

Welding Plastic Profiles Using a B&R 2005 with Integrated CNC

The "Urban" company in Memmingen/Allgäu is a well recognized manufacturer of machines used to produce plastic windows. These machines are built for the world market in manufacturing plants in Memmingen, Forchach (Austria) and Fredericton (Canada). The most difficult part of production is building the plastic profile welding machines used to create plastic windows and also the weld tracking/finishing machines. B&R control systems have been used for 8 years on these machines.

Very high requirements have always been placed on the controller since all of the servo axes controlled by a machine require extensive user control and a network connection to a CAD system. At Urban, special interest was always given to clear, simple and personalized machine operation.

Use of the B&R SYSTEM 2005. The B&R SYSTEM 2005 is used for control and visualization of the newly developed weld tracking/finishing machines that process inside and outside corners using automatic feed and a turn table. The controller operations are handled

with the help of the integrated CNC modules (NC154).

Efficient Project Development. The use of these modules allowed the needed operations to be programmed on the controller from project planning to start-up in approx. four weeks. The NC154 Axis Controller is an active axis module that provides all of the functions needed to operate three servo axes. The software supports different operation modes such as:

- Online Positioning
- Electronic Gears
- Electronic Cams
- CNC Functions According to DIN 66025

The combination of the B&R 2005 PCC System, NC154 Axis Controller and PROVIT 2000 Industrial PC adds up to a high performance control system. B&R has been developing new trends in both hardware structure and software characteristics for several years in order to meet the market's requirements for high performance firmware and high level language programming (IEC 1131).

Function Description of the Machine. The window frame feed on the machine takes place either manually or automatically. Clamping devices hold the frame in position. The frame is measured with an incremental measurement system. Profiles are processed automatically with one of up to 50 different programs based on the measurement data. A grinding disk then follows the weld outline of the profiles. The profiles are

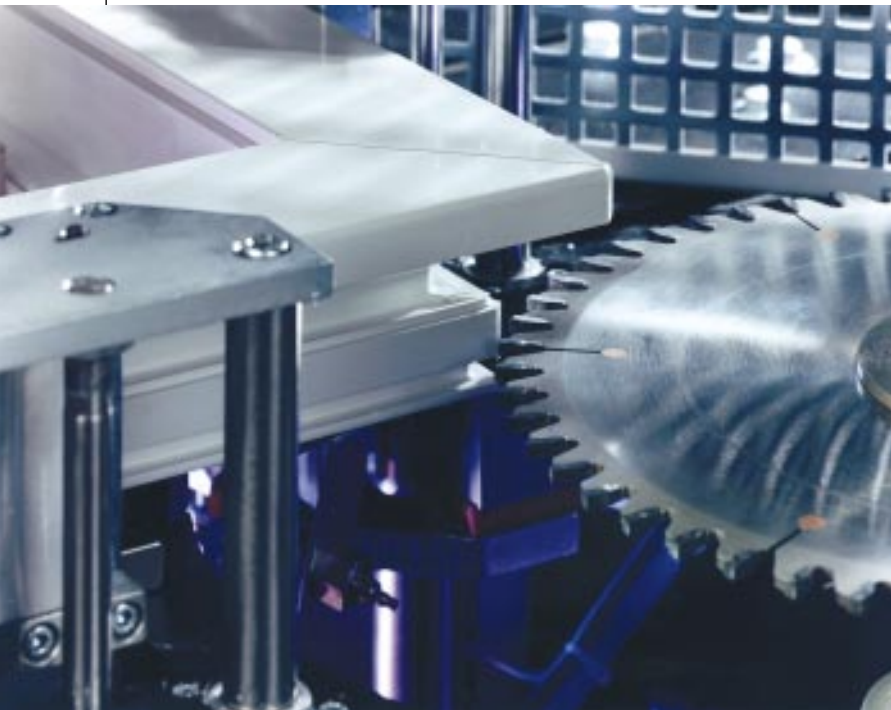
then processed further with grind and drill aggregates as well as a top off knife and an inside fold knife that are used on the top and bottom of the profile. After one corner of the window is finished, the frame is turned, removed or passed along either manually or automatically according to the machine equipment.

Operator Panel Requirements:

- Display 1/4 VGA or 16 lines x 40 characters
- Approx. 20 function keys
- 10 key keypad module
- Floppy Disk drive
- Interface to CAD system via RS232/RS485 or ETHERNET
- Interface to printer
- Interface to PLC/PCC
- Mass memory for approx. 50 CNC programs
- Operator control in four different languages

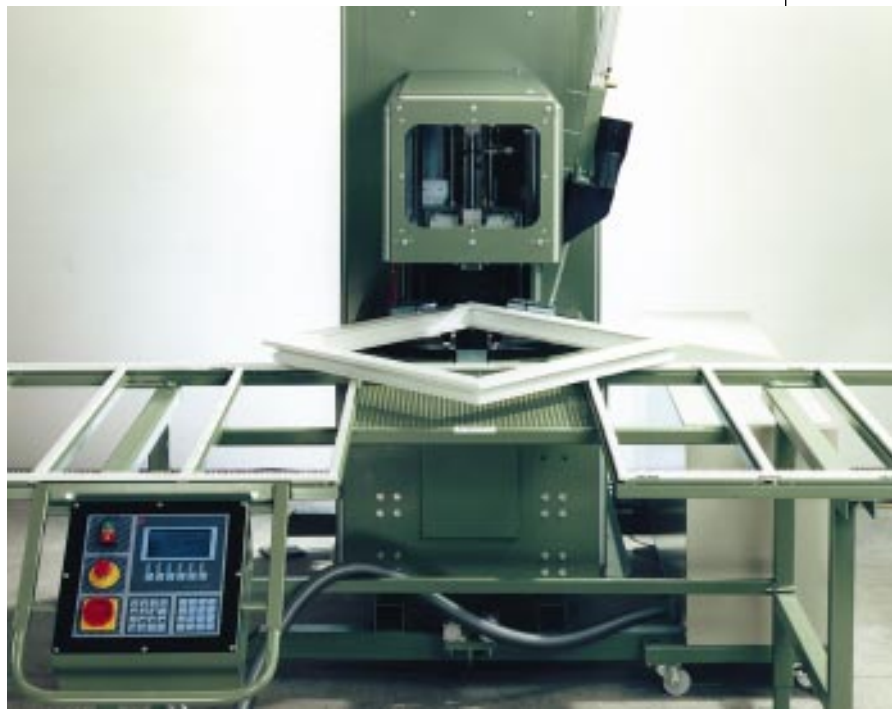
Control System Requirements:

- Two dependent servo axes with incremental measurement system for linear and circular and interpolation operation
- Incremental measurement system to measure the profiles
- CNC programming according to DIN 66025
- 80 binary inputs
- 64 binary outputs



Fully automatic processing of the weld

**Weld tracking/
finishing machine
for outside and
inside corners**



Function Description of the Controller. The operator panel is a modular PROVIT 2000 Industrial PC (consists of controller, 1/4 VGA display and various keypad modules). The machine is operated, programmed and its parameters are set with the PROVIT 2000 operator panel. Service functions can also be called. These operations can be accessed with a password. Naturally, it is possible to change machine parameters, to switch outputs in a static or dynamic manner in manual operation, to accept settings or to set axes parameters or operate them by hand.

High Performance CNC with the NC154 Axis Controller. The NC154 Axis Controller provides the user with a free DIN 66025 software interface. With the help

of standard functions such as G-function and M-function, the axes can be positioned, tools changed, aggregates turned on or off and transfer conditions introduced. With this free interface between CNC functions, PCC and visualization, it is naturally possible to adjust the operation desk top so that an optimal man machine interface (MMI) exists.

CNC Language Extent: The controller operations only require some of the functions of the CNC language. These will be introduced in the form of a typical program entry list:

- N = Set no. (0 - 99)
- G = Function (tool change, linear interpolation, circular

interpolation - clockwise or counter clockwise)

- X Value = Position of the work piece zero point in mm for disk grinder and aggregate
- Y Value = Position of the work piece zero point in mm for disk grinder or switching cam
- R = Radius in mm
- F = Speed in mm/sec

- T = Tool number (drill grinder top/bottom, inside fold knife, top/bottom, top off knife, etc)
- M = Machine function (inside measurement, outside measurement)

A detailed description of the NC154 Axis Controller and the PROVIT Industrial PCs can be found in this edition of the B&R NEWS on pages 4 to 7. ■

