Accessible Automation:

Repluggers

As technology improves and prices decrease, automation has never been more accessible to growers of all sizes.

By Mike Porter

Many growers question whether or not they are ready for automation. I believe this is the wrong question, and I believe it is asked because of a perceived definition of automation.

Almost all growers are already automated to one degree or another. An environmental control system, even a basic one, is automation. Irrigation booms are a form of automation. Anything that replaces human labor is automation. Too often, however, automation is viewed as highly sophisticated. This image is furthered, to an extent, by suppliers showing the latest, most sophisticated equipment at trade shows and the media highlighting totally integrated, new operations. While the reasons for promoting the latest and greatest are understandable, this promotion can sometimes lead potential customers to question their readiness for automation.

Looking at the latest and greatest is important for several reasons. First, new product development and staying abreast of the latest technology are hallmarks of a vibrant supplier committed to the long term. Just as a top breeder invests in new varieties, the top automation suppliers are investing in new products. Second, looking at the newest technology is a way of imagining what is possible, and some amazing things are possible.

But most growers don't want to do the amazing. They simply want to make their operation more efficient and more profitable. Luckily, there exists a broad spectrum of automation options that can be tailored to fit virtually any grower. It is not a question of going from manual operations to total automation. Instead, it is a question of how much automation is right for the individual grower at a particular time. Of course, the first place to automate should be one that is highly repetitive, employs multiple laborers, requires substantial time and/or introduces variability. For many growers, this translates into a replugging line.

REPLUGGING BASICS

When growing plugs, a germination rate of 70-90 percent is common, depending on the crop and the quality of the environment. Ideally, the plug grower would like to ship his product with a 100-percent fill rate. This maximizes efficiency and reduces debates over actual fill rate with customers. On the other hand, a grower receiving plugs trays with an 85-percent fill rate faces difficulties using automated transplanters. Transplanters will attempt to transplant all cells, whether a plant is there or not. Without replugging, trays will be sent to the greenhouse with an 85-percent fill rate, and 15 percent of the valuable growing space will be wasted. Replugging, as with most operations, can be done manually, but is a very time-consuming process.

Not surprisingly, replugging became a prime candidate for automation. The technical challenges were daunting, particularly the problem of identifying bad cells. The first repluggers were highly sophisticated pieces of equipment. The first station consisted of a chamber equipped with cameras that digitized a photo of the plug tray and identified ungerminated cells. A computer linked to the camera could be programmed to define a bad cell, including both ungerminated and poorly germinated cells. The camera chamber was linked both physically and electronically to a "blowout" station. This station reoriented the trays, allowing the bad cells to be removed pneumatically. The next station was a transplanter, again linked physically and electronically to the other stations. This last station filled the now empty cells with good plugs.

This system was ideal for large plug growers but was not readily accessible to smaller growers. The system cost approximately $250,000, had a capacity of 3,000 plugs per hour and required the use of special styrofoam plug trays. Because of its sophistication, growers needed a skilled technician on staff to deal with any problems. Seeing this equipment at a trade show was very impressive but left me questioning its applicability to a large part of the American market.

A NEW GENERATION

Currently, the situation is different. To use an analogy, on a recent trip to Europe, I was amazed at the lack of handicap accessibility in almost all subway and train stations. We now take ramps and elevators for granted in the States. When we do new construction, we accept installing ramps because it is the right thing to do. In a similar way, many of us have been reluctant to automate because we have felt technically handicapped. ➧

Automation equipment manufacturers have recognized this and have designed equipment that is much more accessible for most growers.

Today there are many more options available that are much less intimidating. In the area of replugging, one such system has only recently been introduced. It still performs all three functions of the original machine described above: identification of bad cells, blowout and transplanting. However, the process is much simpler. The first station consists of a camera chamber to identify bad cells and communicate this information to the next station. Because of investments in product development, this station is both more efficient and less expensive than the original. Both the bad cell removal and transplanting are done in a single station rather than in two separate stations. The bad cell removal process is much simpler and could be described as untransplanting. It uses transplanter technology and a special gripper to remove the soil from the bad cells. A second, traditional, gripper will then place a good plug from a source tray in the empty cell.

During the first phase of replugging, a camera records which cells need to be replaced and transfers that information to the equipment that actually does the plugging. (Photos courtesy of Nexus Corporation)

The entire process is integrated, has a capacity of 3,000 plugs per hour and costs approximately $100,000. Additionally, it works well with a large variety of plug trays. The result is a machine that costs less than half of the original, has the same capacity, can be operated and maintained by less-skilled personnel, and can probably use existing trays.

Another option is to manually perform the identification and blowout function through suctioning. The second section of the above machine, the transplanter, can then be equipped with a laser device that will identify empty cells from the manual blowout and will direct the transplanter to fill the empty cells with good plugs. The sophisticated camera is no longer required, making the device even more accessible. Capacity remains at approximately 3,000 plugs per hour, but the cost is approximately $60,000. This indeed represents accessible automation. GPN

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