I'm not a bot

End of line test

End-of-line (EoL) testers are responsible for testing the overall functionality of the product during the manufacturing process. Under the harsh conditions of the manufacturing environment, test systems must simulate all the relevant conditions, whilst at the same measuring the responses of the equipment being tested.In series production, a high testing throughput rate is crucial. For this reason, the test procedures developed in prototype testing are optimised in order to achieve a short cycle time.A stable electromechanical design is every bit as important here as high-performance hardware and software architecture. PCB Testing Before the actual EOL test begins, the product must be prepared for testing. This may involve powering on the product, setting it to certain operating modes, and connecting any necessary equipment or sensors. Most end-of-line tests typically also test several different versions of a product. This can be products that have different configurations. Therefore the Serial number, Item number, or Model number is typically scanned and processed to ensure all the relevant conditions are tested. This can also typically be the most difficult end-of-line step. Visual Testing Visual testing involves a manual inspection of the product to check for any physical defects or anomalies that are easily visible. This may include checking for scratches, dents, or discolored parts. Functional Tests The main component of an EOL test is functional testing, where the product's functionality is tested according to its design specifications. This may involve running various scenarios and inputs through the product and checking if it responds as expected. This is also called IO tests. For example, an air conditioning system may be tested by adjusting the temperature and fan speed settings while measuring temperature and air speed to ensure it does not have a defective unit. A functional test is therefore a series of simple tests to test correct functioning and find defective units. In the automotive sector, end-of-line testing uses vibroacoustic measurements to automatically and objectively detect faulty parts in the production line. Learn how automated measurements can help you minimize quality issues. And understand also how to optimize this process. Table of Contents Every product undergoes some form of testing at the end of the manufacturing process, but some tests are better than others. Do you have the capability and functionality to carry out the most extensive EOL testing without blowing your budget? Register now for the webinar In fact, vibroacoustic measurement has been a trusted end-of-line testing method to detect faults and defects in manufacturing since antiquity. Indeed, when a ceramist just finishes producing a series of fine pottery vases, how can he detect potential invisible flaws in the structure of the delicately crafted objects? He might gently tap every single vase. And he listens carefully to the acoustic response. Does the structure sound healthy and whole? Or does it produce a dull tone, hinting at the presence of small air bubbles or tiny cracks under the flawless surface? Indeed, from the ancient ages through the Industrial Revolution to the modern digital age, noise and vibration measurements have helped reveal many defects. In modern times, vibroacoustic measurements using calibrated sensors have become an automated, objective method to test high volumes of mass-produced parts. But how do you apply and implement automated testing the right way? Ceramist handcrafting a vase. Just like our handcrafted vase, noise and vibration testing can assess the quality of many parts and manufactured products. Yet, many companies are still not aware of this opportunity. Some consider a product’s vibration behavior a secondary characteristic. They focus their attention on other, more tangible product attributes such as its design, surface quality, or color. But what lies beneath the shiny surface of the item is just as important as its appearance. Indeed, a product’s true quality is revealed only during operation. Does it function flawlessly according to expectations, or does it vibrate abnormally? Excessive noise and vibrations are often a sign of a production defect that has gone unnoticed so far. From the imperfections in the finish of a gear tooth to the imbalances of a bearing part, you can hear and feel the defects, even without seeing them. How can noise and vibration testing be used to your advantage and reveal defaults in the parts early in the manufacturing process? Automated vibroacoustic measurements offer a fool-proof method to rapidly test every single part that comes off the production line for its quality. A man works on an engine in the production line In fact, every moving part and piece of a mechanical machine can, and should, be tested for its vibro-acoustic behavior. This includes: Parts of and whole internal combustion engines, of all sizes and for all applications Parts of and whole electric motors, of all sizes and for all applications, from the powerful traction motors down to the tiny windscreen wiper motor or the seat adjustment motor The extremely fast turning parts of turbochargers All types of compressors for air-conditioning units or for refrigerators The applications of systematic end-of-line testing are not limited to parts produced for the automotive industry. Other industries can also benefit from the trusted method. Even single components and non-moving parts are suitable test subjects. The method called acoustic resonance testing consists in exciting the part, for example, by hitting it with a small impact device and listening to its acoustic and vibration response. This method helps identify imperfections like cracks, cavities, improper heat treatment, wrong or missing material, and many more. Check out this blog post for the end-of-line testing definition for electrified powertrains. So, now you understand why you should implement end-of-line testing. But how should you do it? As with many other defect detection methods, it is best to rely on the knowledge and experience of a trusted partner. If you want to meet the demands of industrial quality testing, you should ask him questions such as: Which sensors should I use and where should I position them? How can I catch the signal of interest using highly sophisticated trigger mechanisms? Which analysis functions and evaluation algorithms should I apply? How can I build a test bench? How should I design the test cycle? Manufacturing car engine parts. Siemens experts can help you with the questions above when you implement the Simcenter Anovis solution. Simcenter Anovis is a robust and reliable industrial quality testing system. It is easy to integrate into end-of-line test benches and production lines. It helps deliver product quality at lower production costs while preventing production line outages and reliably identifying defects. Beyond simple fault detection, Simcenter Anovis also provides deeper, valuable insights into the product’s characteristics. These insights foster product enhancements or innovations. Indeed, they clearly point at the possible root cause of the identified problem. This information is not only valuable for the manufacturing team, which consequently implements improvements along the production line. It is also useful for the research and development teams, as a reliable, real-life input into future product enhancements. Simcenter Anovis is a complete system, not a DIY tool kit. Implementing Anovis includes: free technical consulting, explaining the benefits and defining the limits of vibroacoustic defect detection adapting the modular hardware and software according to your tasks and process needs realizing feasibility studies to ensure the applicability of new tasks commissioning at the test bench builder and/or in the production environment, including the initial parameterization of the system’s communication and signal analysis operator training and customer services, tailored to the requirements of industrial production standards Implementing quality inspection for end-of-line testing equipment is key to avoiding extra costs related to rework, product recall, or the loss of stakeholder and customer trust. Firstly, the Simcenter Anovis system collects data from a wide range of sensors over a large bandwidth. This data includes vibration from accelerometers or laser vibrometers, sound from microphones, rotational speed from high-precision tachometers, temperature, and torque. Of course, all of it is accurately recorded with the Anovis hardware. Then, the dedicated Simcenter Anovis software for test bench control initiates a smart signal analysis of the data. It performs precise pass/fail checks for each object under test. With the software, users can also analyze the recorded signals, employing smart analysis methods in the frequency, order, angle, and time domains. As a result, they can reliably detect relevant fault patterns. The system also applies statistical assessment procedures to dynamically tune the testing thresholds. These procedures turn Anovis into a self-learning system that gradually reduces the required setup effort and operation expertise. The responsible team can thus easily deliver a formal quality report that confirms that the part meets the required specifications and operates safely. Do you want to learn more about this topic? Read the white paper or join our free on-demand webinar “End-of-line testing for automotive: How to perform NVH-based quality inspection”. You will learn how to effectively: build a robust and reliable end-of-line testing integrate an efficient end-of-line quality system determine product faults by analyzing the acoustic signature Register now for the webinar For more info about the Simcenter Anovis functionalities, please read the article: Simcenter Anovis for end-of-line quality testing. Or, check out the technical on-demand webinar series. Koops designs, builds, and integrates automation systems, uniting rock solid engineering solutions with stellar customer support to meet the complex demands of robust manufacturers seeking to grow. Test Fixtures & Test Adapters In-line test benches are placed between or integrated into other manufacturing stations. Typically, unfinished products are inspected for physical characteristics like electrical resistances (e. g. in circuit testing) or visually inspected. Functional tests are, by definition, not possible for unfinished products.In-line testing allows for the early detection (and correction) of production faults, especially in complex production environments. Moreover, the setup of in-line test rigs is reasonable when quality assurance tasks cannot be performed later during the production process, for example because test points will not be accessible anymore.In contrast to in-line test rigs, the term end of line testing refers to test benches placed after the last manufacturing station of a product or at least of a functional unit (component). EOL test benches usually emphasise functional tests, possibly under varying environmental conditions (e. g. low temperatures, high humidity). Of course, other test types like checking the correct placement of labels by automatic optical inspection can be performed as well. Learn more about EOL test benches…Fatigue test benches can be found in product design as well as in manufacturing. During endurance testing, finished products are exposed to an application-specific stress until they break. Thus, product designers can test and compare the resilience of different prototypes. In manufacturing, fatigue testing for quality control is only performed on a sample basis because the device under test will not be usable afterwards.As the name suggests, the term product design test bench refers to test rigs used for prototype testing and comparison in new product development. As prototype designs are subject to change, product design test benches need to be more flexible than their counterparts in manufacturing. This results inevitably in a lower level of automation. EOL Test We offer a portfolio of high-quality and reliable test devices and equipment for cable as well as wire tests. Quality controls alongside the production of tin-, nickel- or silver-coated copper wires can be realised with our MetaScope. Moreover, we offer cable and wire test devices for bend tests and torsion tests in cooperation with our partner CConradt. Sign up for our email newsletter and be the first to learn about discounts, events, product news and much more. We are looking forward to welcoming you in our community! Sign up for our email newsletter and be the first to learn about discounts, events, product news and much more. We are looking forward to welcoming you in our community! Pneumatic Test Fixtures EOL Test Functional Testing