



NEWS

TECHNOLOGY

FROM CAD CAM TO BLM ELEMENTS... WHERE ARE SOFTWARE PACKAGES HEADING FOR?

INDUSTRY 4.0

The software used to support the operation of a production system such as a Lasertube system or a tube bending system has significantly evolved during the past few years. The CAD/CAM systems, used to design and draw a part and create a program have given way to increasingly complex software application packages that perform different functions both in the office and on the machine itself. To properly take stock of the state of the art in this interesting world, we have asked a few questions to Dr. Paolo Benatti, ADIGE's Technical Manager and an expert in this field.

From Artube to now BLMelements. What challenges have arisen over the past few years, that the new software packages are able to meet?

“The machines that implement flexible production processes can now be programmed in a flexible way: this is the area where the newest software developments can be seen.

The CAD/CAM systems (initially 2D, then 3D) have solved the problem of generating the programming languages needed for a particular machine tool, which required an operator/programmer, with a system able to automatically generate the machine instructions by starting from just a geometric description of the part to be manufactured.

Then we realized that the production system programming represented only the first step of a manufacturing process that includes a number of activities which can be supported by adequate software applications. We are referring, for instance, to simulating the machining operations in order to check the part feasibility (e.g. in case of bending operations) or to get information about the time needed and the cost to be incurred in order to manufacture one single part or an entire production batch, or to machine either one single part or an entire structure or frame consisting of several elements, in a simple and intuitive way. Finally, integration with the machine control system is a requirement.

All of the above needs are now considered as requirements by the BLM GROUP's customers. All of these features available within the different applications within the BLMelements software suite: Artube, VGP3D, PartViewer, Composer, Protube. ”

Why did ADIGE develop a CAD/CAM program of its own dedicated just for tubes?

“ When ADIGE took the decision to develop a CAD/CAM program of its own, no good option was available in the market for the graphic programming of Lasertube systems. Yet, the main reason that persuaded ADIGE to invest in such a challenging venture was based on the understanding that the CAD/CAM design represents, in case of Lasertube systems, an essential feature of the machine operation, in addition to being a programming tool.

The programming of systems intended for sheet metal laser cutting entails a clear-cut subdivision of tasks between the part nesting phase and the identification of the cutting path (i.e. operations carried out off-line) and the identification of the cutting conditions that will be used on the machine. In case of laser tube cutting, the combination of these phases is very strong and very difficult to be disentangled, due to the fact that the way a tube is handled will affect both the system performance and the quality of the finished parts to a significant extent. Moreover, some functions cannot be solved entirely either off-line or on the machine itself: therefore, taking control of both such functions is the only efficient way of guaranteeing top performance levels.

This is the reason why Artube 3D was designed: a tool expressly developed to meet the requirements of many laser systems of the BLM GROUP's Lasertube family. ”

Where is machine tool software development headed?

“First of all we should point out a trend under way: while there is no doubt that those who pioneered the machining techniques (for both laser and bending technologies) were technology enthusiasts, who took an interest in understanding the operation of the systems to take the best competitive advantage from the technology at hand, a sort of mass utilization is taking hold nowadays, whereby nobody takes an “interest” in technologies any more – instead, customers want to get a high-quality finished part as soon as possible, no matter how the part was manufactured or how the system operated in order to achieve the final result. This is virtually what happens when a photocopier is used: copies should be made quickly and should be high-quality and inexpensive, too.

The software will therefore have to meet such requirements, by increasingly transferring the “intelligence” (i.e. skills) peculiar to the old-time expert operators to now the proper computer applications. The more sophisticated a software package is, the less skilled the operator working on the machine need to be (i.e. the operator will not affect the final result in any way): this will ensure fewer errors and a more stable process (due to the latter being repetitive).

The latest developments follow a direction characterized by full automation: a desirable feature would entail the fully automated processing of a 3D model after the latter has been fed to the cutting system. Operators are not particularly interested in the machine since the automatic choices they are able to make independently are smart enough, on average, to obtain a part featuring superior performance and quality characteristics, without any external influence and any risk of collision, damage, shut-down or poor quality. To sum up, both the experience and the skills lie with the software.

Nobody will need to worry about efficiency any more, since the

efficiency level achieved through automatic operation is very high and the efforts to be made in order to further enhance efficiency will not be justified by the results that can be obtained.

In this regard, we at BLM GROUP are introducing a new application fully transparent to the operator: the latter will just have to place the 3D files into a folder in the office and then will find the cutting programs available within the machine and ready for being executed. This system makes it possible to automatically handle a great number of non-critical items, i.e. the operator will have to take care of certain critical parts.

One further potential development involves simplifying as much as possible the creation of tubular joints, curves and full frame assemblies made up of different tube shapes and dimensions, both straight and curved, also by offering new engineering solutions. A well-known example is the ‘picture frame’ that is no longer made up of four welded tubes but, instead, of one single tube laser cut by means of the ‘cut-and-bend’ approach and fastened by means of a weldless joint. In any case, a number of similar solutions have already been implemented.

A sufficient amount of “intelligence” has been transferred to the latest version of Composer software. A curved tube is now seen as a frame made up of segments connected by joints, thus offering a wide range of possible solutions from which the most suitable one for a specific requirement will be chosen. The operators will no longer connect, join and bend the items by drawing lines or areas: on the contrary, they will make use of pre-defined features, i.e. shapes that incorporate the knowledge of what a tube is and of how it should (or should not) be handled, cut and bent.

From the management viewpoint, Protube is a system able to independently manage the production of the Lasertube systems and also easily interface to the customers’ ERP systems.

The subsequent step will be likely to entail massive utilization of

the “cloud” feature. The information will no longer be available only on the customer’s LAN: some information will be able, after being duly filtered (depending on the customer’s needs), to be sorted out to standardized servers, so as to have a picture of the production progress status which can be shared with both by the customer and by our company (in order to improve our service levels).

One example could be the comparative diagnostics that would make it possible to make a preventive diagnosis that anticipates the occurrence of problems (if any). »

Integrating different types of processing technologies: a topic dear to BLM GROUP. Where is it heading for?

“We are referring to parts requiring multiple manufacturing steps i.e. parts that will typically require machining operations in a sequence, (e.g. sawing, laser cutting and bending). In this case, the integration among different technology – a concept concisely expressed by the BLM’s slogan “All-In-One” – aims at considering a finished part as the only and one item deserving our attention, instead of being considered as the whole of individual machining operations that are managed separately.

The ProTube application takes into consideration multiple machining operations. This part can be included in a production list dynamically created and managed by external ERP systems; therefore, external production job orders can be collected and production lists can be created or received, which will be subsequently split and grouped depending on the material types and shape, thus generating the job orders for the individual machines and ensuring the traceability of the machining operations carried out.

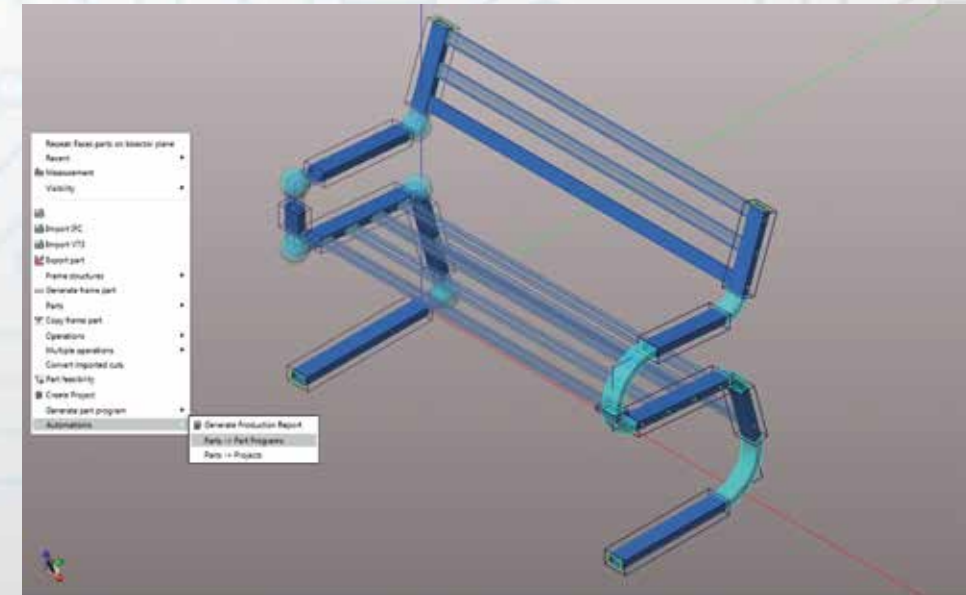
During the programming phase, the cutting and bending platforms manage the exchange of the data needed to “bounce” the models: today we are able to import a model of a curved tube and straighten

it to supply both the laser cutting machine and the bending machine with the correct data needed to process the item from the very first part. Data exchange takes place both off-line and on the machine itself: the extensive know-how relative to the tube handling and machining has been transferred into these software applications.

Of course, the ProTube application is capable of tracking back the production status for individual orders or the entire production list. So, the machines will also provide data of their actual utilization and of their reliability and productivity levels.

All of the above represents one of the elements that have triggered the so-called ‘Industry 4.0’ revolution, which merely entails distributed, massive use of Information Technologies within the production sectors, by providing information both to the individual

machines and the manufacturing process as a whole. »



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