## **Verification Methods: Definitions and Examples**

The following are standard verification methods as defined in systems engineering practices:

|  |  |
| --- | --- |
| **Verification Method** | **Short Description** |
| **Analysis** | Verification through modeling, simulation, or calculation. |
| **Inspection** | Checking compliance by visual or physical examination. |
| **Demonstration** | Proving functionality by operating the system visibly. |
| **Test** | Executing tests under defined conditions to collect data. |

### **1. Analysis**

* Definition:  
  Use of analytical techniques (e.g., mathematical modeling, simulations, or calculations) to verify that a requirement is met. It often applies to performance or reliability aspects that cannot be easily tested directly.
* Example:  
  Requirement: The vehicle shall not exceed a thermal operating limit of 85°C under peak load.  
  Verification by Analysis: Engineers perform a thermal simulation using heat transfer equations and software modeling to confirm the system will remain within the temperature limit.

### **2. Inspection**

* Definition:  
  A visual or physical examination of a product, document, or component to verify that it meets specified requirements. It may include measurements, review of design drawings, or checks for compliance.
* Example:  
  Requirement: The system shall have a red emergency stop button labeled “EMERGENCY STOP.”  
  Verification by Inspection: A technician visually checks the installed panel to confirm the red button is present, properly labeled, and accessible.

### **3. Demonstration**

* Definition:  
  The operation of the system or product under specific conditions to show it performs as intended. Typically used for simple functions where observation is sufficient.
* Example:  
  Requirement: The screen shall turn on within 5 seconds when the power button is pressed.  
  Verification by Demonstration: The user powers on the system while observers time the startup using a stopwatch.

### **4. Test**

* Definition:  
  Execution of a procedure or experiment under controlled conditions to determine if requirements are met. It provides empirical evidence through quantitative results, often involving instrumentation or data collection.
* Example:  
  Requirement: The system shall maintain network communication with no more than 1% packet loss over 10 minutes.  
  Verification by Test: A network test script runs for 10 minutes, logs the transmission and receipt of data packets, and calculates the actual loss rate.