Repetitive shock fixture design is critical and can determine the success or failure of test result outcomes. A good fixture can determine a level of consistency and repeatability in production screening. In factory environment, a good fixture enables manufacturing team members to load, unload, and maximize throughput with ease and repeatability. ESPEC delivers experience, knowledge of the process, and technical expertise - not just the fixture, but the table too.

ESPEC has been at the forefront of delivering Repetitive Shock fixturing design worldwide for over 20 years.

**Different Vibe Systems, Different Fixturing**

<table>
<thead>
<tr>
<th>ED (Electrodynamic) Shaker fixture design characteristics:</th>
<th>COMPARSED TO</th>
<th>RS (Repetitive Shock) Vibration fixture design characteristics:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy</td>
<td>Light</td>
<td></td>
</tr>
<tr>
<td>Rigid</td>
<td>Flexible</td>
<td></td>
</tr>
<tr>
<td>Mimic mounting of product in normal use</td>
<td>Mounting position irrelevant due to 6 degree of freedom vibration</td>
<td></td>
</tr>
<tr>
<td>Carefully designed to transmit vibration with minimum alteration</td>
<td>Carefully designed to maximize vibration transmission without radically changing the frequency content</td>
<td></td>
</tr>
</tbody>
</table>

**Different Fixture Methods are Needed for HASS**

- Designed specifically to rapidly fatigue products
- Components have varying resonant frequencies
  - Excite the resonant frequency of all components
    - Regardless of Frequency
    - Regardless of Orientation

**HA S S Fixture Development**

- Custom Design to Ensure Consistent and Effective Screen
- Fixture Attributes
  - Vibration Transmissibility
  - Temperature Response
  - Consistent Stress Location to Location
  - Fast Product Change Over
- Fixture Qualification

ESPEC fixturing services available for these models: OVTT, Typhoon, QFusion, HawQ, Mechanical HALT
Fixture Development Process

**PRE-ENGINEERING**
Gather all pertinent data regarding:
1. Product information – dimensions, samples, connections
2. Fixturing requirements – total qty, cycle qty, spatial considerations
3. Testing requirements – estimated test limits, cycle time, functional testing
4. Schedule – milestone dates
Output: Requirements documentation

**DESIGN**
1. Create initial design
2. Design review and modifications as needed
3. Build prototype
4. Design validation and qualification
Output: Validation/qualification report, prototype fixture

**PRODUCTION**
1. Order, build and assemble full complement of fixtures for application
2. Perform quality control verifications
Output: Full set of qualified fixtures ship to customer.

**FIXTURE INSTALLATION AND INTEGRATION**
1. HASS system with full complement of fixtures installed and fully loaded with new product, all electrical and mechanical interconnections
2. Integration qualification to assure consistent thermal and vibration response at each product location within the chamber. Repeatability verified to assure consistent test response over time
Output: Qualified and verified production. Fixture integration report

**PROOF OF SCREEN**
1. Determine HASS thermal and vibration stress levels
2. Determine functional testing protocol
3. Conduct screen effectiveness test
4. Conduct safety of screen test
5. Finalize test parameters
Output: Final production report

**ESPEC Fixturing Deliverables**
Discussion with Customer about Product and Testing requirements
- Create initial schedule and cost
Provide Fixture Concept to Customer
- Introduction pdf document showing fixture and product
- E-Drawing (3D Cad viewable model) of single fixture concept
Fixture Concept Design Review w/ Customer
- Via phone or web, discuss all details about fixture design and implementation
- Schedule Status Update
- Acquire customer signoff on acceptable fixture design
Finalize Fixture
- ESPEC Manufactured and Assembled Fixtures (prototype or production quantities)