WHAT IS CLAIMED IS:

1. A laser processing apparatus comprising:

a chuck table configured to hold a workpiece;

a laser beam irradiating unit configured to irradiate the workpiece held on the chuck table with a pulsed laser beam;

a processing feed unit configured to processing-feed the chuck table and the laser beam irradiating unit relative to each other;

an indexing feed unit configured to indexing-feed the chuck table and the laser beam irradiating unit relative to each other; and

a control unit;

the laser beam irradiating unit including

a laser oscillator,

a mirror configured to reflect the laser beam emitted from the laser oscillator and propagate the laser beam to a processing point,

a power measuring unit configured to measure power of leakage light of the laser beam transmitted without being reflected by the mirror, and

a condensing lens configured to condense the laser beam propagated by the mirror and irradiate the workpiece with the condensed laser beam,

wherein the control unit includes

a signal generating section configured to generate a signal controlling timing of pulse oscillation of the laser oscillator, and

a signal synchronizing section configured to synchronize timing of measurement of the power of the leakage light of the laser beam by the power measuring unit with the signal generated by the signal generating section, and

wherein the control unit allows to measure the power of the leakage light of the laser beam by the power measuring unit only while a pulsed laser is oscillated from the laser oscillator.

2. The laser processing apparatus according to claim 1, wherein

the leakage light of the laser beam is made incident on the power measuring unit after passing through a wavelength selecting filter disposed in front of the power measuring unit and configured to transmit only a laser beam of a wavelength used for processing.

3. The laser processing apparatus according to claim 1, wherein

the power measuring unit is a position sensing device.

4. The laser processing apparatus according to claim 1, wherein

the control unit further includes a warning notifying section configured to give notification of a warning when the power of the leakage light of the laser beam measured by the power measuring unit falls outside a predetermined threshold value range.

5. A laser processing apparatus comprising:

a chuck table configured to hold a workpiece;

a laser beam irradiating unit configured to irradiate the workpiece held on the chuck table with a pulsed laser beam;

a processing feed unit configured to processing-feed the chuck table and the laser beam irradiating unit relative to each other;

an indexing feed unit configured to indexing-feed the chuck table and the laser beam irradiating unit relative to each other; and

a control unit;

the laser beam irradiating unit including

a laser oscillator,

a mirror configured to reflect the laser beam emitted from the laser oscillator and propagate the laser beam to a processing point,

a power measuring unit configured to measure power of leakage light of the laser beam transmitted without being reflected by the mirror, and

a condensing lens configured to condense the laser beam propagated by the mirror and irradiate the workpiece with the condensed laser beam,

wherein the control unit allows to measure the power of the leakage light of the laser beam by the power measuring unit while irradiating the workpiece with the laser beam,

positional information is measured by the power measuring unit simultaneously with the power of the leakage light of the laser beam, and

the control unit further includes at least one of

a pass/fail determining section configured to determine whether or not an amount of variation in a position of the leakage light of the laser beam measured by the power measuring unit is within a predetermined threshold value range, and

a recording section configured to record data measured by the power measuring unit.