Following a few rules when selecting a single-source supplier makes putting together a motion-control system a snap.

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Designing a motion-control system can be a trying affair. Time and budget constraints often lead to only a quick review of several manufacturers. Because there are literally hundreds of suppliers, choosing the right one can be confusing and potentially jeopardize critical time to market.

Start by discussing the application with technical buyers. They can offer a wealth of knowledge about the complexity of sourcing components for large systems. It is not uncommon to buy as many as 1,500 components for one application. Few, other than the technical buyer, can realize the benefits of bundling components into one supplier with one check, making one supplier responsible. Buyers generally negotiate with dozens of suppliers for hundreds of components and receive billing from dozens of manufacturers, a time-consuming and
difficult chore prone to mistakes. An alternative is to select one supplier who will outsource to all the necessary component manufacturers. A reputable single source deals with them on a daily basis, knowing which ones can deliver quality parts quickly and at a fair price.

Having one company generate one invoice saves reviewing, processing, and negotiating time. Overall, it improves personnel resources. They also realize an additional benefit: As a result of contracting with one supplier, incoming inspection costs are reduced. The customer inspects only the complete motion-control device delivered by the single source, not deliveries of individual components from dozens of manufacturers. But having the single source buy components is the least-expensive part of the process; it's the manufacturing, quality control, and labor-intensive nature of the assembly process that dictate the larger costs like welding, soldering, crimping, adhesives, and machining of parts.

Besides providing a list of single-source suppliers to pick from, technical buyers can often shed light on their reputation. They should have information about material returns, product lines, quality-assurance methods, and partnership facilities. Inquire about minimum order quantities and what percentage of the supplier's business is standard and custom products. For a custom part, call the potential manufacturer and ask them about projects that were heavily customized and what they entailed.

However, be aware that based on nondisclosure and noncompete issues, some questions will remain unanswered. Still, they're worth asking. If at all possible, visit the potential manufacturer and take a look at devices that contain parts by them. Try and speak to their customer. For example, a common component in a motion-control automation system is the linear stage. The drive-system supplier may not manufacture this end component, but one or more of his customers may.

If visiting the company or talking to their customer is either impractical or prohibitive, ask if the supplier is ISO compliant. Ask questions about their failure-analysis process. What type of analytical tools does the company have at its disposal? What type of statistical...
analysis of production do they perform? Ask what a typical turnaround time for a prototype would be and what tools the company has at its disposal to expedite the process. For example, do they use CAD and CNC tooling? Are sales and manufacturing in the same building? The more distance between sales and production, the slower and less adept they will be at reacting to the customer’s inquiries. They’ll also be less able to answer questions about production methods, failure analysis, and delivery times.

In times of tight deadlines and budgetary constraints, the first product choice is always an off-the-shelf product. The second choice is a modified standard product, while the third, (if time and budget permit, and application requires) a customized product. Care is necessary when dealing with off-the-shelf products. Although suppliers make valiant attempts to standardize products to fit the general market, it is rare that an off-the-shelf package will “slip fit” without modification into the application. Modified standard products are almost always the most versatile and the quickest way to assess if a supplier is right for you. If the supplier can come close with a modified standard product, it means that they are familiar with the technologies and have worked with them often. Some typical modifications include cabling connections, shaft modifications, the addition of pinion gears, pulleys, and cams, which could involve special sealing, lubricants, and temperature or environmental protection.

On the electronics side, this could mean anything from preprogrammed motion sequences and power-stage modifications to various types of feedback and control options. Various modifications might be recommended for the actuators such as mounting holes, bolt circles, shaft diameters, and facing. Even though projects begin with specifications and an idea of the finished product, changes occur throughout the development process. Having a lineup of motors and gears that have different size and power options, plus the availability of a machine shop to make modifications and prototypes quickly and efficiently, can facilitate making needed changes down the road.

The most versatile single-source manufacturers can offer an option that goes beyond the typical standard, modified, or customized product. They can offer a total turnkey system approach which includes motors, gearing, feedback, control electronics, components, and software. Such a system maximizes resources in more productive areas while turning over complete responsibility for the design, development, and manufacture of an application to a single source. In that case, the supplier and OEM need to develop a good working partnership.

An existing customer, familiar with the supplier’s staff, should be able to talk directly to the quality-control manager or line manager. New or

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prospective customers should have immediate access to an application engineer especially on returned material or repairs, the true test of customer commitment. No more than two weeks should go by without receiving at least a preliminary report. Quality issues should be addressed immediately, especially if full production is underway. An OEM should be able to visit the manufacturer’s facility, do an audit of their quality and manufacturing systems, as well as have the supplier’s application engineer visit the OEM. A full service, single-source manufacturer should encourage its engineers to do fieldwork whenever necessary for the complete satisfaction of its customers. A close working partnership between the applications engineer and the OEM’s design engineer can overcome obstacles.

It’s important to select a single source that has a good mix of capabilities, products, and experience. When that versatility is missing, especially in the international marketplace, the interoperability of parts and systems plus cultural differences can become critical, affecting an application’s performance and success.

A single-source supplier for the international market should have an international presence. The single source should also be familiar with the issues concerning their products and the various types of worldwide certification that the OEM will be confronted with. For example, U.S. companies must comply with UL certification, while in Europe CE is the standard. A supplier’s experience with both can speed up the certification process and help speed the product to market.

Also, if issues like differing bus systems and program languages are not adequately investigated and dealt with early in the design phase, they can cause havoc in production. Frequently, there are several bus languages in use. A supplier should be versatile in all the bus systems and programming languages involved, or at least able to recommend a standard to strive for in the factory.

Each bus system requires the purchase of the source code and then programming it to function with the specific device. There are at least 20 bus or networking systems that speak different languages. Common European standards are Profibus, CANopen, and CAL. DeviceNet, SDS (Smart Distributed Systems), ControlNet, USB,
and FireWire are common in North America. Obviously, a supplier with facilities in the U.S. and Europe would be an ideal candidate for single sourcing, because they would be well versed in the most popular U.S. and European bus systems.

Besides bus systems, there are three other important aspects of motion-control automation that your single source must be well versed in. The first is the versatility of their driver systems. This is the ability of the drive to be switched from machine to machine or communicate with different machines in the actual operating environment. Secondly, network cabling. This is the hard wiring necessary to connect the various devices on the network. In a large automated factory setting, the supplier should be able to provide electronics that can work at a long distance from the controller to the drive, shielded cables for ambient noise effects on the drive system, and the right connectors. Lastly, they should be familiar with gateways or bridges used to convert from one network standard or protocol to another.

Because a big part of the prototype and design process involves empirical testing, a well-stocked lab is important. Suppliers should be able to empirically test important issues like the load point and duty cycle of the customer’s machine, including the electronics and motion profiles. As a single-source supplier, you are going to be expected to use the drive electronics with its accompanying motor, so you need to know exactly how those two things will perform together. However, empirical testing is not always necessary. Theoretical values alone can sometimes point the way to a standard product that can be modified to fit the application.

Motor or gearhead shaft sizes can be a frustrating issue when trying to size a gearmotor for a quick fit into a machine. The single source company should be able to deal with this problem in a variety of ways. It could provide shaft adapters, make shaft modifications, either in prototype or in production quantities, or recommend sources for peripheral metric parts to fit the rest of the mechanism.

Ultimately, selecting single sourcing for motion-control applications is not an option for every OEM. It may be difficult for some, especially those that are used to having tight control over the entire process. This, plus their search for the right single-source supplier versus bidding out the entire process to different suppliers, may cause them to feel that their position of control in selection and negotiation is weakened. However, for those OEMs wanting to get their product to market faster and beat the competition, single sourcing a turnkey solution may be the best way to go.