

Automation Increases Productivity of Czochralski Crystal Growth in Solar Industry

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The solar industry is expected to grow more than two billion kilograms of silicon mono-crystals this year for producing some 500 GW of solar modules. These modules can be used to generate enough electricity to meet the total power demand of both UK and Italy. More than 50 thousand crystal growing furnaces operated by tens of thousands factory workers are mobilized to grow this large quantity of crystals. In order to enhance productivity, save man power, and reduce cost, state-of-the-art automation technologies are used in crystal growth. These technologies include:

1. Large Czochralski furnaces with growing chamber ID of 1700mm or bigger;
2. Quartz crucibles larger than 40 inch in diameter, capable of containing more than 1000 kg molten silicon and lasting more than 400 hours;
3. Fast growing techniques allowing growth rates of more than 100mm and 16kg per hour;
4. Automated recharge technology that allows up to 8 crystals being grown in series from the same crucible;
5. One-Push-Button growth technique that standardizes growth process, simplifies operation and operator training, greatly saves man power cost;
6. Precise diameter control reduces excessive silicon waste and reduces ingot machining time;
7. Central control system in the shop allows up to 100 crystal furnaces being monitored by a single person;
8. Advanced safety features provide fool-proof protection.

These advanced automation techniques have greatly reduced the cost of photovoltaic power and promoted its commercial utilization, contributing to environmental protection and stabilized energy supply.