

**Project Proposal For
EXAMPLE**

**Accelerated Testing Program
Of
Door System**

Proposal No.

March 7, 2005

Example
March 7, 2005
Page 2 of 8

Inquisitive Engineer
Example

Dear Engineer:

Thank you for the opportunity to provide this proposal for an accelerated testing program for **closure system development**. This accelerated test program proposal includes the costs associated with initial fixture development, testing, reporting and analysis. Intertek ETL SEMKO appreciates this opportunity to work with Example.

OBJECTIVE:

This current proposal covers the use of an FMVT comparison test to bench mark the a previous door design against the design iterations of the new door. The primary objective is to identify potential failure modes that need to be addressed in the new design to meet the goal of being more robust then the reference design

CURRENT SITUATION:

Example company is developing a new door module for the automotive industry and would like to iterate the design and prove that the design is as good or better then the reference design.

FAILURE MODE VERIFICATION TESTING ®

Failure Mode Verification Testing (FMVT®) is a process which employs highly accelerated test methods in a manner intended to reveal inherent design weaknesses. The process utilizes known sources of “stress” which are amplified to magnitudes that are limited by “reasonable” failure modes. A reasonable failure mode may be defined as a failure which could conceivably occur throughout the life of a product. Typical stress sources include: 6-axis vibration, temperature, humidity, voltage variation, contamination, UV or solar light, and dynamic loading. Through an FMEA process, the exact stress sources and conditions would be determined and reviewed with the client prior to initiating the test.

A typical test program consists of an approximately 2-3 week period to firm the stress source concepts, to discuss fixturing options, to resolve the necessary inter-level functional checks and to discuss potential failure points and modes that might be anticipated. From this, the Intertek team designs and fabricates the test fixtures. Once Intertek and the client agree on the essential

features of the test plan and the fixture is completed, the testing can be scheduled.

The actual testing will take place at the Intertek facility during a 3 to 5 day period. Representatives from the client company are encouraged to attend at least the first day of testing to facilitate any functional checks and observations. During the testing it is anticipated that various components and subassemblies will suffer different degrees of failure. Where possible, Intertek engineers will repair or replace the broken components in a manner that permits extended testing. If a product fails to a point that it cannot be repaired on site in a reasonable amount of time, the testing is complete. The goal is to achieve 10 levels of increasing test severity and to uncover any inherent defects.

At the conclusion of the testing program, a computer analysis of the Design Maturity is performed and a test report prepared.

TEST PLAN NOTES:

- 1) The objective of this accelerated testing program is to expose the a reference design and the new design to the accelerated testing profile in order to identify failure modes and demonstrate the final design is more robust then the reference design.
- 2) During the FMVT, it is expected that various failures will be observed. These failures will fall into one of three categories:
 - a. Soft failures --- occur when a unit does not appear to function properly during a stressed state, but recovers after the stress step is complete, or when the stresses are removed.
 - b. Hard failures – occur when the unit does not appear to function properly during a stressed state, and does not recover after the stress step is complete, or when the stresses are removed. A hard failure is a permanent failure, and includes fractured components even if the fractured component does not overtly affect the “function.”
 - c. Unexpected Functions – occur when the unit behaves in a way that is not technically a lose of function, but is not an intended feature.

- 3) **Fixture and Samples:** The test sample will consist of one door system. Replacement components for items that may break (such as latches, strikers, handles and rods).
- 4)
- 5) **Stress Sources** may include the following:
 - a. 6-axis Vibration (FMVT Pod – 3 g to 30 g)
 - b. Shock (FMVT-Pod)
 - c. Temperature (Env. Chamber -40°C to +60°C)
 - d. Fast Ramping between Low/High (Env. Chamber – AFAP)
 - e. Humidity (Non-Condensing – Condensing)
 - f. Dust
 - g. Voltage (DC) (Programmable Power Supply)
 - h. Voltage sag (-10%) (Programmable Power Supply)
 - i. Voltage swell (+10%) (Programmable Power Supply)
 - j. Radiant Heat (Heat Lamp Bank)
 - k. Other stresses as Identified with client
- 6) **Operational checks** may include:
 - a. Continuous monitoring during test of functionality of product.
 - b. A more thorough evaluation of function and anomalies between levels.
 - c. Signs of cracking, movement of seals, fatigue in connectors, or damage will be monitored between levels.
- 7) Details of the Test Plan, including fixture design will be worked out with consultation between the Project Manager and the client engineer.

Justification/Notes on Target Test Conditions:

Each level is the same length.	max service temperatures per client; max test temperature = chamber limit; Temperature at Start of Level = Temperature at End = 25 °C; Total Hot Dwell Time = Total Cold Dwell Time; Total Dwell Time = Total Ramp Time;	max service = typical; max test = chamber limit	2.25 gRMS resulted in ~50 g door peak (Client Limit for max ft-lb energy)	Narrowband Random must be modified to each target gRMS to induce slam	outside handle lifted (door slams) for 5s then released (door rebounds) for 5s; handle lifted with minimal load (Client declined inside handle cycling)
--------------------------------	--	---	---	---	---

EVENT LOG TEST PLAN:

Event Number	Estimated Duration minutes	Ambient Temperature (lo,hi) °C	Total Time Ramping minutes	Time at Hot Dwell minutes	Time at Each Cold Dwell minutes	Resultant Temperature Change Rate °C/minute	Ambient Relative Humidity %RH	Door Slam Energy 1 Axis, Narrowband) In-Car Lateral Acceleration gRMS	(Random, Hz	Outside Handle Load N	Outside Handle Cycle Rate CPM
Op-0	30										
1	60	-30 80	30	15	7.5	11	95	1	2 - 20 (TBD)	50	6
Op-1	30										
2	60	-35 85	30	15	7.5	12	95	1.3125	2 - 20 (TBD)	50	6
Op-2	30										
3	60	-40 90	30	15	7.5	13	95	1.625	2 - 20 (TBD)	50	6
Op-3	30										
4	60	-45 95	30	15	7.5	14	95	1.9375	2 - 20 (TBD)	50	6
Op-4	30										
5	60	-50 100	30	15	7.5	15	95	2.25	2 - 20 (TBD)	50	6
Op-5	30										

total time = 480 minutes
 8.0 hours

Client Responsibilities:

The client will supply all parts and spare parts to insure the continuation of the test when a component fails and must be replaced

The client will supply any specialized support equipment.

Prior to beginning the test program, Intertek will assign a team of engineers and technicians for this project. One member of the team will be a person skilled in electrical and electronic devices. As part of the actual test plan development, programming effort and set up for the functional checks, the client will provide instruction to the team members in the operation of the part. A procedure for checking the functionality of the test units will be developed by the client working with the Intertek lead engineer.

Client personnel are encouraged, but not required, to be present at the Intertek laboratories for any part of the testing program. Intertek has found that when our clients are present for the beginning of the testing period that the information gained by Intertek and the clients is enhanced.

Deliverables:

It is anticipated that one or more failure modes will be observed in each of the units under test. These could be failures in any of the components and subsystems that make up the unit. Each failure (soft or hard) will be documented with respect to the time of failure and the progression of the test program at the time of failure. From this documentation, certain inferences will be drawn about the design maturity level and the improvements that could be achieved if one or more of the early failures were eliminated through a redesign process. Also a comparison of the different units robustness relative to each other will be made. This comparison will provide a basis for assigning risk of warranty of one unit over another. The physical deliverable will be a test report including photographic documentation of the test set up and the failures.

PROPOSAL & COST:

The estimated cost for fixture, test plan development, setup, testing, analysis and report is \$20,000. This figure reflects the current assumed stress and client provided equipment.

Example
March 7, 2005
Page 6 of 8

Timing:

The project is initiated upon receipt of a purchase order and of the test samples, and the actual scheduling of the test depends on the work schedule at the time of the project initiation

Thank you for the opportunity to provide this proposal. Please contact me for any additional information or clarifications of the test approach.

Intertek

Engineering & Testing Laboratories
1-800-88-TESTS/Fax: 616-248-0591
E-Mail: gr.services@intertek.com

Proposal Number EXAMPLE

Notes/Assumptions:

Any technical or timing questions should be directed to Ted Fine, (414-540-1018)

Timing:

By agreement

Proposal Terms:

Shipping and Handling is the customer's responsibility. There is a \$100.00 minimum invoice charge if test program does not meet or exceed \$100.00.

Each program will include a final report/certification with complete documentation of test procedures and results. See the enclosed page for statement of terms and conditions. Stated prices are based on certification and/or verification testing only. Additional evaluations beyond the normal scope, consulting, or failure-type testing will incur additional charges.

Payment terms are subject to credit approval and account status verification upon acceptance of this proposal. A purchase order is required to initiate this project. This quotation is effective for 30 days after the date of this quote.

Should this proposal be accepted, certain criteria must be met before the project can proceed. All questions or concerns both on the part of the client and Intertek's Project Manager must be answered. Any Intertek-suggested or client-requested test method deviations agreed to must have a written sign-off from the client. Intertek's billing and credit information must also be supplied. No project will begin until Intertek's Project Manager determines the above criteria have been fulfilled.

For faster, more expedient service, please reference Intertek's Proposal Number (located at the top of this document) on any purchase orders, shippers, inquiries, or any correspondence you may be sending us.

Thank you for the opportunity to quote on this project. If you have any questions, or if I can be of further assistance, please feel free to contact me.

INTERTEK

TERMS AND CONDITIONS

The following terms and conditions apply to all work performed by Intertek (Intertek) and supercedes and/or replaces terms and conditions of Client's purchase order unless specifically exempted in writing by an officer of Intertek.

1. Intertek represents to the Client that testing is done in accordance with standard procedures as applicable and that reported test results are accurate within generally accepted commercial ranges of accuracy, unless a specific measure of greater accuracy has been agreed to in writing by Intertek and the Client.
2. Intertek reports apply only to the specific sample(s) tested under stated test conditions and test results are not necessarily indicative of the qualities of apparently identical or similar test or operating conditions. Intertek shall have no liability for any deductions, inferences or generalizations drawn by the Client or others from Intertek reports.
3. When Intertek performs services, its work and reports are not governed by the Uniform Commercial Code. Except as stated in Paragraph 1, Intertek disclaims all warrants of merchantability or fitness for a particular purpose.
4. The Client shall not advertise or publish the name, the seal or servicemark, reports, test results, documentation or procedures of Intertek without written authorization from Intertek. Any test reports provided to Client by Intertek shall not be reproduced **except in full** without the approval of Intertek. The Client's actual or threatened failure to abide by this Paragraph 4 may result in legal action by Intertek for injunctive and other relief.
5. Payment for the services rendered is the obligation of the Client issuing the purchase order or accepting the proposal. The obligation is not contingent on any specific result from Intertek's services and may not be assigned without the written permission of Intertek.
6. If services are to be supplied to a Client who has not established credit with Intertek, or in connection with a legal action, a retainer equal to the estimated cost is required with the order, which retainer may be applied at Intertek's option to its final billings. The minimum retainer required for services to be performed in connection with a legal action is \$1,000.
7. If the service to be performed requires more than one (1) month for completion, Intertek will make monthly billings of the approximate percentage of the work completed each month, supplying with the interim invoice a progress report showing accomplishments to date. Terms of all invoices shall be net 30 days upon receipt of invoice.
8. If the Client desires forensic testing services, the Client must mark each test sample and supporting documents and the test authorization form conspicuously as "LEGAL". Unless otherwise indicated in writing, prices quoted or charged by Intertek do not include charges for any court appearance, records retrieval/storage, expert witness testimony, deposition, or affidavit, or preparation thereof, in connection with forensic testing services. Such charges will be computed at Intertek's then prevailing hourly rates, plus expenses. All such charges must be prepaid by the Client prior to such appearance, testimony, deposition or affidavit and, where required by law, the Client at the Client's expense must obtain advance court approval of charges.
9. In the event that Intertek, as a result of an order or subpoena issued by a court, is called upon to produce or testify in respect to a report, it will advise the Client of the fact and the time and place of the scheduled hearing, if reasonable advance notice is given to Intertek. If the Client has any objections to Intertek complying with such order or subpoena, it will be the Client's obligation to present such objections to the court at or prior to the time specified in such order or subpoena, and to give timely notice to Intertek of the results.
10. Sample(s) will be destroyed thirty (30) days after the date of the final report, unless the Client indicates otherwise in writing before the expiration of said 30-day period. **Tested samples shall be returned at Client's expense including return charges and cost of insurance against risk of loss or damage of goods.**
11. Prices quoted by Intertek are subject to change if not accepted by the client within thirty (30) days, or if the work involved is not commenced within forty-five (45) days of such acceptance through no fault of Intertek.
12. Intertek's liability is limited as follows:
 - a.) The Client agrees to limit Intertek's liability arising from Intertek's professional activity, errors, or omissions, such that the total aggregate liability of Intertek shall not exceed Intertek's total fee for services rendered on the project in question, except in the case of a finding of gross negligence or willful misconduct on the part of Intertek by a court of competent jurisdiction
 - b.) Intertek shall be discharged from all liability to the Client for all claims for loss, damage, or expense unless a claim is made within three (3) months of the date at which damage, defect or alleged non-performance became apparent to the Client, and the process of law served no later than two (2) years from the provision of services by Intertek.
 - c.) Intertek shall not be liable to Client for any consequential damages incurred by the Client due to the fault of Intertek, regardless of the nature of this fault, whether it was committed by Intertek, its employees, agents, or subcontractors. Consequential damages include, but are not limited to, loss of use and loss of profit.
 - d.) The Client agrees to extend any and all limitations, indemnifications, and waivers provided by the Client to Intertek and to those individuals and organizations Intertek retains for execution of work. These shall be deemed to include but not necessarily limited to Intertek's officers and employees and their heirs and assigns, as well as Intertek's agents, subcontractors, and their officers, employees, heirs and assigns.
 - e.) Client acknowledges that testing, including sample preparation and transportation, may damage or destroy Client's property. Client agrees to hold Intertek harmless from any and all responsibility for such alteration.
 - f.) The Client agrees Intertek shall not be responsible for any injuries to the Client representatives while attending to or observing testing at Intertek's facility. If testing takes place at the Client's facility, Client agrees that Intertek will not operate and shall not be responsible for any of Client's equipment and that although Intertek agrees to abide by Client's safety procedures, Intertek shall not be responsible for injury to any of Client's personnel.
13. Any order or agreement for testing services by Intertek may be terminated in writing by the Client before completion thereof with Intertek's written consent in which event the Client shall pay to Intertek an amount to be determined by Intertek as being sufficient to reimburse Intertek for all direct and indirect costs and expenses, including (but not limited to) supplies, materials, labor, and overhead incurred with respect to the order or agreement through the date of termination.
14. Intertek shall not be liable for any failure or delay in performance which is caused in whole or in part by fire, flood, accident, riot, war, operation of law, government action, strikes or other labor disturbances, fuel shortages, or any other cause beyond the control of Intertek.
15. All contracts between Intertek and the Client shall be deemed to be made in and governed by the laws of the State of Michigan.
16. Should Intertek be required to subcontract any testing or other services, the Client will be informed of such arrangement either verbally or in writing. Intertek shall have no liability for any deductions, inferences, or generalizations drawn by the Client or others from subcontractor's data.
17. It is the Client's responsibility to understand the procedures utilized in the testing process. Any action taken by a Client based on any consulting, recommendations, results, observations, conclusions, discussions, or data as provided by INTERTEK, the sole responsibility of the Client.