

transmits an imaging request signal to the first imaging unit 130 and the second imaging unit 140, and acquires the image signal of the first image and the image signal of the second image.

[0026] The calculation unit 172 calculates the three-dimensional coordinates (X_R , Y_R , Z_R) of the indicator 321 based on the first indicator image which is an image of the indicator 321 captured in the first image, and the second indicator image which is an image of the indicator 321 captured in the second image. Specifically, the conversion table 181 is used to acquire the three-dimensional coordinates (X_R , Y_R , Z_R). The drive control unit 173 generates a drive signal for driving the head drive motor 150 and a drive signal for driving the tool drive motor 160, and transmits them to the respective motors. For example, when the calculation unit 172 calculates the center coordinates (X_T , Y_T , Z_T) of the die pad 320 from the three-dimensional coordinates (X_R , Y_R , Z_R) of the indicator 321, a drive signal for bringing the bonding tool 120 closer to (X_T , Y_T , Z_T) is generated and transmitted to the tool drive motor 160.

[0027] Figure 3 is an explanatory diagram for explaining the Scheimpflug optical system employed in the first imaging unit 130. A similar Scheimpflug optical system is employed in the second imaging unit 140, but here, the Scheimpflug optical system of the first imaging unit 130 will be described as a representative.

[0028] In Figure 3, a plane S_1 is the intended focal plane of the die pad 320 arranged parallel to the stage plane of the stage 220. A virtual plane S_2 is a plane including a main plane of the first optical system 131 having an object-side lens group 131a and an image-side lens group 131b as a constituent group. A plane S_3 is a plane including a light receiving plane of the first imaging element 132. In this embodiment, the Scheimpflug optical system includes the first optical system 131 and the first imaging element 132 that are arranged to satisfy the Scheimpflug condition. An arrangement that satisfies the Scheimpflug condition is an arrangement in which the plane S_1 , the virtual plane S_2 , and the plane S_3 intersect each other on a common straight line

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relation is described in the conversion table 181.

[0038] The conversion table 181 described and generated in this way is a collection of data indicating correspondence relation between the three-dimensional coordinates (X_k, Y_k, Z_k) and the two-dimensional coordinates (x_{1k}, y_{1k}), (x_{2k}, y_{2k}), and may be used as a look-up table. In other words, by referring to the conversion table 181, coordinate values (x_{1R}, y_{1R}) of the first indicator image and coordinate values (x_{2R}, y_{2R}) of the second indicator image may be converted to the three-dimensional coordinates (X_R, Y_R, Z_R) of the indicator 321. Moreover, in a case where calculated combination of (x_{1R}, y_{1R}) and (x_{2R}, y_{2R}) does not exist in the conversion table 181, interpolation processing may be performed using peripheral coordinates that exist in the conversion table 181.

[0039] Further, not limited to the conversion table 181 in look-up table format, other methods may also be used to convert the coordinate values (x_{1R}, y_{1R}) of the first indicator image and the coordinate values (x_{2R}, y_{2R}) of the second indicator image to the three-dimensional coordinates (X_R, Y_R, Z_R) of the indicator 321. For example, a polynomial approximation function may be acquired according to the correspondence relation between the three-dimensional coordinates (X_k, Y_k, Z_k) and the two-dimensional coordinates (x_{1k}, y_{1k}) and (x_{2k}, y_{2k}) acquired in advance using the chart 400, so as to convert (x_{1R}, y_{1R}) and (x_{2R}, y_{2R}) to (X_R, Y_R, Z_R). In this way, in the case of using a look-up table or polynomial approximation function generated based on actual measurement data, since the actually measured data absorbs the error factors caused by the constituent elements such as lens aberration and attachment error of the imaging unit, it is expected that three-dimensional coordinates can be calculated with higher accuracy.

[0040] On the other hand, the conversion formula may be calculated arithmetically using Scheimpflug's geometric condition, a baseline length defined between two imaging elements, and the like, without depending on the measured data. For example, a transformation matrix for transforming a trapezoidal image into a rectangular image is predetermined using physical