Research Article

Automatic Measurement of Nanoimage Based on Machine Vision and Powder Metallurgy Materials

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Received 13 May 2022; Revised 21 June 2022; Accepted 1 July 2022; Published 3 August 2022

Academic Editor: Haichang Zhang

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The advantages of noncontact, high-efficiency, and fully automatic vision measurement technology make it widely used in industrial inspection and other fields. This study is based on the research of machine vision nanoimage automatic measurement and powder metallurgy materials. It aims to apply the machine vision imaging-related image processing technology principle to the automatic measurement of nanoimages and analyze the related properties of powder metallurgy materials and their image applications. This study mainly combines theory and practice to carry out experiments and data acquisition and analysis. On the one hand, it has a theoretical understanding of machine vision imaging principles and image segmentation; it also analyzes the properties and applications of powder metallurgy materials. On the other hand, on the basis of these theories, machine vision technology is fully applied to analyze the related physical properties such as the gap and density between tiny particles. Among them, the image measurement technology of moving targets is applied, and the model of the machine vision system is established. After a series of experimental verifications, the accuracy of the machine vision image measurements was fully guaranteed. The experimental results show that with the aid of machine vision technology, the accuracy of the observed data has been greatly increased; the maximum porosity of powder metallurgy materials has increased from 6.56 to 8.22; the maximum density has increased from 6.46 to 8.40. This demonstrates that automated image measurement based on machine vision technology can greatly improve the accuracy of measurements.

1. Introduction

Measurement has always occupied a very important position in the development history of human society. Technology is an important branch of computer technology from its birth to its development. The degree of completion of technology applications is getting higher and higher, and its functions are becoming more and more powerful [1]. For example, machine vision technology can inspect the external integrity and sealing of food packaging. Machine vision is no longer used in the electronics and semiconductor industries, but more and more technical equipment is used in industrial production, such as automobiles, food and beverage production, and packaging. With the advancement of society and the development of science and technology, in the process of understanding nature and exploring the world, the scope of space that humans pay attention to is no longer limited to the macroscopic world that people have been familiar with since ancient times, from the vast universe to the invisible atoms and molecules; the spatial scale of the research is getting larger and larger; and the time scale in the research can also be reduced to the order of micro-nanoseconds [2]. Computer simulation technology has also become an effective research method on the micro-nanosecond space scale and micro-nanosecond time scale [3]. Digital imaging technology is a technology that uses a computer to process images and graphics using specific machine vision algorithms to preview collected particle images. The image measurement system based on the image path requires the measurement of objects within the depth of field of the image system to obtain a clear
image [4]. In this process, the clarity of the image has a direct impact on the processing of the machine vision.

The powder material is a discontinuous body composed of a large number of particles, and its deformation is the result of the deformation of each powder particle and the coordination of the whole, and the deformation process is very complicated [5]. The most important feature of powder metallurgy materials is that they contain pores, which are an important factor affecting the mechanical and tribological properties of metal powder materials [6]. The influence of porosity is mainly through the role of the macroscopic mechanical properties of the material, and the pore itself around the formation of broken and torn abrasive debris, and is directly involved in the friction process for the opposite phase of the movement, resulting in material friction coefficient and wear rate with the increase in porosity and the corresponding increase. Increasing parameters such as pressure, temperature, and casting time can reduce porosity and increase the density of the matrix. Relying on its advantages in obtaining system integration, better performance, and higher efficiency alloys, it has broad growth prospects. With the rapid development of nanotechnology in the field of tribology, nanoparticle antifriction technology of adding nanoparticles to lubricating oil has been extensively studied, and this technology can significantly improve the antifriction and antiwear ability of lubricating oil [7, 8]. Powder metallurgy oil-bearing bearings are representative of powder metallurgy oil-bearing self-lubricating materials, which are often used in poor or nonlubricated conditions. Researchers have not conducted in-depth research on how nanoparticles affect friction and change the tribological properties of materials [9].

The relationship between nanoparticles and friction has always been puzzling, and this has, therefore, attracted a large number of experts and scholars to conduct in-depth research. The depth estimation of micro-nano-operations within scanning electron microscope (SEM) has always been a major issue. Marturi et al. proposed a new technique for real-time estimation of depth. The main flexibility of this method is that it can use only the acquired image information (i.e., sharpness) to calculate the focus position and depth. The feasibility of this method is demonstrated by various real experiments in different scenes in the tungsten gun SEM vacuum chamber to prove the autofocus achievement, depth estimation, focus-based nanomanipulator depth control, and sample terrain estimation [10]. Park proposed a correction method to correct the wrong hardness measurement value in the accumulation situation. This method is a supplementary derivation of the original hardness measurement with a known elastic modulus value. Through the tensile test, nanoindentation test, indentation observation, and finite element analysis, the method was tested on soft engineering metals, Al6061T6 and C12200 [11]. Tsoutsios et al. reported an unprecedented sensitive method to detect nanotube resonators with effective masses in the range of 10–20 kg. We use the beam of an electron microscope to analyze the mechanical fluctuations of the nanotubes in real time. The thermally driven Brownian motion of the resonator can be fully accessed in the space and time domains, establishing the feasibility of carbon nanotube resonator technology at room temperature, and paving the way for the observation of new thermodynamic mechanisms and quantum effects [12]. Sharma et al. use moderate pressure during the cold pressing of the powder. The use of high-pressure compaction helps to reduce/limit the amount of adhesives required, which in turn will produce relatively dense cell walls, resulting in better mechanical strength of the foam. Using the 2N-factor method, a mathematical model has been developed to express the final porosity and pore size as a function of various processing parameters, namely, compaction pressure, sintering temperature/time, and space retainer content [13]. Sun et al. have prepared Ti-6Al-4V powder metallurgy (PM) materials using hot isostatic pressing technology. The cutting experiments of Ti-6Al-4V forgings and PM materials using grooved tools involve tool wear mechanism, tool life, cutting temperature, cutting force, and chip formation. As the microfluctuation of the cutting force is more severe, the chipping wear of the tool becomes more serious. Due to the influence of the gap on the friction of the tool-chip interface, the adhesive wear becomes more minor [14]. The purpose of Confalonieri et al. is to combine traditional powder mixing techniques (simple mixing and ball milling) to improve the active phase isolation and mechanical properties of AlSn alloys. In fact, the ball milling of tin powder can reduce the hardness difference in aluminum powder; in addition, ball milling the two powders together will produce a fine microstructure with improved mechanical properties [15]. Powder metallurgy materials have excellent mechanical/chemical properties [16]. In order to solve the processing problems of high-hardness sintered products, CM Lee is studying a method to maximize productivity and efficiency by processing powder metallurgy materials before they are fully sintered. A structural analysis of the turret center was carried out to verify the structural stability of the turret center for processing powder metallurgy materials [17]. Although the experimental results of these studies have great reference value, the experimental methods are too single and the data still lack a certain degree of accuracy.

The method of controlling the proportion of alloy and composite material layer in the sample as much as possible and repeating the test of multiple samples was adopted to analyze the relationship between the entrance concentration of nanodiamond particles, the porosity of powder metallurgy, the entrance pressure, the concentration distribution, and the percolation time. It captures the predefined images of the main design cooperation in the field of view, performs matching operations on the images to extract image features and calculate motion, and develops a multigray image discrete tomographic reconstruction that does not rely on prior knowledge of image gray levels. The new algorithm is used to reconstruct the gray and smart discrete images under the limited projection angle, and through a series of experiments to verify the characteristics of the algorithm; the layered structure will greatly improve the bending performance of the material. Therefore, the static mechanical properties of the material under bending action are tested;
based on the advancement of motion, the mathematical model is linear and high precision, and the six-dimensional independent change is solved by the series-solution inversion.

2. Machine Vision Image of Nano and Powder

2.1. Powder Metallurgy Materials. In today's increasingly fierce competition in the field of materials, finite element simulation methods are used to simulate the processing process, analyze and predict the impact of various process conditions on the quality of the formed parts, and provide a reference for the formulation of subsequent process parameters, which can save costs and improve efficiency [18]. The composite material belongs to the matrix layer and the stable part. Therefore, in addition to the grouping and configuration characteristics of the matrix material, the type, content, and distribution of the stable part will also affect the mechanical properties of the composite material [19, 20]. In addition to this, the micro- and macroscale analyses allow us to predict their performance and calculate their mechanical, thermal, and electrical properties for use in various subsequent finite element analyses. By reducing the stable content of the composite material layer to achieve the applied hard impact, the role of the alloy layer is offset due to the absence of precracked material and the relatively low alloy strength. We promote the complete dynamic recrystallization of the composite material during the hot extrusion process [21]. Because the grain refinement can promote the grain boundary slip, the composite material is in a better stress relief state, thereby limiting the deformation of the alloy during the phase transformation process. If the composite material is located on the surface layer, the necking effect will cause longer cracks perpendicular to the interface direction. In this case, the necking effect is the local reduction in cross section that may occur in the material under tensile stress. The existence of these cracks, in addition to the low plasticity and toughness of the composite layer relative to the alloy layer, is the main reason for the bonding method of interface powder metallurgy [22]. Based on the advantages of the powder metallurgy process to facilitate the adjustment of the microstructure, obtaining composite materials with excellent comprehensive mechanical properties through the adjustment of the reinforced structure has become a highly valuable research direction [23].

The interdiffusion and interfacial reaction between atoms form the chemical bond of the interface, which can improve the interfacial bonding strength of the layered composite material to a great extent. This requires the control of the preparation process and the control of the interface reaction, so as to achieve the preparation of materials with the best performance [23]. The metallurgical powder is a process technology that uses metal powder as raw material to make metal materials through grinding and mixing. The raw metal powder has an important influence on the performance of metallurgical powder. Due to the characteristics of powder metallurgy, the bonding interface can be basically the same as the matrix. Increasing the powder pressure plays an important role in the entire preparation process. In general, raw metal powders of 0.2% to 1.6% purity can play a major role in the preparation process. It affects the shape and function of the powder product, and has a profound impact on the subsequent processes [24]. Sintering prealloyed powder is a key step in powder metallurgy technology to achieve powder densification. In the research of metal powder coating process, because the powder coating process is very complicated and has many parameters, it is a combination of material abnormalities, geometric abnormalities, and abnormal boundary conditions. The powder particles will diffuse under the combined action of high temperature and high pressure, and the pores will disappear through diffusion and combination with each other, which promotes the densification of the molded parts [25]. Powder metallurgy friction materials have mature and controllable technology, excellent friction and wear properties, and are widely used at home and abroad. Two materials that are often used in the manufacture of wind energy generators, namely, permanent magnet NdFeB and brake pads, have a direct impact on the safety and stability of wind energy generators and affect their operation. The dyeing forms of metal powder and traditional rolled materials are different. The dyeing is specially made in the process of powder spraying and mixing. The most common description is that the metal material peels and rolls on a smooth surface [26].

2.2. Machine Vision and Image Automatic Measurement Technology. The speed and development of imaging technology are no different from the development of computer vision technology and digital imaging technology [27]. In the process of image processing, due to the interference of electrical signals and surrounding areas, there will be some random noise in the image [28]. In order to improve the operation speed of the visual system, when the program is not necessary, the color image will be converted into a black and white gray image first when processing the image, so as to improve the running speed of the program. Preprocessing can improve the contrast between the foreground and the background, and eliminate most of the noise interference. The main objective of image preprocessing is to improve the reliability of feature extraction, image segmentation, matching, and recognition by eliminating irrelevant information from the image, recovering useful real information, enhancing the detectability of relevant information, and maximizing the simplicity of the data. The molecular dynamic method uses the classic Newtonian equation of motion, combined with various potential functions, to describe the interaction and motion process between molecules and atoms in a multiparticle system, and can give the motion trajectory of the atom in the simulation process. An excellent calculation program not only pursues the accuracy of simulation results but also needs to improve the efficiency of simulation calculations [29]. Accuracy is the most common program evaluation metric and is easily understood as the number of samples that are scored correctly divided by the number of all samples. Generally speaking, the higher the correct rate, the better the program processing.
performance. In the process of simulating molecular dynamics, it takes a lot of time to calculate the energy between particles. Machine vision is a powerful imaging method that can measure the particle size and shape of particles at the same time. It has the characteristics of a large sample size, no orientation error, no adhesion and overlap of particles, etc., so it has been widely used. Compared with the static image method, the powerful image method has the characteristics of large sample size, no orientation error, high particle dispersion, uncompromising, and overlapping. Visual measurement has no specific requirements for the area and can be applied to many complex or dangerous events [30]. Especially for the measurement of dynamic objects, the visual measurement not only has high accuracy, but also the measurement has no specific requirements for the area and dispersion, uncompromising, and overlapping. Visual measurement of large sample size, no orientation error, high particle performance. In the process of simulating molecular dynamics, it takes a lot of time to calculate the energy between particles. Machine vision is a powerful imaging method that can measure the particle size and shape of particles at the same time. It has the characteristics of a large sample size, no orientation error, no adhesion and overlap of particles, etc., so it has been widely used. Compared with the static image method, the powerful image method has the characteristics of large sample size, no orientation error, high particle dispersion, uncompromising, and overlapping. Visual measurement has no specific requirements for the area and can be applied to many complex or dangerous events [30]. Especially for the measurement of dynamic objects, the visual measurement not only has high accuracy, but also the measurement has no specific requirements for the area and dispersion, uncompromising, and overlapping. Visual measurement of large sample size, no orientation error, high particle size increases. Only the light $f_1$ parallel to the optical position will appear on the microlens in front of the image sensor, so the captured image will not appear dark shadow. Image smoothing from a signal processing point of view means removing the high-frequency information from it and retaining the low-frequency information. The smoothing parameter [32] of the image is calculated as follows:

$$H(i, j) = \max \left[ \sum_{i=1}^{n} \sum_{j=1}^{m} g(i, j)f_1(i - a, j - b) \right],$$

$$Z = \delta \int_{-\delta}^{\delta} g^2(b)\,db,$$

During the particle imaging process, the probability of particle $(i, j)$ falling into the measurement area decreases as the particle size increases. Only the light $f_1$ parallel to the optical position will appear on the microlens in front of the image sensor, so the captured image will not appear dark shadow. Image smoothing from a signal processing point of view means removing the high-frequency information from it and retaining the low-frequency information. The smoothing parameter [32] of the image is calculated as follows:

$$f(i, j) = \frac{1}{2\pi\sigma^2} \exp \left( -\left( \frac{a^2 + b^2}{2\sigma^2} \right) \right),$$

$$\int_{\alpha} g(a, b) = \frac{\beta^2}{\beta^4} g(o, j) + \frac{\beta^2}{\beta^4} g(i, j),$$

Ordinary lenses have a perspective effect. The closer the lens is, the larger the image of the object will be. At this time, the image of the measured object that is not parallel to the image plane will be deformed. The purpose is to determine the position of each particle in the image, and after the outer contour feature $\delta$ of the particle in the image is obtained, since the contour has a one-to-one correspondence with the connected domain of the binary image $J$, the formula is calculated as follows:

$$S = \frac{1}{\alpha} \sum_{i=1}^{m} \int (a\ast_{i-1} b - b\ast_{i-1}),$$

$$g = \frac{1}{f} I(i, j)a_i - |\delta_{i-1}|,$$

$$\|\delta_{i-1}\| = [n_i(f_i)(i - t)^2] / f_i(j)[1 - f_i(j)].$$

The image surface after thresholding will produce small holes $1/f\|k(G - j)^2\|$, and these holes will interfere with the subsequent extraction of the inner hole contour $l_{i-1}$. The morphology $f_i(j)$ operator can be used to fill the holes.

3. Machine Vision Image Measurement Technology and Its Application

3.1. Visual Image Measurement. With the rapid development of modern science and technology and advanced production, the requirements for accuracy, efficiency, and automation level of measurement technology are gradually increasing. Vision measurement is an emerging technology based on optical technology. The development of vision algorithms, the increase in powerful camera functions, and the popularization of computers have all contributed to the rapid development of this technology. Visual measurement technology has been successfully applied to industries such as manufacturing in developed countries. Image measurement technology is a new type of noncontact measurement technology based on computer vision and automated development. Based on the multi-image imaging and camera refinement technology, the internal and external dimensions of the camera and the multi-view measurement method are used to complete the speed measurement and size measurement of the on-site position of parts and objects. In the measurement process of the machine vision system, due to the greater influence of the external environment or the system itself, when the external environment or measurement conditions change, the algorithm must also change accordingly. The camera is a key component of the device’s vision system, and its main function is to convert light signals into electronic signals. The camera not only determines the quality of the captured image but also directly affects the working conditions of the entire system. For a system-based detection system, the construction of an application platform is very important. The design of a good application platform is an important prerequisite for obtaining high-resolution images, and a prerequisite for the normal operation of the software system. We build the hardware platform of this research, as shown in Figure 1.

The visual system can capture external information very quickly. Our eyes can not only capture ambient light, but also visualize, disseminate, understand, maintain, and analyze visual information. Machine vision is the use of equipment instead of human eyes to capture, distinguish, and analyze visual information. When the two image planes are fully compatible, no stereo calibration is the easiest thing. In practical applications, since it is almost impossible for two cameras to have a consistent image plane and precise alignment, it is almost impossible to perfectly align in a true three-dimensional system. Mathematical morphology operation is the most commonly used processing method in image segmentation, because after the image segmentation algorithm is processed, the extracted target components are often not complete mathematical morphology operation. The camera parameters used in this system are shown in Table 1, and the lens parameters are shown in Table 2.
Compared with traditional cameras, industrial cameras have great advantages in terms of resolution, frame rate, and lighting requirements. Compared with lenses with longer focal lengths, they have a shorter closest focusing distance and are easy to install and place. At the same time, the test samples are taken by observation, and the use of this lens can better highlight the target object, reduce the interference of the background to the target, and can collect graphics of objects of different sizes by changing the optical lens. Based on the machine vision system, a large amount of external information can be quickly obtained, and with the development of system integration, the application of the vision measurement system can be intelligent, miniaturized, networked, and multifunctional. The image preview can be used to judge whether the collected image meets the requirements, and the area selection can be used to select the area that needs to be calculated and the points with certain characteristics. These two pieces are the preparation stage before the formal recognition. The application method of combining circular guide rail and linear guide rail can be used to adjust the loader on the sliding plate of the partition guide rail, and the partition guide rail is based on the sliding plate of the partition guide rail. It is fully collected on the directional rail. We analyze the performance of the machine vision system, as shown in Figure 2.

The focus of image detection is to study the geometric size, shape, and surface properties of the object, and to help the system control the actuator to produce corresponding actions based on the detection results. Machine vision includes noncontact measurement, wide field of view, long-term stability, strong environmental adaptability, and high monitoring accuracy. Visual inspection is the use of machines to replace human eyes for various measurements and judgments. The core object of measurement and judgment is the related content of the image. The effect achieved must be combined with image processing technology, that is to say, image processing, analysis, and understanding are the
decisions, an extremely important technology for visual inspection. We count the values in different coordinate systems at different stages of image processing, as shown in Figure 3.

After coordinate conversion, the relative relationship between the theodolite measurement system and the image coordinate system is determined. While the advanced development of computer applications has increased the speed and capacity of data processing, advances in techniques such as sample identification, digital imaging, and artificial intelligence have accelerated the development of industrial production to a high level. Image noise is a random error that can only be recognized by probability and statistical methods, so it is unpredictable and is regarded as a random process. Image preprocessing is the premise of image analysis and recognition. The quality of image preprocessing has a great influence on the subsequent image analysis and recognition. Image segmentation algorithm, edge segmentation algorithm, region segmentation algorithm, cluster segmentation algorithm, and many different types of segmentation algorithms based on specific technologies are simulated and analyzed, as shown in Figure 4.

Any control system needs an actuator to complete the control of the controlled quantity, and the actuator that meets the system requirements can complete the output of the controller to ensure that the system achieves the expected control effect of the controller. Image refinement refers to the process of extracting a single-pixel wide skeleton line while maintaining the original image topology. It is an important step in the development of digital imaging and plays an important role in image analysis and image recognition. The edge of the image has two characteristics: direction and size. The pixels smoothly rotate along the edges, and the pixels smoothly change in the direction perpendicular to the ear. This change on the edge can be detected by the differential operator.

3.2. Powder Metallurgy Materials. Different forms of powder materials also affect product performance. The research and production of powder metallurgy friction materials have also sprung up. The economic and technical advantages of powder metallurgy materials far exceed those produced by ordinary melting and casting methods. Some materials cannot be prepared by conventional melting and casting methods due to their special characteristics. Powder metallurgy can only be used for preparation. Due to the difference between the thermal conductivity of the powder material itself and the internal pores, the thermal conductivity of the matrix material is greater than the thermal conductivity of the pores. Therefore, the thermal conductivity of powder raw materials is lower than that of dense materials, so the hardenability is not as good as that of dense materials. The phase structure of the material is also another factor. The powder material should try to maintain the characteristics of the raw material, or the metastable structure formed due to the solidification speed and other factors. The alloy layer will provide a very suitable angle for the composite material layer connected to it during the sliding process so that the brittle phase whiskers of the composite material layer can be carried at a suitable angle, thus ensuring the integrity of the interface. The densification process can be completed quickly in a short time. At the same time, after ball milling and mixing the powder, the tendency of the powder to fracture increases, and the powder size is sharply reduced to the nanometer level. Nanopowder has the characteristics of high performance, large specific surface area, and large sintering driving force. We speed up the sintering densification process. The relevant parameters of the experimental materials are shown in Figure 5.

Hybrid composite materials will significantly improve or enhance the characteristics of the original composite materials due to the compatibility between the different properties of many composite materials, mainly due to the hybrid effect. When metal powders are used to prepare granular mixed materials, due to the increase in physically stable components, there are many factors that affect the properties of the materials. When the particles contact each other, elastic deformation occurs first. With the further increase in pressure, the metal powder particles undergo plastic deformation, and the brittle nonmetal powder undergoes brittle fracture. The particles change from point to point surface contact. The oxidized surface material is easily made of air and water vapor in the air, forming a dense air-carrying film covering the surface of the material. The running table data of different datasets are shown in Table 3.

In order not to affect and better cooperate with subsequent processing such as image recognition and understanding, the image must be preprocessed. By comparing the obtained sample data, the working edge of the image is obtained, and then, the normal position of the edge of the image pixel is obtained. The similarity formula is used to calculate the similarity of the two images, and then, the similarity of the two images is judged according to certain criteria, so as to realize the matching of the images. The fuzzy control method can control the black-box model. The system does not need a precise mathematical model. The virtual
controller has a simple system, which can quickly obtain the control quantity according to the controller input and control the control object. Using the gradient direction Gaussian fitting technology, the accurate horizontal position information of the probe is obtained. Using the principle of ambiguity, the general vertical position information of the probe is obtained. Next is the research on the relevant parameters of powder metallurgy materials, as shown in Figure 6.

From the data in the above figure, we can find that powder metallurgy materials have the advantages of high friction coefficient and stability, strong corrosion resistance, good adhesion resistance, and good mechanical properties. The beginning of each information box should contain synchronization characters. When there is no useful information to be released, blank characters should be filled,
Figure 6: Performance analysis of powder metallurgy materials.

- Frictional thermal stability
- Thermophysical properties
- Mechanical properties

Figure 7: Powder metallurgy materials.
because synchronization transmission is not allowed to have gaps. In asynchronous communication, the interval between two search data can be arbitrary, so some bits must be used as the deviation before and after each frame. To achieve coaxial rotation on the hardware, the requirements for the stability of the sample stage are very strict, and it is generally difficult to achieve, so the offset of the rotation axis is usually corrected by postprocessing. We record the image of powder metallurgy materials, as shown in Figure 7.

Due to the relatively low temperature in the heating phase, the gas spread between the powders is not obvious. As the temperature increases, the particle diffusion rate between adjacent particles of the powder increases, and the closer the metal between the adjacent particles of the powder, the easier it is to form an air gap. The diffusion of atoms is accelerated; the neck sintering between the powder particles rapidly increases; and the pores between the powder particles are gradually closed. A comparative analysis of the data before and after the machine vision application is carried out in terms of porosity and density, as shown in Figure 8.

The effect of pressure can partially remove or even destroy the bridging effect of the powder, so that the powder fills the pores with each other, rearranges, and increases contact. Not only the crisis bridge between the powders is completely destroyed, the powder particles will also undergo plastic deformation, thereby increasing the contact area between the particles, which is easier to proceed than the atomic diffusion between the powder particles at temperature, making the sample pores reduce, and the distribution is more even. The data in the above figure show that the maximum porosity goodness of powder metallurgy materials increased from 6.56 to 8.22; the maximum density goodness increased from 6.46 to 8.40. We simulate related parameters such as the accuracy of machine vision image automatic measurement technology, and the results are shown in Figure 9.

4. Discussion

As new materials play an important role in the development of new and advanced technologies, and weaken all national capabilities and national security capabilities, countries around the world are playing an important role in the research and development of new applications, and have formulated and managed environmental pollution, and elimination of regulations on information development plans related to energy shortages can give full play to its positive effects. Nanomanipulation is one of the most important research contents of nanotechnology, and its value in the fields of science, economy, and society has risen to a prominent position and has become a major
research technology. Nanomaterials are at an important stage in the development of advanced science and technology. It is acquired by the image provided by the system between the storage system and the intelligent process, so when the storage system or the physical structure changes, as long as the image between the physical process and the set physical structure changes, the scientific system can be changed. The reactor has irreplaceable advantages in the preparation of nanomaterials. Therefore, the combination of microreaction technology and nanomaterial preparation technology is gradually becoming one of the most concerned and valued research directions in many branches of microchemical research.

5. Conclusions

The world is full of excitement. What the human eye can directly observe is the macroscopic object, while the observation of the microstructure requires the help of different tools. Image processing technology and image correlation method provide great support for the application of machine vision, making the scope of the machine vision application more extensive. It is very important to apply image measurement technology to measure the end-face runout of the workpiece during the production and assembly process. The end-face runout refers to the difference between the maximum and minimum value of the end face measured in the axis direction when the rotating body rotates around its own axis. It is a measure of the rotating workpiece kind of geometric tolerance. With the rapid development of industrial production, many measurement operations are gradually changing from contact to noncontact, and technology plays an important role in it. Machine vision is not only an extension of the human eye but also an integral part of the human brain. To create a digital image is to use a computer to calculate and analyze the image, and to meet the needs of subsequent analysis by calculating and processing the image. The rapid development of computer technology and imaging technology, and optical measurement and microanalysis technology has promoted in-depth research on search from macro to micro. The use of a combination of neighborhood and medium-sized systems effectively reduces the hot electron noise generated in the large-scale process of image capture and transmission. In the application of nanotechnology, it is mainly restricted by the nanoelectronics community. Therefore, it is necessary to conduct a series of basic research on nanomanipulation.

Data Availability

No data were used to support this study.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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