Production programmer with open architecture

FlashFOX is a universal production programmer for electronic assemblies and components. Its open architecture provides flexibility for custom configurations.

In electronics production, the demands of in-circuit programming electronic assemblies and components are always increasing. Process and test engineers are constantly faced with new challenges. Complex designs comprise a variety of powerful and sophisticated components.

Often, not just a single data file is loaded onto the electronic assembly, but several, possibly quite different components need to be programmed. Hence, different programming interfaces and technologies have to be taken into account. Furthermore, the amount of data to be programmed is constantly increasing, while cycle times in volume production need to be kept low or even reduced; process and test engineers must program more data in a shorter time. Agile development processes, component shortages, or new product designs may create situations in which existing programmers cannot satisfy demands. A worthy production programmer must address all of those requirements for in-system programming of electronic assemblies.

A system solution for agile programming requirements

A modern production programmer must support many different targets. Microcontrollers, processors, FPGAs (Field Programmable Gate Arrays), and CPLDs (Complex Programmable Logic Devices) from different manufacturers must be programmed. In addition, there is a wide range of different non-volatile memory devices, including I^2C and SPI EEPROM, NOR-Flash, NAND-Flash, and eMMC from various manufacturers that must be considered. In addition to the items above, a production programmer must be able to cope with design changes during the product's life cycle. This includes not only changes in the data load but also the replacement of specific target devices.

The number of memory devices to be programmed can vary between different manufacturers and components, but also over the life cycle of a specific product. Strict cycle time specifications in production often require the simultaneous and parallel programming of several assemblies. A programmer claiming to be universally applicable must be flexible and able to adapt effortlessly to such changing requirements.

GOEPEL electronic's FlashFOX production programmer has been designed specifically with these requirements in mind. One key aspect of the solution is the pairing of a base unit with one or more remote programming heads (POD). This separation enables a range of use cases and integration

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opportunities for the production programmer. For example, the FlashFOX base unit can be utilized for multiple projects by keeping it outside the enclosure and only installing the needed POD(s) inside each project-specific enclosure or adapter, significantly reducing the programmer cost per project.

Another important feature is the ability to cascade multiple FlashFOX base units. Cascading is necessary to extend the number of channels (Figure 1) to program either several devices on one printed-circuit board assembly (PCBA) or several PCBAs in parallel. As the first programmer on the market, FlashFOX can be configured both as a master and as a slave. This means that master and slave units do not require different hardware components; instead a pool of programmers can be configured and arranged for use as dictated by specific project requirements.

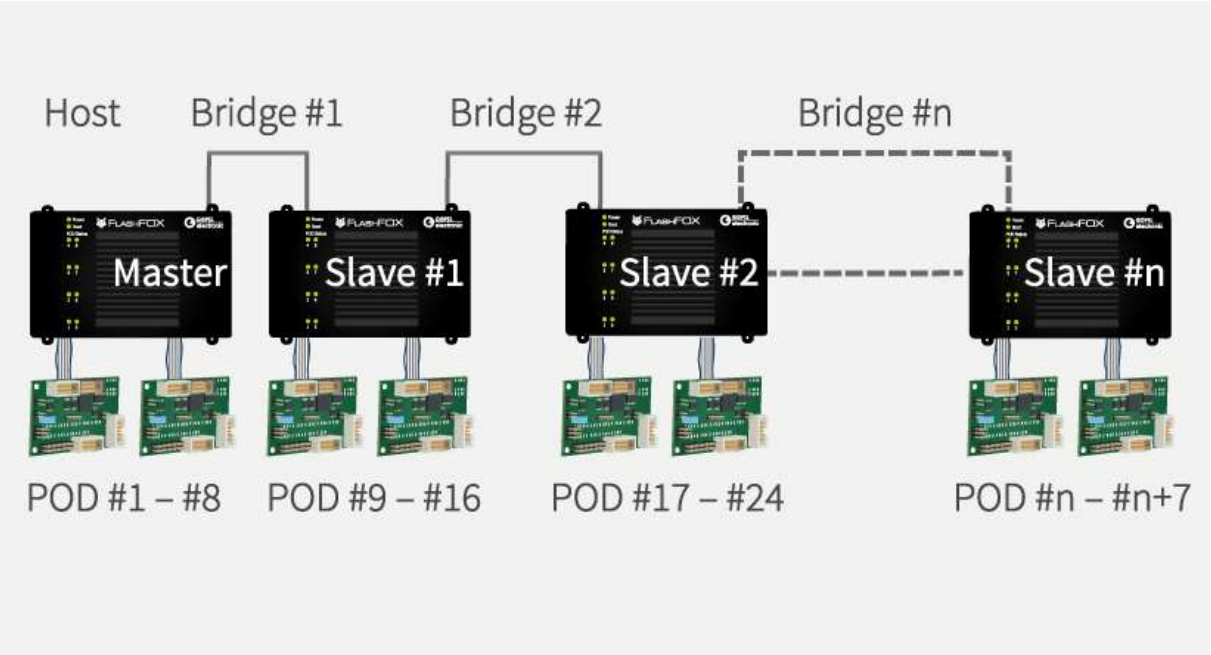

Figure 1: Extension of the number of programming channels through cascading

Enhanced signal quality in suboptimal environments

Another significant argument for or against a programmer is the maximum programming speed it can support and sustain. Data packages are becoming larger and must be programmed in less time. However, high data rates also require optimum signal quality. Programming data must be transmitted without interference. Particularly on the manufacturing floor, ensuring high signal quality can be difficult. Contact resistance on probe points, different signal path lengths, losses due to cable length, and interference caused by neighbouring signals are potential sources of problems. Modern

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programmers must be able to guarantee the highest possible data rates even in suboptimal environments.

The partitioning of the FlashFOX system into base unit and one or more PODs not only offers flexibility but also facilitates optimum signal quality, as the POD can be mounted as close as possible to the programming target device. Differential signal transmission between base unit and POD minimizes interference susceptibility, and the POD generates the conditioned single-ended signals for the target device. To support the desired high programming speed even over long distances, FlashFOX offers delay compensation for each programming channel independently: the propagation delay times of the entire system are measured automatically and compensated for accordingly.

Adaption of the programming data to the DUT

Having discussed the desire to access many targets simultaneously, with the highest possible speed and signal quality, we must also consider the data that needs to be programmed. Not only is programming data highly sensitive, but it also comes as a wide variety of formats and use cases. We are frequently faced with the task of manipulating programming data to fit the respective target at runtime. For example, serial numbers or calibration data may need to be added. Or different variants of the UUT are processed at one programming station, where the programmer must be able to select variant-specific programming data packages at runtime.

Another important question concerns data storage. Should data be stored on the programmer itself? Or will data be pulled at runtime from a host PC / server? Will data perhaps be transferred over a separate communication interface, such as an Ethernet port on the UUT? Last, but not least, programming data must be protected from unauthorized access or may need to be kept secret. Data transmission may therefore need to be encrypted.

FlashFOX offers several options for data handling (Figure 2). The base unit has sufficient on-board storage capacity for the actual programming data as well as the programming algorithms, allowing target devices to be programmed without any further data transmission between host PC or data server and FlashFOX. However, this does not satisfy all previously defined requirements. That is why FlashFOX offers another option for data storage: the programming data is pulled at runtime from a predefined data server and stored temporarily on the base unit (for the duration of the programming task).

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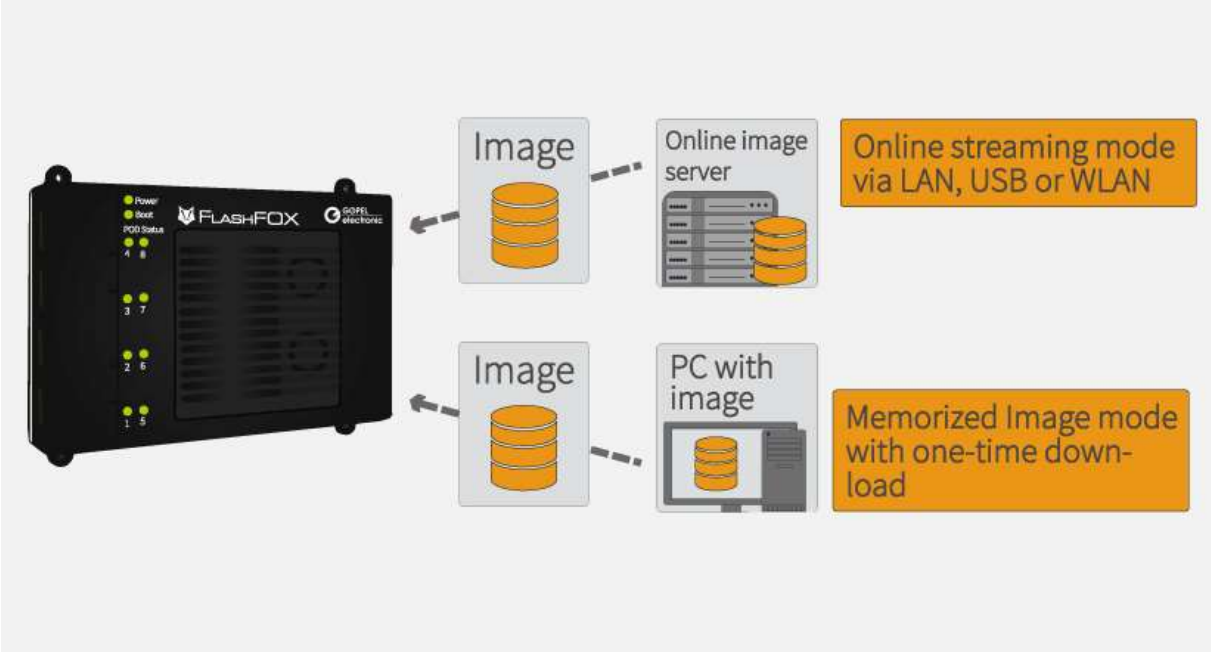

Figure 2: FlashFOX data storage and processing diagram.

By FlashFOX dynamically querying the programming data, the host system (in which FlashFOX is integrated) can customize the data to include a unique ID and/or serial number, date and time stamps, or calibration data, for example, and/or the data can be encrypted prior to transmission. The FlashFOX base unit features a highly efficient AES unit for the real time decryption of any encrypted programming data.

Conclusion

With FlashFOX, GÖPEL electronic expands its product portfolio with a flexible and powerful production programmer. FlashFOX is scalable and can be configured to fit different environments. Data is transmitted to the programming target device securely and without speed degradation due to signal interference.

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