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Eye On The Prize

Rapid growth created manufacturing control problems for this seven-year-old sheet metal fab shop. ISO 9000 helped turn the company around, poising it for even faster growth.

By CHRIS KOEPFER, Associate Editor

In the heart of Silicon Valley, about 50 miles south of San Francisco, things electronic rule manufacturing. It's where Hewlett-Packard, Apple and almost any other computer company one can name are located or represented. It's also home to a host of supplier companies who make their living supplying things for these "big boys." One such supplier, MASS Precision (San Jose, California), is the focus of this story. They design, fabricate and manufacture precision sheet metal parts for the electronic industry. Card carriers, cabinets, doors, chassis and other components are made to demanding standards of quality and production control.

However, saying one "manufactures in a quality manner" is easy. Proving it is another matter. In July, 1993, this 200-person job shop completed a major step toward substantiating their claim of quality manufacturing by becoming certified compliant with ISO 9001 standards. This story is about how and why they did it.

Getting ISO 9000 certification is the beginning of a never-ending pro-

MASS Precision is a sheet metal fab shop. They use CNC turret punch presses, like these from Amada, to fabricate parts for electronic cabinetry. Equipped with load/unload stations, the presses help increase throughput by keeping work "in the cut."

cess of continuous improvement for every aspect of the business. It may sound tedious and, at first, it certainly is. ISO is not a set-it-and-forget-it system. Daily attention is needed to keep the system operating. But once properly integrated as part of company culture, "doing ISO" becomes second nature.

The question is: How does a company go from ISO "wannabe" to ISO-certified? For MASS Precision, the process started with a decision by top management to pursue certification. Next, the company began a search for someone to help do the job. Coming into a company as a turnaround specialist, Jim Johnson began the daunting task of documenting all of the company's activities.

In the form of procedures, these documents became the base for ISO certification. Included in the system was a mechanism for handling changes in procedures. Showing how these changes could be quickly implemented in the operations helped win over skeptic employees that ISO could help. To keep the process working, employees were charged with periodically auditing their operation. These audits revealed problems which they, as the auditor/employee, were encouraged to solve. On-going training and

ISO champion, Jim Johnson is instrumental in maintaining the process control system momentum built during the drive for certification. Key to success of the system is communication among all employees.

attention to systems maintenance makes the system part of the company culture. Here's their story.

Getting Started

MASS Precision's pursuit of ISO 9000 certification was born of a need for the company to gain more control over its manufacturing processes. Surprisingly, the decision had little to do with global marketing ambitions—the usual motivation for getting ISO certification. According to company president, Al Stucky, Jr., "Although we had a good reputation, we remained concerned with increasingly frequent problems of delayed deliveries, lost parts, changes not communicated in time, and labor costs exceeding estimates." These problems resulted from the company's rapid growth. Simply put, the business had out-grown manageability using its traditional means.

For three years, the company worked with full-time specialists in an effort to gain control—to no avail.

It was at a seminar sponsored by the Precision Metalforming Association (PMA) that Mr. Stucky, Jr., heard about ISO 9000. It sounded like a possible answer for MASS Precision because of the standard's holistic nature. ISO standards permeate an entire organization from shear-to-ship, bottom-to-top. Mr. Stucky, Jr., believed this was the key difference between it and other improvement systems the company had tried implementing by force-feeding from the top down.

Next came a search for someone to help the company prepare for the audit which leads to ISO certification.

Step One: Select A Champion

The starting point for pursuit of ISO is selection of what MASS Precision calls a champion. A champion is a change agent, an individual or team

charged with getting a company ready for an ISO audit. MASS Precision chose Jim Johnson, a management consultant, as their champion. He carried the title Director of ISO Certification. While it's not unusual to go outside for help negotiating the ISO maze, many companies choose a champion from their own ranks. "This may even be more effective," says Mr. Johnson.

Characteristics of a champion include, most importantly, a process-oriented person or persons as opposed to those who are task-oriented. In an inspection-driven quality system (which Mass Precision had prior to ISO) the focus of quality control activities is on the task of inspection. That focus changes with installation of a holistic quality assurance system which puts QA in every step of manufacturing rather than just the last one. "Things flow smoother with a process-oriented person heading up the certification effort," says Mr. Johnson. Organizing and assimilating large amounts of information, so it can be accessed easily when needed, is vital to the success and expedition of an ISO certification effort.

Interpersonal communication skills rank high on the requirement sheet for a champion. Much of the work involved in gathering information about how a shop works comes from interviews of employees rather than managers. "There is no other way to get the real picture," says Mr. Johnson. A secondary benefit of this information-gathering phase is that, by soliciting the input of all the employees, their involvement comes along too. More about that later.

Mr. Johnson also ranks writing skills as an important requisite for a champion. Much of the work involved in documenting how a business works takes the form of written procedures. These procedures become living documents, so to be useful they must be understandable. Too often, procedures read like legal documents, effectively shutting out the very people who need to understand them. Clear and concise best describes how the documentation for ISO should appear.

So the champion should embody processes and organization ability, interpersonal communication skills (which require patience), and good writing ability. "Finding one person with all of these traits is difficult," admits Mr. Johnson. "It may be easier to select two champions, who combined, have the necessary skill set for this important assignment."

Step Two: Procedures

"Because ISO requires handling and dissemination of large quantities of information, putting in a system for gathering, cataloging and referencing this information is an important early step in the process," says Mr. Johnson. It's a way to provide answers to a couple of very basic, and very important questions: For the manager—what does the department need; and for the employee—what are your job and responsibilities within the department?

So the very first thing Mr. Johnson

did upon coming into MASS Precision as champion of ISO was to sit down and write a procedure for managing the process. That is, he explained how the input that was soon to be solicited from everyone in the company was to be organized. His system divided the company along department lines, including, for example, the brake department, shear department, accounting and engineering. The system is simple; each manager and supervisor maintains a department binder. Each binder is then used to collect and hold written procedures that define what that department does. At Mass Precision, there are eight departments.

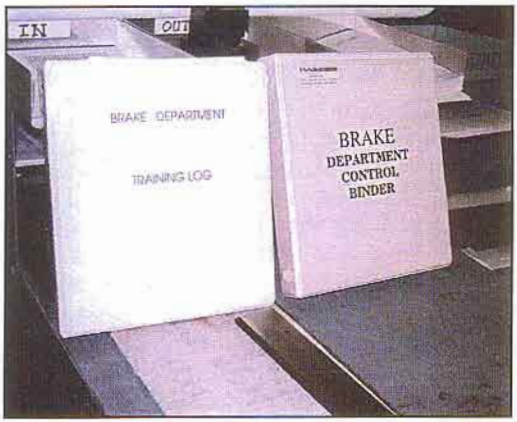
Each binder also contains a department matrix which clearly shows who is responsible for a given task within the department. Since this is a job shop, it is updated continuously to reflect changes in assignments.

These binders become the ISO focal point of each department's operations. They serve as a two-way communication device for the people within a department. Information, suggestions, enhancements, techniques—anything dealing with the work of the department—is written up and put in the department binder.

The binder serves the department as an archive of information. It becomes, in part, an instruction manual, with answers to questions an operator has about how to do something in the department, and in part, a management tool, containing a department matrix that documents who is responsible for what. Job descriptions and findings from continuous improvement audits and procedural changes are kept in the binder.

It is a dynamic instrument because of continuous input of procedural changes. Since MASS Precision is a metal fabrication job shop, procedural flexibility is paramount to successful throughput of a job. It is the operator's responsibility to document changes made in a procedure and follow up with how successful, or not, the change was.

A procedure is a brief, general explanation of an operation or function, either departmental in nature or



Shopfloor focus for ISO is these binders. The department control binder contains all of the procedures and work instructions for the department. A second binder records the department's training activities.

describing a process. Procedures also cover a department's interaction or overlap with other departments by describing how this interaction is to proceed. Each procedure is held to one or two pages of brief description. If an operation or function needs more detailed explanation than procedures allow, it is designated as work instructions. Work instructions are cross-referenced to procedures.

With a system of documentation in place, the next hurdle for the champion is to demonstrate the dynamic nature of the system by showing how changes to existing procedures are made to improve an operation or function. At first, because there is no evidence to show to the contrary, motivation takes a "leap of faith" by the employees and a constant sales job by the champion to move toward self-reliance using the system.

Step Three: Implementation

"Establishing good faith with the workforce starts very slowly," says Mr. Johnson. "After all, these people have seen wave after wave of 'new' programs designed to help with quality. The ISO champion's job is to instill confidence that this is not just another program."

Follow-through is the key that unlocks this good-faith door. It's OK to collect suggestions from people about how to do a better job. A suggestion box can do that. But when a champion interviews a press brake operator and takes down his suggestion on Tuesday, then has that suggestion in writing and working before week's end, people begin to have confidence in the champion's ability to follow through.

That's the scenario that Mr. Johnson followed at MASS Precision. Starting with an individual operator, he listened to a suggestion, wrote up a procedure describing the suggestion, distributed it in the department binder and at that point, began implementing the suggestion. Soon that same operator came to Mr. Johnson with another suggestion, which was acted upon immediately. Then another operator came forward with a suggestion, then another. The cultural change began to happen. It began with small things like tagging individual parts in a set to help keep a job together through different operations. Then some got larger in scope, such as order processing checking inventory before giving a delivery date to make sure the parts can be produced when promised.

Implementation was proof of the company's sincerity. Before long, over 1,000 suggestions had been written into procedure and implemented. At this level, the system began to operate on its own, independent of the champion, exactly like it was supposed to. "The whole thing hit critical mass about the fifth month," said Mr. Stucky, Jr. "After that, we knew that ISO 9001 was going to happen."

The system was in place for everyone to contribute and receive information about what the company was actually doing. "With the 'model' in

place, the system could be improved and people could be trained and developed," says Mr. Johnson.

Step Four: Internal Audits

Two of the 20 ISO 9001 elements (see sidebar) that seem to give companies the most difficulty, says Mr. Johnson, are the internal audit process and the corrective action process. At MASS Precision, the two are intimately connected and incorporated as an internal mechanism for continuous improvement.

The usual output from an internal audit is a litany of problems. That's its purpose. However, with the procedural and implementation systems in place, the problems uncovered by analyzing an operation become grist for the system. Within the system, everyone becomes an auditor. Each employee is charged with analyzing their or another's operation and when a problem is identified, a solution is required in the form of a procedure update. The same person does both fault-finding and problem-solving.

A Quick ISO Primer

First thing to understand about the ISO 9000 series of standards is that they have nothing to do with products and everything to do with process control. These standards apply exclusively to process. It's not what a company manufactures that interests ISO, but how it manufactures. Very simply, ISO requires that a company document each step it takes to make a product and that the company actually does what it documents.

In concept, ISO 9000 is quite sensible. There are three standards (9001, 9002 and 9003) each applicable to a specific enterprise. ISO 9001 is the most comprehensive standard because it covers activities in companies that design, manufacture and service specific products. The second standard, 9002, applies to businesses that take other company's designs and manufacture from them. And ISO 9003 is applied to companies that engage in sales or service operations. There is no ranking implied in these designations. ISO 9001 is not better than 9003. The three standards simply represent categories of business activities.

In ISO 9001 there are 20 line items with which a company must document and demonstrate compliance. For certification to 9002, the design line items are dropped so 18 of the line items are applied. For 9003, 12 such items are applicable.

To be certified ISO compliant, a company must bring in an accredited registrar to conduct an audit against the ISO elements. Passing consists of being able to document each of the respective elements and demonstrate that, in operation, the documented procedures are followed.

For more information about ISO 9000, contact: *ASQC*, 611 East Wisconsin Ave., Milwaukee, WI 53207-3005—(414) 272-8575; *ANSI*, 11 West 42nd St., New York, NY 10036—(212) 642-4900; and *PMA*, 27027 Chardon Road, Richmond Heights, OH 44143—(216) 585-8800.

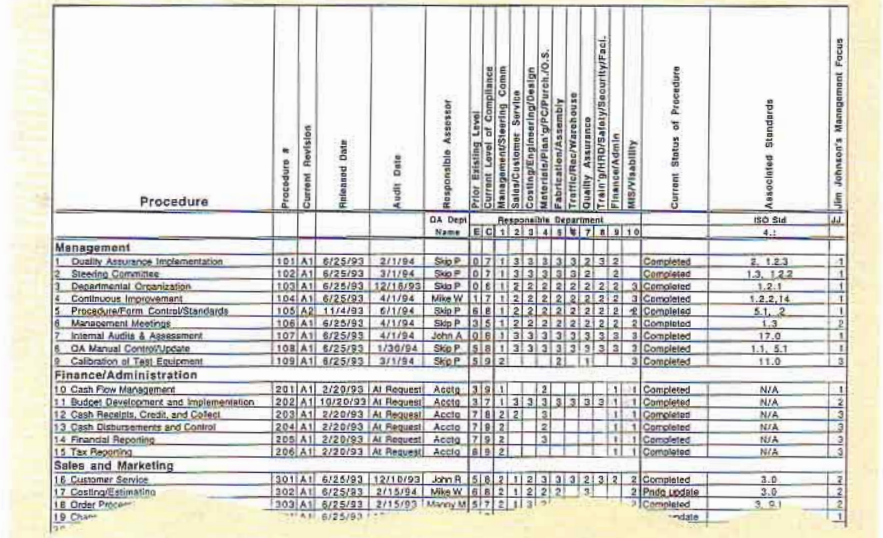
When an error is made with a customer, for example an incomplete order is shipped, in this industry, the customer issues a request for corrective action back to the shipper. Companies also issue these requests to vendors. It's a communication device. If a corrective action request is submitted by a customer of MASS Precision, it is handled as a continuous improvement request and the documentation that shows the corrective action is given to the customer. At the same time, internally, the change of a procedure is implemented in the departments affected by the corrective action. It's a closed-loop system that helps eliminate repeat errors.

To eliminate any stigma associated with making mistakes, the company refers to corrective actions as continuous improvement. "Of course errors occur," says Mr. Johnson, "that's why having a procedure in place to handle them smoothly is so helpful. No customer is going to believe we're perfect. They are impressed with how quickly and thoroughly we respond to

Elements From The Three ISO 9000 Series Standards

	9001	9002	9003
Management Responsibility	X	X	X
Quality System Principles	X	X	X
Contract Review	X	X	
Design Control	X		
Document Control	X	X	X
Purchasing	X	X	
Purchaser Supplied Product	X	X	
Product Identification And Traceability	X	X	X
Process Control (Production)	X	X	
Inspection And Testing (Verification)	X	X	X
Inspection Measuring And Test Equipment	X	X	X
Inspection And Test Status	X	X	X
Nonconformity (Control Of Nonconforming Product)	X	X	X
Corrective Action	X	X	
Handling, Storage, Packaging And Delivery	X	X	X
Quality Records	X	X	X
Internal Quality Audits	X	X	
Training	X	X	X
After-Sales Servicing	X		
Statistical Techniques	X	X	X
	20	18	12

ISO 9000 is composed of a series of elements. Here are the elements for the three business types, ISO 9001, 9002 and 9003.



Procedure	Procedure #	Current Revision	Released Date	Audit Date	Responsible Assessor	Prior Existing Level	Current Level of Compliance	Management/Steering Comm	Sales/Customer Service	Costing/Engineering/Design	Materials/Plan'g/PC/Purch./O.S.	Fabrication/Assembly	Traffic/Rec/Warehouse	Quality Assurance	Train'g/HR/Safety/Security/Facil.	Finance/Admin	MIS/Viability	Current Status of Procedure	Associated Standards	Jim Johnson's Management Focus
					QA Dept Name	E	C	1	2	3	4	5	6	7	8	9	10		ISO Std 4.:	JJ
Management																				
1 Quality Assurance Implementation	101	A1	6/25/93	2/1/94	Skip P	0	7	1	3	3	3	3	3	3	2	3	2	Completed	2, 1.2.3	1
2 Steering Committee	102	A1	6/25/93	3/1/94	Skip P	0	7	1	3	3	3	3	3	2		2		Completed	1.3, 1.2.2	1
3 Departmental Organization	103	A1	6/25/93	12/15/93	Skip P	0	6	1	2	2	2	2	2	2	2	2	3	Completed	1.2.1	1
4 Continuous Improvement	104	A1	6/25/93	4/1/94	Mike W	1	7	1	2	2	2	2	2	2	2	2	3	Completed	1.2.2,14	1
5 Procedure/Form Control/Standards	105	A2	11/4/93	6/1/94	Skip P	6	8	1	2	2	2	2	2	2	2	2	2	Completed	5.1, 2	1
6 Management Meetings	106	A1	6/25/93	4/1/94	Skip P	3	5	1	2	2	2	2	2	2	2	2	2	Completed	1.3	2
7 Internal Audits & Assessment	107	A1	6/25/93	4/1/94	John A	0	6	1	3	3	3	3	3	3	3	3	3	Completed	17.0	1
8 QA Manual Control/Update	108	A1	6/25/93	1/30/94	Skip P	5	8	1	3	3	3	3	3	3	3	3	3	Completed	1.1, 5.1	1
9 Calibration of Test Equipment	109	A1	6/25/93	3/1/94	Skip P	5	9	2				2		1			3	Completed	11.0	3
Finance/Administration																				
10 Cash Flow Management	201	A1	2/20/93	At Request	Acctg	3	9	1			2					1	1	Completed	N/A	1
11 Budget Development and Implementation	202	A1	10/20/93	At Request	Acctg	3	7	1	3	3	3	3	3	3	3	1	1	Completed	N/A	2
12 Cash Receipts, Credit, and Collect	203	A1	2/20/93	At Request	Acctg	7	8	2	2		3					1	1	Completed	N/A	3
13 Cash Disbursements and Control	204	A1	2/20/93	At Request	Acctg	7	8	2			2					1	1	Completed	N/A	3
14 Financial Reporting	205	A1	2/20/93	At Request	Acctg	7	9	2			3					1	1	Completed	N/A	3
15 Tax Reporting	206	A1	2/20/93	At Request	Acctg	8	9	2								1	1	Completed	N/A	3
Sales and Marketing																				
16 Customer Service	301	A1	6/25/93	12/10/93	John R	5	8	2	1	2	3	3	3	2	3	2	2	Completed	3.0	2
17 Costing/Estimating	302	A1	6/25/93	2/15/94	Mike W	6	8	2	1	2	2	2		3			2	Pndg update	3.0	2
18 Order Proce	303	A1	6/25/93	2/15/93	Manny M	5	7	2	1	3	2						2	Completed	3, 9.1	2
19 Char		A1	6/25/93															date		1

This chart shows MASS Precision's procedures and management matrix. It serves as an index to procedures for each of the company's departments. Each department procedure is cataloged and its status recorded across the page.

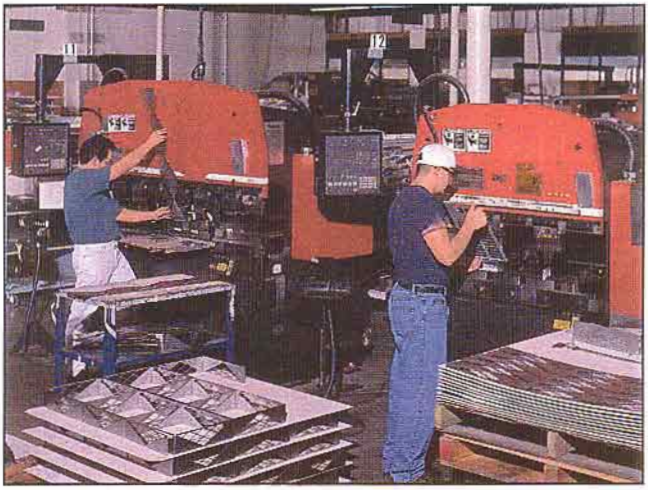
errors and how fast we are able to change."

Training

Documenting training is an important part of the ISO process. Before going for ISO 9000 certification, MASS Precision approached training like many other shops—as time away from the job. The company does its training internally. Director of training, Larry Quinnell said, "Before ISO, the training department owned training. We were the motivators. Our job was, it seemed, to force training on department managers who didn't see the need for it. These managers viewed it as a cost because of the time involved." That was before.

"Now," continues Mr. Quinnell, "ownership of training has shifted to the department. If a punch press operator wants to learn how to operate a press brake, he's encouraged because it strengthens the department. The more things each member of the department can do, the smoother work can flow through the department."

There are three ways MASS Precision trains. Each of these methods are described in a procedure and are compliant with ISO 9000 standards. The first level is called "follow Joe." As the name implies, the trainee follows



Operations in each department, like the brake department shown here, are documented in the form of procedures and work instructions. Everyone in the department contributes suggestions on how to improve operations. In a job shop like this, procedural flexibility is vital because of the variety of work.

the teacher through a process while taking notes. From that they learn how to do a task and the notes become the work instruction. The subject of the training, time spent and date are recorded in the department binder.

More formalized training is conducted by the company's training department in the form of individual training modules. Some of it is programmed training. Mr. Quinnell maintains an extensive library for motivational and practical training video tapes and manuals for company personnel to use at will. Some of the material is purchased, some of it is supplied by vendors.

For additional training beyond the scope of Mr. Quinnell's department, employees are sent off site. MASS Precision claims credit for much of the curriculum used in PMA's apprenticeship program. Many of the company's new hires are selected to go through this basic training for sheet metalworking. "The training process is key towards implementing strategic objectives and improving operations," says Mr. Johnson.

The Audit

From January, 1993, until July, MASS Precision reinvented itself in anticipation of the ISO 9001 audit. In the 90 days leading to the auditor's visit, the company invited customers to come through and see the process control systems working. These visits served as pre-assessment audits (ISO-talk for trial runs). "Not only did the visits help us build better relations with our customers, they were able to spot things we had overlooked. Procedures were written and implemented to accommodate these observations," says Mr. Johnson.

When the auditors came through, the company was ready. They passed on

Getting the fab shop under control has allowed MASS Precision to increase sales by doing value-added work for their customers. Here, electronic cabinets made in the shop are assembled using components provided by the customer.

the first try even though there were some nonconformances (ISO-talk for standards violations). These were remedied within the 30-day grace period granted by ISO, and the company was certified ISO 9001 compliant.

Choosing an ISO auditor is almost as important as choosing a champion. MASS Precision hired NSAI (National Standards Authority of Ireland) to conduct the audit. According to Mr. Johnson, "They had certified other companies involved in our type of business." An auditor's familiarity with the business being certified is helpful because it shortens the learning curve for the auditor.

It took two auditors two days to complete their work at MASS Precision. A total of four nonconformances and 12 improvements were cited, mostly dealing with training. To comply within the 30-day post-audit grace period required updating procedures to address the audit findings. That done, certification was awarded.

Six months is a very short time for certification. Usually 12 to 18 months is required. "MASS Precision was able to get certified so quickly because they had process control systems in place," says Mr. Johnson. "They weren't ISO, but they were a place to start. The problem was, the old systems didn't represent what was actually being done. Plus, no one had "sold" the employees on why such a thing was needed. A neat thing about ISO is it doesn't care what system is in place, only that it is working."

IS ISO 9000 For You?

Mr. Stucky, Jr., believes ISO has helped his company reach a new plateau of efficiency, even though installing the systems and maintaining them have required a major cultural change. Certification has enabled the company

ISO 9000 involves a lot of documentation. Displayed on the shelf behind Mr. Johnson's desk is the amount generated for MASS Precision. Key to success for the program is not letting these binders sit. Using them, updating them and continuous improvement are how the system keeps running.

to grow unimpeded by systemic problems often associated with growth. "Instead of doing our jobs intuitively, now there is a formal system that eliminates many of the gray areas. It interconnects the company from front door to back in a communication web. Everyone is included in development and improvement of the process. Growth potential is unlimited because allowance for it is part of the system."

Getting ISO 9001 certification can be viewed as a capital investment like any other. In many cases, the certification process costs less than a new machine tool. But like a machine tool, installation (getting certified) is only the beginning. Maintenance and upkeep are required for the machine tool and the ISO system. To make a profit on either investment they must be kept busy. Payback for a machine is good parts, on time. Payback for an ISO 9001 certification is continuously improving the business and smoothly handling the changes that are the essence of a job shop environment.

Mr. Stucky, Jr., has three suggestions for businesses considering ISO 9000. "Leadership for the effort must come from the top." The champion needs full and public backing from the organization's top management. "Management must lead by example." It's important that the company's leaders demonstrate personal involvement in the process. And third, "The company should be set up in a way that is conducive to handling documentation and improvements before starting the process."

ISO 9000 standards are very nonspecific. All they ask from an applicant company is that it document what it does then does what it documents. Sounds pretty simple. MASS Precision's story is not about how to do ISO 9000. Each company approaches it differently. MASS Precision offers testimony that a sheet metal fabrication job shop can benefit greatly from ISO 9000. This company just wanted to do a better job and found a tool that helped. It's that simple. **MMS**

Editor's Note: *Thanks to U.S. Amada for providing an introduction to MASS Precision and some of the photos appearing in this article.*