# MANUFACTURING EQUIPMENT PURCHASE SPECIFICATION
## DELPHI SAGINAW STEERING SYSTEMS

| | | | | | |
|---|---|---|---|---|---|
| **TITLE:** | Vibratory Finisher For Deburring, Surface Finishing, and Cleaning | | | **NUMBER:** | SD-1011 |
| **ISSUED BY:** | Manuel Gonzalez | **DATE:** | 11/30/95 | **APPROVED BY:** | |
| **REVISION:** | 2 | **DATE:** | 09/26/97 | **SHEET:** | 1 of 15 |

**TABLE OF CONTENTS**


| | DESCRIPTION | PAGE |
|---|---|---|
| I. | INTRODUCTION | 2 |
| II. | SPECIFICATION REFERENCES | 2 |
| III. | GENERAL CONDITIONS | 2 |
| | A. Machine | 2 |
| | B. Controls | 4 |
| | C. Paint | 6 |
| | D. Machine Inspection and Performance Requirements | 6 |
| | E. Final Acceptance | 7 |
| | F. Design Approvals | 7 |
| IV. | ENGINEERING SERVICES | 8 |
| | A. Drawing Standards | 8 |
| | B. Reproducible Drawings | 9 |
| | C. Operating and Maintenance Manuals | 9 |
| | D. Delivery and Shipping Procedures | 10 |
| | E. Warranty and Payment | 11 |
| | F. Orders, Alterations, and Cancellation | 11 |
| V. | QUOTATION | 11 |
| VI. | REVISIONS | 15 |




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

## I. INTRODUCTION

This specification covers the basic requirements for a vibratory finishing machine incorporating a spiral-type motion which has a circular path. The purpose of the machine is deburring, finishing, and cleaning parts.

## II. SPECIFICATION REFERENCES

(2) **A.** Unless otherwise stated, latest versions of the following specifications are to be considered part of this specification:

**1.** SD-000 Delphi Saginaw Steering Machinery and Equipment Specifications.

**2.** SD-001 General Manufacturing Equipment Specification.

**3.** SD-002 Manufacturing Equipment Statistical Qualification Requirements.

**4.** SD-003 General Drawing and Manuals Specifications.

**5.** SD-004 General Manufacturing Equipment Controls Specification.

**6.** SD-005 General Gages Specification.

**7.** SD-006 Design Guidelines for Learn Manufacturing Equipment.

**8.** SD-007 Preferred Component List.

**9.** The vendor's letter head Material Safety Data Sheet form shall be completely filled out with authorized signature and dated, submitted, and approved by Delphi Saginaw Steering System's Hazardous Material Control Committee before any new chemical products are allowed onto Delphi Saginaw Steering System's property.

## III. GENERAL CONDITIONS

### A. Machine

**1. Arrangement**
A completely self-contained, floor-mounted system is required which is to be pre-wired with motor(s), controls, and is to meet OSHA Standards. The machine is to include hinged access doors/panels with interlocks as required for repair. Items on Delphi Saginaw Steering System's Preferred Components List shall be used when required. Desirable load and unload height is 40-42".

**2. Work Platform**
A work platform will be required if the machine height is greater than 42".




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

3. **Drive**
   The drive should be constant speed and capable of having manual amplitude adjustments. (If necessary, a variable-speed system should be recommended for running the parts with the control logic making the speed change as the machine sequence changes. Details explaining the method for varying the speed must be discussed with the Process Engineer before quoting.)

4. **Bowl**
   The bowl is to be lined with an abrasion-resistant polyurethane material which is at least ¾' thick. The working capacity and minimum media level of the machine are to be identified on the urethane lining. Drains in the bowl are to route the waste liquid to a setting tank.

5. **Compound System**
   An automatic system for continuously injecting cleaner/compound and rinsing water to the tumbling media and parts is required. Powder chemicals shall be contained in a stand alone enclosure and automatically charged. When compound feed panel is used to enclose the metering pump and flow control devices, the electrical terminal strips from these devices shall have their own separate NEMA 12 enclosure.

6. **Cleaner Disposal**
   The setting tank is required for separation of the abrasive and metal fines before passing the biodegradable solution to the plant drain. The tank size is to be at least four (4) times the flow rate per hour to allow settling of the fines. One side is to be sloped so the sludge can be scraped out of the tank and into a container supplied by Delphi Saginaw Steering Systems.

   A re-circulation system with filtration system to remove only the abrasive and metal fines should be quoted if the pay back is less than one year. The cleaner being discharged by the filter shall be minimized by returning the active and clean cleaner to the system.

7. **Media Classification**
   A system to remove the under-sized tumbling media from the bowl shall be included. This removal system shall be located after the ramp discharge.

8. **Unloading**
   The unloading dam is to be actuated for unloading from the control panel.

9. **Part Separation**
   The tumbling media is to be returned to the bowl during separation of the parts and not discharged from the machine with parts.

10. **Rinse System**
    A washing operation occurring during part discharge is to remove the tumbling cleaner by applying a rust-preservative cleaner to protect the parts for a minimum of 72 hours storage.

    The washing operation is to completely rinse the entire part, have a tank so the cleaning solution can be re-circulated, and a make-up compound system.




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

**11. Lubrication**

The machine is to require lubrication attention only after every 200 hours or longer of machine spindle rotation. An automatic system can be used. Lubrication type by Delphi Saginaw Steering Systems code is to be identified on the machine and located at each filling port.

**B. Machine Controls**

**1.** Spring-centered (3-position) selector switches should be used for manual motion control to conserve console panel space. Group selector switches, push buttons, and light together by motion or function.

**2.** Timers for finishing and unloading are to be mounted on the face of the enclosure door. The timers are to be Eagle-type with at lease twice the cycle time or 60 minutes minimum.

**3.** The machine cycle is to be similar to the typical line sequence diagram shown on sheet 6.

**4.** All control components (timers, relays, limit switches, terminal strips, solenoids, etc.) are to be identified on the machine.

**5.** A 100,000 hour non-resettable timer is to record the total hours that the tub motor runs.

**6.** A compressed air filter, regulator, and moisture separator are required.

**7.** All incoming water at each compound system is to have a flow meter for determining the flow rate.

**8.** Air solenoids shall not be mounted in the same enclosure which houses electrical terminal strips.

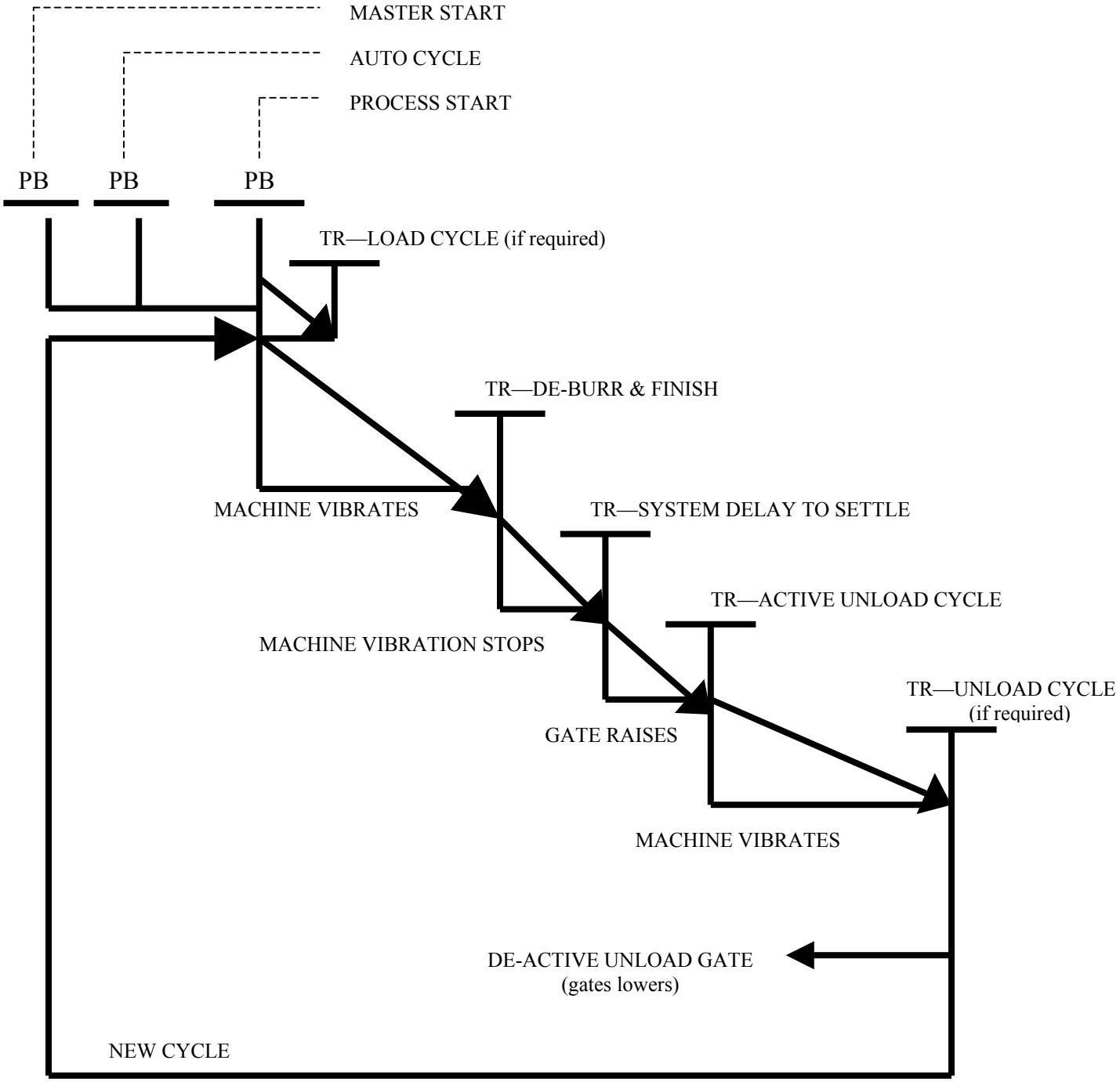
**9.** All electrical wires must connect to the terminal strip.

**10.** The machine is to be capable of operating in both a “manual” mode and an “automatic” mode.




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

TYPICAL MACHINE LINE SEQUENCE DIAGRAM
(REFER TO ES-1)







Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

(2) **C. Paint**

Painting to include all equipment, including structural steel and miscellaneous iron installed, except pre-painted purchased components per parts list and urethane surfaces that the parts tumble against. The electrical panel is to be painted the same color as the machine, with the sub-plate gloss white per Delphi Saginaw Steering Systems pain specifications.

(2) **D. Machine Inspection and Performance Requirements:**

The Delphi Saginaw Steering Systems Process Engineer will examine the system and process parts after the run-off Readiness is completed.
The performance requirements will consist of three (3) separate run-offs, which are: The Run-Off Readiness, the Run-Off at the Vendor's Site, and the Run-Off at Delphi's Factory Site. Equipment service personnel shall be required at all the run-offs.

1. **Run-Off Readiness:** The run-off readiness will consist of two (2) separate runs the machine system shall perform prior to the Run-Off on the Vendor's Site by Delphi Engineering personnel. Washer run-off is in accordance with SD-002.

   a. **RUN #1:** The complete machine system shall run, with the selected process media (and without parts) and process settings, on the vendor's floor for 24 hours minimum with all motors and systems operating without causing any faults, jams, or media exiting from the machine. Any problems that occur should be corrected and the 24-hour run re-started from the very beginning.

      After the 24-hour run is completed, the machine system shall run four (4) hours with parts and without machine faults, jams, or adjustments.

   b. **RUN #2:** The vendor will run parts and accumulate sample pieces for either deburring, surface finish, and/or cleanliness testing, record the readings and forward the information to the manufacturing engineer for evaluation. The parts shall be selected at random as they completely discharge from the machine for any of the following processes:

      **Deburring:** The required areas shall burr free.

      **Surface Finishing:** The parameters being sought shall be in accordance with SD-002.

      **Cleanliness Testing:** A 10 micron filter patch will be used for milliporing per the procedure SD-1008.

      **Dryness:** Parts shall discharge dry.




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

**Sound Level:** Measurements shall comply to specification GM-1619. Before the vibratory finisher run-off, this data shall be recorded and forwarded to the manufacturing engineer for evaluation. These readings may be performed during run #2.

Upon the acceptance of the data items (Run #1, Run #2, Deburring, Surface Finishing, Cleanliness Testing, Dryness, Sound Level) the machine will be readied for the run-off by the Delphi Engineering personnel.

2. **Run-Off at the Vendor's Site:**

   a. **Duration:** The run-off shall consist of a minimum of 8 hours/machine or 2 loads per part per machine of continuous production without machine adjustments, whichever is greater.

   b. **Testing Equipment:** Vendor will supply all testing equipment for the run-off.

3. **Run-Off at Delphi's Site:** A repeat of the vendor's run-off will occur at Delphi site(s) immediately following installation, and shortly after delivery. After the run-off has been accepted, the machine will be turned over to the Operations Department for running of production parts.

**E. Final Acceptance:**

Final acceptance of the equipment will be based upon a 300-hour production run at Delphi Saginaw Steering Systems without machine adjustments and the contract completed. The vendor will supply all the required technical service during the installation and/or pre-operative stages until final acceptance.

**F. Design Approvals**

1. A concept meeting will be held at Delphi Saginaw Steering Systems with the vendor and his design personnel to discuss the design. Two (2) copies of the following drawings will be required and are to be submitted at least three (3) days before the meeting.

   a. Top and side assembly view of system

   b. Assembly view of drive train with list of components.

   c. Sequence of electrical and pneumatic controls with interlocks along with proposed diagram.

   d. List of major purchased components, including mechanical, electrical, pneumatic, lubrication, etc.




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

**e.** All vendor standard drawings that will be supplied but not drawn on Delphi Saginaw Steering System's paper will have Delphi Saginaw Steering System's title blocks.

**f.** Preliminary list of drawings that will be drawn on Delphi Saginaw Steering System's paper for detail approval meeting.

**2.** A detail approval meeting(s) will be held at Delphi Saginaw Steering Systems with two (2) sets of drawings submitted at lease (2) weeks in advance – showing the complete machine. Revisions required during building must be shown on the drawings as a revision and approved. All drawings marked approved with a limitation (as shown, as noted, etc.) must receive final approval. At this meeting, the vendor shall have:

**a.** Compete general arrangement drawings.

**b.** Assembly and major sub-assembly drawing showing the location of all components as details in the complete system and parts list. Three (3) views are required on these drawings.

**c.** Drive spindle and bearing housings.

**d.** Screen.

**e.** Manual sequence of operation for start-up, operation, and shut down.

**f.** Delivery schedule of purchased component parts.

**g.** Electrical drawings, panel drawings, line-sequence diagram, and parts list.

**h.** Pneumatic drawings and parts list.

**i.** Lubrication drawings and parts list.

**3.** Drawing approval constitutes an acceptance of the design concept. It does not relieve the responsibility for proper operation of the equipment.

## IV. ENGINEERING SERVICES

### A. Drawing Standards

**1.** All drawing per SD-003.




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

2. Reproducible drawings shall permit changes and provide readable blueprints.

3. Schematics shall be provided for all components. “Black boxes” will not be permitted.

**B. Reproducible Drawings**

One complete set of reproducible drawings must be supplied for each piece of equipment and shall include, but it not limited to:

1. Major sub-assemblies showing the location of all items in the complete machine and parts list.

2. Assembly and general arrangement.

3. Screen.

4. All drive-train components and assembly, including the spindle, bearing housings, etc.

5. Lubrication and parts list.

6. Electrical panel layout and parts list.

7. Electrical elementary wiring.

8. Pneumatic and parts list.

**C. Operating and Maintenance Manuals**

1. Two (2) preliminary manuals shall be supplied for approval at least 30 days prior to shipment of the equipment. These manuals shall include all required information. However, to assure accuracy, the process data sheets should not be filled out until the equipment has successfully completed the runoff on both the vendor’s plant floor and Delphi Saginaw Steering System’s factory floor.

(2) 2. One of the preliminary manuals will be returned with recommended changes. Four (4) sets of approved manuals should be received by the Delphi Saginaw Steering Systems Process Engineer responsible for the job within 30 days after satisfactory operation of the equipment. **<u>The fourth set shall be on disk using MS Word 6.0.</u>**

(2) 3. Operating and maintenance manuals shall comply to technical report standards and be grammatically correct, and in accordance to SD-003.




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

**D. Delivery and Shipping Procedures**

1. Every effort must be made to meet the promised delivery date (at price quoted). Delivery shall be between 8:00 a.m. and 1:30 p.m. Monday through Friday. Call the Delphi Saginaw Steering Systems Process Engineer with shipping information before the equipment leaves your plant.

2. When it is impossible to meet the promised delivery date, the supplier shall notify Delphi Saginaw Steering System's Process Engineer and Business Unit Buyer at once in writing. Appropriate action will be negotiated and confirmed in writing by the Process Engineer responsible for the equipment.

3. Shipment shall be by truck, and all purchased items shall be gathered by the supplier and shipped with the equipment in one lot.

4. Adequate skids shall be provided for handling the equipment during loading, shipping, unloading, and skidding into place in the plant. Equipment will be moved with fork trucks (if skids are not practical, lifting lugs will be required and noted by tags as to proper unloading procedures – this must be discussed in advance with the Process Engineer).

5. Every item shipped shall be plainly identified with purchase order number and Delphi Saginaw Steering System's tag number. Items separately listed on the purchase order shall be detailed on the packing slip and invoice.

6. When equipment is ready for shipment and is F.O.B. other than Delphi Saginaw Steering Systems, the supplier shall contact the Delphi Saginaw Steering Systems Traffic Department for final shipping details.

7. All approval drawings, reproducible drawings, and manuals are to be hand-carried, mailed, or sent U.P.S. to the Process Engineer. Documents of value shall have method of tracing to verify who received subject items at Delphi Saginaw Steering Systems

| **Mail** | **U.P.S.** |
|---|---|
| Delphi Saginaw Steering Systems | Delphi Saginaw Steering Systems, Plant 3 |
| 3900 E. Holland Road | Towerline Road off Holland |
| Saginaw, MI 48605 | Saginaw, MI 48605 |
| ATTENTION: Name | ATTENTION: Name |
| Process Engineer | Process Engineer |
| Advanced Manufacturing Center – 1 | Advanced Manufacturing Center – 1 |




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

**E. Warranty and Payment**

**1. Warranty**

The supplier's warranty on the equipment shall be as follows:

**a.** Purchased parts: Manufacturer's warranty.

**b.** Workmanship and material: One year from date place into service, regardless of delivery date.

**c.** During the warranty period, the vendor – as part of this job – will be responsible for supplying technical service for troubleshooting done beyond that supplied in the drawings and manual and for resolving warranty items that must be replaced.

**2. Payment**

As negotiated with the Purchasing Department.

**F. Orders, Alternations, and Cancellation**

When the product design or process is changed, new prints will be submitted to vendor by alteration from the Purchasing Department. This alteration will request confirmation of the effect of the change on the price and delivery. This acknowledgement or revised quote should be received by the Delphi Saginaw Steering Systems Purchasing Department as soon as possible and not later than two weeks after the purchase order is issued.

Indicate the basis on which charges will be claimed in the event of cancellation.

## V. QUOTATION

**A.** The vendor is expected to discussed Delphi Saginaw Steering System's requirements with the Process Engineer in order to fully understand all details in this specification before the proposal is submitted.




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

**B.** By submitting a quotation the vendor automatically agrees to conform to these Delphi Saginaw Steering System's specifications. If for any reason the vendor does not agree with these specifications, or any single part of these specifications, or any single part of these specifications, a request for deviation must be included in numerical order in the quotation, and written approval of the deviation(s) required must be obtained from the Process Engineer responsible for the equipment before an order can be issued. All deviations should be discussed with the Process Engineer before quoting.

**C.** The quotation shall be identified and shall contain:

**1.** Request for quotation number.

**2.** Name and part number of Delphi Saginaw Steering System's parts to be processed.

**3.** Drawings and text describing proposed system.

**4.** Floor-plan sketch of total system with overall dimensions.

**5.** Sequence of machine operation.

**6.** Weight and dimensions of system.

**7.** Working capacity of machine and maximum pounds per cubic foot that allow proper tumbling action.

**8.** Cycle time needed to perform required deburring and surface finishing, and time needed to unload all parts.

**9.** Required tumbling media and amount to fill machine.

**10.** Media and cleaner cost for each hour of machine operation – show calculations.

**11.** Expected sound level.

**12.** Delivery.




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

**13.** Critical path flow chart from purchase order date.

- **a.** Mechanical, electrical, pneumatic, and piping drawings for approval.
- **b.** Start building machine.
- **c.** Approval trip by Delphi Saginaw Steering System's personnel.
- **d.** Shipment to Delphi Saginaw Steering Systems.

**14.** Motor – horsepower, RPM, frame size, and type.

**15.** Terms.

**16.** State price for the following:

- **a.** Basic machine.
- **b.** Settling tank.
- **c.** Re-circulation system, if feasible.
- **d.** Rinse system during part discharging.
- **e.** Sound deading system, if required.
- **f.** Loading equipment, if required.
- **g.** Unloading equipment.
- **h.** Work/standing platforms, if required.

**17.** Make response if any price applies to the following:

- **a.** Sound level to Delphi Saginaw Steering System's specification # SL 1.0.
- **b.** Delphi Saginaw Steering Systems preferred components.
- **c.** Paint to Delphi Saginaw Steering System's specification.
- **d.** Approvals.
- **e.** Engineering services.




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

**f.** Machine run-off and inspection.

**g.** F.O.B. Delphi Saginaw Steering Systems.

**h.** Delphi Saginaw Steering Systems standard payment terms are: 90% upon completion of all approval required before shipping and receipt of machine at Delphi Saginaw Steering Systems with 10% balance at completion of contract. Normal payment is on the 10th and 25th of each month after the invoice has been received for 30 days.

**i.** Warranty.

**18.** State which cleaner(s)/compound(s)/tumbling media should be used for the machine operation. If the chemical(s) is/are not presently approved, the vendor's letter headed "Material Safety Data Sheet" forms must be completely filled out with authorized signature and dated, and submitted before it/they can be brought onto Delphi Saginaw Steering Systems property.




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.

### SPECIFICATION REVISION SHEET

| PAGE # | REV SYMBOL | REVISION DESCRIPTION | DATE | ISSUED BY | APPROVED BY |
|---|---|---|---|---|---|
| | | Rewritten as SD-1001, was E-1911 | 11-03-95 | M. Gonzalez | D. Hitz |
| 2 | (2) | • Added "latest versions" to II.A. | 09-11-97 | M. Gonzalez | T. Freudenstein |
| 2 | (2) | • Added SD-000 to II.A. | 09-11-97 | M. Gonzalez | T. Freudenstein |
| 6 | (2) | • Removed "and back of the door orange" from III.C. | 09-11-97 | M. Gonzalez | T. Freudenstein |
| 6 | (2) | • Section III.D re-written | 09-11-97 | M. Gonzalez | T. Freudenstein |
| 9 | (2) | • Section IV.C.2. added MS Word 6.0 | 09-24-97 | M. Gonzalez | T. Freudenstein |
| 9 | (2) | • Section IV.C.3. added SD-003 & removed manual wording. | 09-24-97 | M. Gonzalez | T. Freudenstein |




Note: The above specification was developed without considering whether patents may or may not be involved. In all cases, therefore, the supplier shall be required to assume patent liability.