS DRIVEN FORWARD ONTO A NEW ALIGNER, WHERE INDEPENDENT HEADS SPIN THE FRONT WHEELS. THE REQUIRED TIE ROD ADJUSTMENTS ARE MADE UNTIL THE READOUTS INDICATE TOE-IN IS PROPERLY SET AS THE WHEELS

ARE SPINNING AT NORMAL ROAD SPEED. CASTER AND CAMBER SETTING IS RECHECKED. IF ALL SPECIFICATIONS ARE WITHIN LIMITS, THE INSPECTOR PUSHES A BUTTON IN THE PIT WHICH CAUSES THE CONTROL PANEL NEXT TO THE DRIVER TO STAMP AN "OK" ON THE INSPECTION TICKET.

WHEN TOE-IN IS COMPLETE, THE DRIVER ACCELERATES OUT OF THE ALIGNER UNIT ONTO A BRAKE TEST UNIT. IF THE JOB MEETS THE SPECIFIED BRAKING FORCE AT EACH OF THE FOUR MOVABLE PLATES, THE CONTROL UNIT STAMPS THE INSPECTION TICKET "OK" AND THE DRIVER CONTINUES. IF A CORRECTION IS INDICATED, LIGHTS ON THE PANEL PINPOINT THE WHEEL SO THE DRIVER CAN RECORD IT ON THE TICKET.

THE FINAL PHASE IS THE CONVENTIONAL ROLL TEST.

THE PLANT HAS FOUR NEW SETS OF TEST LINES, INCLUDING ONE FOR BACKUP.

WITH THE FOUR FUNCTIONAL TESTS COMPLETE AND ANY CORRECTIONS MADE THE CAR IS WASHED AND CONVEYED TO A FINAL PAINT RE-INSPECTION AREA. AFTER THE HEADLAMPS ARE AIMED, THE CAR IS RE-INSPECTED IN A NEW BUILDING. THE CAR IS ACTUALLY READY TO SHIP BEFORE ENTERING THIS NEW AREA, BUT A COMPLETE RE-CHECK IS DONE HERE OF ALL APPEARANCE AND SAFETY ITEMS, INCLUDING ANOTHER ELECTRICAL TEST AND FLUID LEVEL CHECK.

READY FOR SHIPMENT, THE VEGA HAS UNDERGONE HUNDREDS OF SEPARATE

INSPECTIONS AND AT LEAST FIVE DIFFERENT FUNCTIONAL TESTS AS A COMPLETED UNIT.

ALL THE INGREDIENTS FOR PRODUCTION OF UNPRECEDENTED VEHICLE QUALITY ARE BUILT INTO THIS SYSTEM. ONE OF THE MOST IMPORTANT ELEMENTS IN ITS EFFICIENCY IS THE APPLICATION OF COMPUTER TECHNOLOGY.

ITS DEVELOPMENT BEGAN WITH THIS OBJECTIVE -- BUILD THE VEHICLE RIGHT THE FIRST TIME IN STATION. THE RESULT IS THE PRODUCT ASSURANCE CONTROL SYSTEM OR PACS. IT IS A COMPUTER-BASED SYSTEM UTILIZING THE LATEST IN DATA PROCESSING TECHNOLOGY.

THERE ARE TWO PRIMARY ACTIVITIES IN PACS. THE FIRST INVOLVES A PROCESS REVIEW TEAM WHICH CONSISTS OF CHEVROLET AND FISHER BODY REPRESENTATIVES AT LORDSTOWN. AS SPECIALISTS IN PROCESSING, INDUSTRIAL ENGINEERING AND QUALITY ENGINEERING, THEY ARE RESPONSIBLE FOR ESTABLISHING QUALITY LEVELS FOR PLANT OPERATIONS. THIS IS DONE THROUGH EVALUATION OF THE OPERATION TO DETERMINE ITS CAPABILITY TO CONFORM CONSISTENTLY TO ITS DESIRED QUALITY LEVEL.

THEY CONSIDER WORK SPACE LAYOUT, MATERIAL HANDLING PRACTICES, TOOLING AND MAINTENANCE REQUIREMENTS, COMPONENT RECEIVING INSPECTIONS AND TRAINING REQUIREMENTS FOR THE OPERATION. THE RESULT IS A "PROCESS CONTROL STANDARD". WHEN THE TEAM IS FINISHED WITH AN OPERATION, THEY HAVE IT FUNCTIONING EFFICIENTLY AND THEY KNOW WHAT IT NEEDS TO STAY THAT WAY.

THE SECOND PART OF THE PACS PROGRAM IS THE "REAL-TIME" REPORTING OF THE OPERATION'S QUALITY PERFORMANCE. PREPRINTED INSPECTION TICKETS ACCOMPANY EACH VEHICLE FROM THE BODY SHOP TO THE END OF THE ASSEMBLY LINE. INSPECTORS RECORD INFORMATION ON IT BY SIMPLY CHECKING THE APPROPRIATE BOX.

SIXTEEN OPTICAL SCANNING DEVICES ARE STRATEGICALLY LOCATED THROUGHOUT THE PLANT. INSPECTION TICKETS ARE FED THROUGH THESE SCANNERS AND THE INFORMATION IS TRANSFERRED INTO THE COMPUTER.

THE COMPUTER CONTINUALLY CALCULATES THE CURRENT QUALITY LEVEL ON ALL OPERATIONS AND COMPARES THESE TO THE PRESCRIBED OBJECTIVES STORED IN ITS MEMORY BANK.

HERE IS WHAT HAPPENS IN THE EVENT OF A DISCREPANCY.

SUPPOSE THAT FUNCTIONAL TESTING OF THE BRAKES ON ONE VEHICLE SHOWS EXCESSIVE PEDAL TRAVEL -- LOW BRAKES IN OTHER WORDS. THIS COULD INDICATE AN EQUIPMENT OR OPERATIONAL PROBLEM IN EVACUATION AND FILL OF THE FLUID SYSTEM.

THE INSPECTOR MARKS THE JOB FOR REPAIR AND THE NECESSARY CORRECTION ON THAT VEHICLE IS MADE IN ANOTHER AREA. INFORMATION ON THE INSPECTION TICKET IS READ INTO THE COMPUTER. AN "ALERT" MESSAGE IS SENT INSTANTANEOUSLY VIA TELETYPE TO THE PROCESS MONITOR WHO IS IN THE AREA DIRECTLY INVOLVED.

WORKING FROM A CHECKLIST, THE MONITOR DIAGNOSES THE OPERATION TO DETERMINE WHERE AN ADJUSTMENT IS REQUIRED, IN CONJUNCTION

WITH THE AREA SUPERVISOR.

WHEN THE CORRECTION IN EQUIPMENT OR PROCEDURE IS MADE, THE COMPUTER IS GIVEN THE VEHICLE SEQUENCE NUMBER CORRESPONDING TO THE CORRECTION POINT. IT RETAINS THIS INFORMATION UNTIL AN "ALL CLEAR" IS GIVEN. NORMAL INSPECTION CONTINUES ON VEHICLES PRIOR TO THE TIME OF THE CORRECTION AND ANY REQUIRED REPAIRS ARE MADE. ONCE THIS SEQUENCE NUMBER HAS BEEN ENTERED, THE COMPUTER MEASURES THE EFFECTIVENESS OF THE ADJUSTMENT.

THIS IS A "CLOSED-LOOP" SYSTEM. NO UNRESOLVED PRODUCTION PROBLEM IS ALLOWED TO CONTINUE BEYOND A SPECIFIED PERIOD. IN THAT WAY, THE COMPUTER PROVIDES AN ACCOUNTING SERVICE FOR OUR INSPECTION SYSTEM AND CORRECTION PROCEDURES. ASIDE FROM THE FUNCTIONAL CHECKS BY OPERATORS AND INSPECTORS, THE LORDSTOWN PLANT UTILIZES A NUMBER OF AUTOMATED CHECKS. THESE INCLUDE THE BRAKE TEST, ELECTRICAL SYSTEM CONTINUITY CHECK AND COMPLETE FUNCTIONAL QUALIFICATION OF THE UNDERBODY. THESE AUTOMATIC INSPECTIONS ARE ALSO BACKED BY THE PACS SYSTEM.

FOR INSTANCE, BY LINKING THE BRAKE TESTER DIRECTLY TO THE COMPUTER, WE HAVE AN INSTANTANEOUS RECORD OF QUANTITATIVE RESULTS FROM FUNCTIONAL INSPECTIONS. THIS IS VERY SIGNIFICANT IN ANALYZING QUALITY TRENDS.

FINALLY, THE PACS SYSTEM ASSISTS LORDSTOWN PERSONNEL WHEN IT

COUNTS MOST AS FAR AS THE CUSTOMER IS CONCERNED. A SIMPLE INQUIRY TO THE COMPUTER WILL HELP INSPECTORS DETERMINE EACH VEHICLE'S READINESS FOR SHIPMENT. THIS REPORT IS BASED ON ALL IN-PROCESS RESULTS THAT HAVE BEEN IDENTIFIED THROUGHOUT ASSEMBLY BY VEHICLE SERIAL NUMBER AND STORED IN THE COMPUTER.

THIS ON-LINE REAL-TIME QUALITY ASSURANCE SYSTEM HELPS US GIVE EACH NEW VEGA ITS OWN PEDIGREE AS IT'S BEING BUILT RATHER THAN AFTER IT'S BUILT, AND IS JUST ONE OF THE MANY NEW AND INNOVATIVE TECHNIQUES THAT HELP US AT LORDSTOWN MAKE OUR VEGA THE BRIGHTEST NEW STAR IN THE AUTOMOTIVE WORLD.

THANK YOU