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Greetings PMCD members,

Please contact me if you have suggestions about how the division can better complement your professional objectives. I am fortunate to have an excellent core group actively serving on your division board.

The division has been very active this year and involved in many events. Some of our activities are summarized below.

56th IIS: PMCD sponsored several technical sessions at the International Instrumentation Symposium held this last May in Rochester, New York. A lot of effort went into executing an excellent symposium led by Mario Cash who chaired the event. During the symposium PMCD recognized the outstanding paper presented at the 55th IIS held in League City in 2009. The outstanding paper for the 56th IIS will be selected and recognized at the 2010 Automation Week during the Automation and Technology/Industries and Sciences luncheon in October.

57th IIS: This symposium will be hosted by the Aerospace Division at the Chase Park Plaza Hotel in St. Louis, Missouri during the week of 20 June 2011. Dennis Coad will be symposium general chair. Edward Naranjo will be the PMCD papers chair and he is looking for session developers and paper reviewers. More information will follow on our website when available. Please put this on your calendar as we expect to continue the growth of this valuable technical symposium. If you know of any potential topics of interest to be presented please forward information to me so that I can follow up with the symposium’s organizers. Ardis Bartle is serving as PMCD exhibits chair and is looking for committee members to assist her in recruiting exhibitors.

58th IIS: The 2012 symposium will be hosted by PMCD. Edward Naranjo will be the symposium general chair.

The 2010 Automation Week: This event was held in Houston, Texas in October 2010. PMCD was very much involved in the technical content of the conference. We had members serving on the program committee who worked soliciting technical papers for presentation at the conference. Members also offered support with moderator duties. A moderator has the responsibility of attending a technical session and ensuring that the presenters are on time and non-commercial in their content. Training for moderators is offered on-line by ISA. A benefit to being a moderator is that you get a free pass for the day to attend any technical sessions that interest you. Please consider becoming a moderator at future events. Feel free to contact me for more details on how to volunteer. PMCD was proud to sponsor the International Student Game Competition at the fall conference.

2011 Business Plan: Our plan has been submitted to ISA; it includes support for the areas discussed above.

PMCD Scholarship Program: The program will be funded using the society matching contribution funds. The scholarship will be awarded annually to deserving students. We would like to honor a current/previous division member in naming the scholarship fund. The PMCD board will be searching for appropriate names and submit them to the membership for approval once the scholarship fund is approved in the 2011 budget. Jere Haney is our scholarship administrator and Murtaza Gandhi is serving on his committee. They are developing requirements and criteria for nominating candidates and selecting recipients.

Succession Plan: Fateh (T. J.) Tajani is serving PMCD as director-elect and secretary. He has been selected by the ISA A&T Department to become division director in 2012. As secretary he has done an excellent job of scheduling and documenting the division’s monthly board conference calls and the joint division meetings held at the IIS and spring and fall leadership conferences.

Newsletter: Rick Williams is serving as newsletter editor and Mary Carmichael is serving as assistant newsletter editor. The electronic version will be on the ISA website and a notification will be sent to your email address in your profile. I suggest you review your ISA profile on a regular basis to confirm that your contact information is current.

Website: Edward Naranjo is serving as associate director and webmaster. Joey Cate is serving as assistant webmaster. Edward and Joey are developing communication tools using LinkedIn and Microsoft Office Live.

Membership: Graham Nasby is serving on the membership committee; I am still looking for a chair. We expect to survey the membership to determine how the division can enhance its value.

Section-Division Relations: Nikesh Regmi is serving as section-division liaison and is looking for committee members from each of ISA’s sections.

Standards and Practices: The standards and practices liaison position is open.

There continue to be opportunities to serve on the PMCD board and its committees. If you are interested please contact me and I will discuss the open positions with you.

Regards,

Ken Belteau
Director, PMCD
Message from the Chair of the 57th IIS

On behalf of the 57th International Instrumentation Symposium organizing committee I would like to invite you to attend the IIS in 2011.

The committee is confident that 57th IIS will be an exciting world class instrumentation Symposium. It will be jointly sponsored by the Aerospace Industries, Test Measurement, and Process Measurement and Controls Divisions of ISA.

The Communication Division of ISA along with the PIWG (Propulsion Instrumentation Working Group) will also be providing tracks of papers.

There is still time to submit an abstract for consideration, please visit the web site to the latest information on training and short courses as well as important dates.

Hope to see you there!

Dennis Coad ATF
Boeing Corporate External Technical Affiliation Focal to ISA Director, Aerospace Division 57th IIS - Chair, ISA President - North Alabama Section, HATS representative for ISA

Phone: (256) 461-2976
Mobile: (256) 541-9417

SPECIAL OPPORTUNITY

SESSION DEVELOPERS & PAPER REVIEWERS

Are you interested in serving?

Session developers are responsible for organizing one or more sessions comprising about five papers each.

Paper reviewers are responsible for reviewing and evaluating one or more papers of their choosing for technical content and suitability.

Anyone interested in serving as a developer or reviewer should notify T. J. Tajani or Edward Naranjo.

Session developers should plan to register for and attend the symposium in St. Louis.

Paper reviewers are not required to attend.

Get the Power of...
2,500 technical papers

57th International Instrumentation Symposium

will be held at the Chase Park Plaza
212-232 N. Kingshighway Blvd
St. Louis, Missouri 63108
+1 877-587-2427
www.chaseparkplaza.com
Sponsored by the Aerospace Industries, Test Measurement, and Process Measurement and Control Divisions of ISA, the 57th International Instrumentation Symposium will provide outstanding technical information and training for industry professionals working with measurements/sensors, instrumentation systems, data and advanced system/sensor technology, and many other state-of-the-art areas.

Industry experts will present papers on important topics like electronic instrumentation, wireless technology, cybersecurity, aerospace systems, process measurement and control, virtual instrumentation systems, laser and electro-optics instrumentation, geo-science and remote sensing, and more. The event will also feature volunteer-led tutorials, social events, exhibits, networking, social functions, and a student presentation/paper competition. Special sessions focused on communications and SCADA as well as the Propulsion Instrumentation Working Group will be featured.

IIS has been scheduled so that conference sessions and exhibit hours do not overlap. Exhibitors will have the full attention of conference when they meet with them to discuss solutions and applications during conference breaks, meals, and receptions.

Further your own education and networking opportunities while the conference is in session—your exhibit space include one (1) full conference registration with scheduled luncheons.

Product Exhibitors
8’ backdrop, includes full conference and lunch.......................... $900
Extra Exhibit Personnel (no conference)................................. $150

Limited exhibit space and sponsorship opportunities are available.
Contact:
Carol Schafer
cschafer@isa.org
+1 919 990-9206

Ardis Bartle
ardisbartle@apexmeasurement.com
+1 713-446-1902

Setting the Standard for Automation™
# 57th International Instrumentation Symposium

20–24 June 2011 • Chase Park Plaza Hotel • 212 N. Kingshighway Blvd. • St. Louis, MO 63108

## 1. Customer Information

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<td>ISA PO Box 3561 Durham, NC 27702-3561</td>
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<tr>
<td>Call ISA Customer Service at:</td>
<td>(919) 549-8411</td>
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<tr>
<td>E-mail:</td>
<td><a href="mailto:info@isao.org">info@isao.org</a></td>
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<td>Fax to ISA Customer Service at:</td>
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- Speaker
- Developer
- Chairman
- Vendor
- Staff
- Attendee

## 2. All Participants Are Required to Pay Registration Fees

### Symposium Registration

- ISA Member: $495 (On or before 20 May 2011)
- Non-member: $595 (On or before 20 May 2011)
- ISA Member: $545
- Non-member: $645
- Student: $50 (Excluding Banquet)
- Non-Working Retiree: $250 (Excluding Banquet)
- Single Day: $275
- Thursday PWG Sessions: $275
- Speaker: $275

- Extra Exhibitor: $275
- Tuesday Exhibits Only: $50
- Banquet: $30
- Guest: $75
- Guest Tuesday Tour: $30
- Guest Banquet: $30
- Guest Registration, Tuesday Tour, and Banquet: $100

### Training Course

- Overview of Wireless Technology: $445 ISA Member/$570 Nonmember

## 3. Payment Summary

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**Make Checks Payable to:** ISA

Military vouchers or company purchase orders not accepted.

**Hotel Registration:**

Chase Park Plaza Hotel
212 North Kingshighway Blvd.
St. Louis, MO 63108
Rates start at $145

Hotel Reservation cut off date: **30 May 2011**
1. **Exhibit Table Selection**  Space will be assigned on a first come basis

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- Exhibit Space $900 (includes one 8’ back drop, duplex outlet, and one conference registration)
- 57th International Instrumentation Symposium Sponsorships
  - Platinum $7,000
  - Gold $5,000
  - Silver $3,000
  - Bronze $2,000

Additional exhibit only personnel @ $150

 ISA reserves the right to assign comparable space if the selections are not available.

2. **Payment for Space/Conference**

- Payment in US currency only.
- Full payment required with application. Make check payable to ISA.
- For wire transfers, contact ISA Customer Service.
- To pay by credit card for the selected tabletop space, complete the following: (check one)
  - [ ] Visa
  - [ ] MasterCard
  - [ ] American Express
  - [ ] Discover
  - [ ] Other

Card #: ___________  Exp. Date: ___________  Amount: $____

Card Holder’s Name: ____________________  Card Holder’s Signature: ____________________

3. **Applicant Information** Please type or print clearly:

Applicant Company: ____________________  The company name listed here will be used for all promotional purposes.

Street Address: ____________________

City: ____________________  State/Province: ____________________  Country: ____________________  Zip/Postal Code: ___________

Company Web Site: ____________________

Contact Name: ____________________  Position: ____________________

Phone: ____________________  Fax: ____________________  Contact’s Email: ____________________

(If contact is different from applicant please provide name and address.) Listed contact will receive all materials.

Contract terms and conditions are on the reverse of this page. These rules and regulations are incorporated by reference into this contract, and by executing this agreement Exhibitor agrees to be bound thereby as if same had been set forth fully herein.

Authorized Signature: ____________________  Position: ____________________

Technologies and products to be displayed: ____________________

We request that, if possible, space assignment near the following potential Exhibitors be avoided: ____________________

4. **Conference Registration** (includes one admittance to all conference sessions and scheduled meals)

Contact Name (if different from above): ____________________

Address: ____________________

Phone: ____________________  Fax: ____________________

Email: ____________________

5. **Additional Exhibit Personnel** (will not have access to conference sessions— an additional $150 fee is required for each)

____________________  ____________________
EXHIBITOR SPACE CONTRACT TERMS AND CONDITIONS

1. APPLICATIONS. Applications for exhibitor space must be made on the form printed on the reverse hereof, completed as requested, and accompanied by the required payment.

Products and services to be displayed must be specified on the application.

ISA reserves the absolute right to decline any application for space in its judgment. The products or services to be shown shall be demonstratable and not related to the educational purposes of the 57th International Instrumentation Symposium. This application becomes a contract only when accepted by ISA by notifying applicant of the assignment of a specified tabletop space.

2. EXHIBIT SPACE, TABLETOP SPACE AND FLOOR PLAN. The 57th International Instrumentation Symposium exhibit space rent includes 10′ back drop space, 6′ table, 2 chairs, and duplex outlet. No rental allowance will be made if standard equipment is not desired. The exhibit space floor plan for this Exhibit will normally be maintained as initially offered. ISA reserves the right to modify the plan to the extent necessary for the best interests of the Exhibitors and ISA or to correct inaccuracies or errors. ISA also reserves the right to modify the plan to the extent necessary for the best interests of the Exhibitor.

3. SPACE ASSIGNMENT. Space available will be allocated on a first-come basis.

4. SPACE PAYMENT SCHEDULE. 100% of total space fee must be paid with application.

5. CANCELLATION. An Applicant may cancel the contract by giving written notice of cancellation received by ISA on or before 23 May 2011. Upon receipt of a timely notice of cancellation, ISA will refund the tabletop space fee previously paid by Applicant. Applicant agrees that any cancellation after 23 May 2011, withdrawal from the event, or failure to show at the event is a material breach of this agreement and ISA will retain the entire tabletop space fee paid by Applicant in such event. Applicant agrees that the amount of the tabletop space fee is a reasonable measure of the damages to ISA in the event of such breach. ISA does not agree that the retention of the fee is Applicant's sole liability in the event of such breach. All notices of cancellation must be delivered to ISA before 23 May 2011. No notice is effective unless submitted to ISA in a manner in which proof of receipt by the deadline can be shown, such as certified mail with a return receipt, corner with signed receipt, or an acknowledged email from ISA.

6. SUBLETING EXHIBITOR SPACE. No Applicant shall assign, sublet or apportion the whole or any part of the space allotted. Applicant may not display or exhibit materials or equipment from other than its own firm or joint Applicants' firms in said space, without the consent of ISA.

7. INDEMNITY AND LIMITATION ON LIABILITY. Applicant covenants and agrees to hold and save harmless ISA, the owners, operators, and managers of the Exhibit Facility; and the respective officers, agents, and employees of each (collectively referred to as Exhibit Management) from any and all claims of liability, damage, or expense resulting from any injury to or death of any person, including Applicant's employees, agents, and contractors, occurring within Applicant's Exhibit Space or resulting directly or indirectly from any act or omission of Applicant or any loss, damage to, or theft of any property. An omission of Applicant includes any failure of Applicant to comply with any of the terms and conditions of this Contract, any of the Conference and Exhibit Rules and Regulations, or any and all laws of St. Louis, Missouri. Applicant agrees to indemnify each and every member of Exhibit Management group for any and all costs and liabilities incurred in defense of any such claim, including all expenses, attorney's fees, and any judgments awarded or settlement amounts agreed to.

8. GOVERNING DOCUMENTS AND LAWS. Applicant expressly understands and agrees to be bound by all terms and conditions and rules and regulations contained in this Exhibit Space Contract, the Exhibit Rules and Regulations, including any amendments which may be issued, the master lease between ISA and the Exhibit Facility, and the Exhibit Facility Rules and Regulations, and Designers of such extracted of which are attached and/or available for inspection at ISA during normal business hours. Applicant also agrees to be bound by any deadlines or policies stated in the Exhibit Information which will be provided by ISA. Such documents are an integral part of this Contract by reference as if set forth in full in this Contract. Applicant is further charged with the knowledge of, and agrees to comply with, all local, state and federal laws, regulations, and codes pertaining to health and safety and promotions, marketing, and advertising, including activities requiring copyright licenses or permission and constituting a lottery, applicable to Applicant's Exhibit.

Compliance is Applicant's sole responsibility. This Contract will be interpreted and governed by the laws of North Carolina applicable to contracts signed and wholly performed within North Carolina.

9. EXHIBITOR EVENT CONFLICTS. Exhibitor will not schedule any receptions, hospitality suites, social functions, exhibits, product demonstrations, technical seminars, training sessions, or other event or function for attendees of the exhibit space during the 57th International Instrumentation Symposium hours unless authorized by ISA.

10. SURRENDER OF SPACE. If not cancelled as provided in this contract, Applicant's license for the exhibit space expires at the earlier deadline for move-out or actual vacating of the exhibit space. Applicant will surrender the space occupied by Applicant at the expiration of the license in the same condition as it was at the commencement of occupation. Applicant assumes sole and total responsibility for any damage to the Exhibit Facility due to construction, use, or dismantlement of Applicant's Exhibit and will reimburse ISA for any charges assessed by Exhibit Facility caused by Applicant paid by ISA, including charges for failing to vacate the premises in a timely manner.

11. VIOLATIONS. The interpretation and application of these Terms and Conditions and documents incorporated by reference are the sole responsibility of ISA. Violation by Applicant of these Terms and Conditions shall subject the Applicant to cancellation of its contract to occupy exhibit space and to termination by ISA of all monies paid. Upon due notice to Applicant of such cancellation, ISA will have the right to take possession of the Applicant's space, remove all persons and property from the space, and hold the Applicant accountable for all risks and expenses incurred as a result of such re-entry and removal.

ISA reserves the right to restrict activities which become objectionable because of noise, operational methods, rules violations, or any other reason and may prohibit or evict any Exhibit, which in ISA's sole opinion, may detract from the general character of the Exhibition as a whole. In the event of such restriction or eviction, ISA will not be liable for any refunds of fees or expenses of Applicant.

If ISA must engage an attorney to collect any amounts due under this Agreement, Applicant agrees to pay all reasonable attorneys' fees and expenses incurred by ISA.

12. AMENDMENTS. If any unforeseen event renders it necessary, ISA may amend these Terms and Conditions and those documents included by reference. All amendments will be published and mailed to each Applicant who shall be bound thereby. Any other changes in the terms and conditions and rules and regulations must be in writing and signed by both parties.
Dear Society Delegates …

Thank you for your support and contributions to the Society in 2010. I would like to share the following information with you to enable you to better fulfill your responsibilities at the local Section level.

The 2010 Annual Members Meeting presentations and the 2010 Council of Society Delegates meeting minutes are available at http://www.isa.org/community/soccsd. Select the "2010 Council Documents" link from the left navigation bar and follow the links on the page. In addition, as announced prior to the meeting, a live webcast was available for those who could not be in Houston but wished to observe the meeting. The recorded webcast is also linked on the Delegates webpage. A photo gallery from the meeting is also linked from this page. If desired, high resolutions photo files can be provided. Email your request to Debbie Eby at deby@isa.org.

In order to better understand and serve our members, we continue to seek out information and feedback. ISA Image and Membership Department, in coordination with ISA District Vice-Presidents and Section leaders, is performing a survey of new and recently lapsed members. ISA Staff have provided Excel spreadsheets to DVPs for this purpose. By engaging section leadership in the promotion of this important survey, we are encouraged that we will get broad response and useful results. Society Delegates may be asked to help in the promotion of this survey. In an effort to engage all of our members, please contact your local Section President and ask how you could assist in completing this task. Your participation and support are appreciated.
VISION BASED PARTICLE ANALYSIS FOR PROCESS CONTROL

Thomas M. Canty, P.E., President, J.M. Canty
Keith DeMonstoy, Lab Researcher

KEYWORDS
Particle, Size, Shape, Visual, Fused, Glass

ABSTRACT
Imaging techniques for characterizing particles in dry solids and slurries can be a valuable tool for control and study of a monitored process. Traditional particle analysis methods are often limited to off line lab environments where a process sample is taken to a lab and timely control is difficult. These methods cannot yield information about particle shape and surface morphologies which can be critical in determining the efficacy of a manufactured product. Vision based systems lend themselves well to examination by the operator which reduces the likelihood of characterization errors and enhances reproducibility, repeatability and accuracy. The visual capability allows the user to input his or her knowledge of the process to work in making meaningful analyses. Imaging filters can be applied to the analysis to sort through noise and focus on the important process information that must be monitored. In addition, filters can be used to monitor for upset conditions that are shape or color based. This paper describes a vision based system used for particle sizing that provides a true 2-dimensional size and shape analysis. The paper also discusses the fundamentals of a vision system that allow for accurate and repeatable analysis of a wide range of processes.

TERMINOLOGY
CCD – charge coupled device; camera chip which converts light to a digital image signal
Wet Process – any liquid based mixture, solution or suspension
Dry Process – any solid particle based product
Vision System – a visual based configuration of illumination, image capture and associated product handling hardware.
INTRODUCTION

Vision based analysis enables the user to see the process and perhaps understand it better in order to optimize its outcome. The ability to watch the process offers the user the opportunity to witness events as they occur and to possibly determine how the events were caused which is most important in solving process related problems. Vision technology is also capable of measuring particle features such as shape and color. In most cases it is better to know, and to be able to control, particle shape as this characteristic is often important to the performance of the product in its intended use. An example of this would be the monitoring of a grinding process to manufacture grit for sand paper. Round particles are of no use while triangular particles are ideal.

VISION SYSTEM FUNDAMENTALS

The building blocks of a vision system include a constant and bright illumination source, a quality lens and camera to gather true images and a method of controlling the flow of the process through the measurement zone in a way that provides repeatable and accurate analysis results. These requirements hold true for both wet and dry process systems.

Illumination, transmitted through the particle stream to the camera or reflected off the particles and back into the camera, allows the camera to see the particles. As with the human eye, objects or particles can appear to be of varying size due to changing light conditions. In very poor light conditions an object’s edge may be difficult to see and thus its size may be difficult to determine. The same is true for a vision based instrument in that it detects the size of a particle by determining what its boundaries are by separating the object from its background. In the simple case of a back lit system, bright lighting conditions will reveal definite boundaries of particles while dim lighting will reveal less definite boundaries. Under these two lighting conditions it is likely the same particle will be sized differently and that likelihood is the reason constant, bright illumination is a critical component of a good vision system.

The camera / lens combination dictates the resolution with which the particles will be viewed. Proper magnification and chip array combinations are required to accurately resolve the true size of the particle captured. The lens system must also be capable of conducting a true image to the camera chip. Distortions due to lens effects can insert error into the analysis. Current technology standards include Ethernet camera systems which can be viewed and controlled over network communication lines. This enables best quality video transmission as well as remote access throughout a network.

Lastly, the presentation of the particles to be measured to the camera is as important as the first two requirements. There are several situations to discuss depending upon the type of system, wet or dry process, and the type of particle that is to be measured. If a wet process is assumed then the normal configuration for an instrument is to flow either a portion or complete pipe flow through the measurement zone. A typical layout is
included in Figure 1. Illumination is provided from one side of the flow chamber while the camera is on the opposite side. Particles are back lit and captured on video where they are further analyzed by the software. Typical applications might include monitoring of oil droplets in water, particulate caught in rinse water downstream of a filter or even growth of crystal particles in a batch seeding operation (styrene beads or sugar). The critical part of the presentation of the process is that the vision system can handle the process conditions (pressure, temperature etc...), but also have the capability to control the flow gap and maintain a clean view into the process. Both of these latter capabilities may seem obvious, however many in situ instruments are not capable of achieving these conditions which leads to degradation of the measurement quality.

At this point an explanation of fused glass to metal technology is important in understanding how the process view can remain clean and unobstructed. A fused glass to metal window is constructed by melting glass into a metal ring. The glass fuses to the metal and as the window is cooled the glass accepts greater compression until ambient temperatures are again reached. This manufacturing process places the glass under several thousand pounds of compression which changes the apparent characteristics of the glass from fragile to rugged and from poor under pressure load to very good under pressure load. As a window is placed under pressure, the outer surfaces do not go into compression, rather they merely relieve compression and this process avoids the normal reaction glass would have which would be to break in a brittle way under low pressure.

The manufacturing process also provides another benefit to process viewing. In a normal, un-fused window the glass is sealed to the process by a gasket. This type assembly creates contamination sites. The fused glass construction presents a perfectly joined

**Figure 1. Typical In-Line Particle Size Instrument**
metal-glass interface which acts as one material, and so the process only encounters a smooth, polished surface (see Figure 2).

Hardware is not the only important piece to the puzzle. Software provides the real insight into the process when it is integrated with a properly designed hardware system. Typical back scatter devices (lasers) classify particles by the reflected light pattern, they do not directly measure particle features and only provide a size characterization of the particle. These systems do not provide any insight to the particle shape which can be of great interest for many manufacturers. Without knowing the particle shape it becomes impossible to classify particles based on shape which is a requirement for many analyses for different reasons. Shape may be an important characteristic of the product being manufactured, or shape may allow the user to sort through and detect particles of interest among various particle types which is the case when detecting oil versus sand particles in water flows exiting a separator in a refining facility.

![Diagram of Fused Glass vs. Gasketed Glass](image)

**Figure 2. Fused Glass vs. Gasketed Glass**

The concerns are the same for a dry process system. Presenting the product to the CCD is of utmost importance in obtaining reliable data. It is usually the case that a dry product process is at ambient pressures and so maintaining process integrity is not an issue. It is also often the case that dry process measurement systems are sampled from a conveyor line or hopper somewhere in the process stream. Large volumes of dry product pile up with the small particles falling to the bottom of the pile making a representative image from the pile all but impossible. Sampling the product into an at-line instrument allows the product to be passed through the measurement zone in a controlled and repeatable way.
PARTICLE ANALYSIS

The definition of a particle is determined by the user interacting with the software. This is done by viewing the particles as they move through the measurement zone and, with the aid of the software, determining how the digital particle is formed. As it is with the human eye, objects are distinguished from their backgrounds due to the way light reflects off different surfaces as well as variations in object color. The vision system can be set so that it accurately digitizes a particle in the field of view (see Figure 3 and 4).

![Figure 3. Live Image of Particles](image1)

![Figure 4. Digital Image of Particles](image2)

The particles that are digitized show a very close profile to their un-digitized images. This is done by manipulating the target value of light intensity change from the background to the particle that determines where the software finds the edge. This value is often referred to as the threshold. Some particles do not show up in Figure 4. They do not meet the focus requirements set to be counted as a particle. It is normal to analyze well focused particles only. Due to randomness, in a properly designed analyzer all particles will flow through the measurement zone with equal regularity and so they all have the same chance of being captured in focus. The exercise of setting the threshold is a visual confirmation that the instrument is properly determining how to measure the particles and this is a powerful tool when trying to gather accurate information.

Each particle is then processed to determine its physical characteristics; minor diameter, major diameter, perimeter, area, equivalent volume, circularity, intensity, color and other parameters. All of these parameters can be used to filter data as is appropriate in achieving the desired result. For instance, minor diameter is often used to compare results to sieve analysis. Circularity may be used to judge whether the particles are on average more circular, square, rod shaped or triangular shaped. The several filters that can be used allow the user to get at the information needed to control and improve the process.

To demonstrate some of these features actual images and particle analyses will be presented and explained. The image in Figure 5 shows a live image of a software
interface as would be seen by the user. Figure 6 shows the image as digitized and analyzed by the software.

Figure 5. Live Image Capture of Particles in Process
Figure 6. Scanned Image of Particles in Process.

Figure 6 shows the scanned image and how it captures particles and what the particle size measurements are. Figure 7 shows the same image with additional information not shown in Figure 6. These additional headings reveal color, intensity and circularity information to name a few. As an example of how particles can be classified, look at the entries listed for particle circularity. Notice the value for the elongated particle on the left is much lower than either of the circular particles on the right side of the screen. Values near one (1) indicate a particle is close to circular in the 2D representation. An average circularity value of one (1) would indicate that the average particle is likely close to spherical whereas a value well away from one tends more towards a rod shape.

![Image of scanned particles with additional data]

Figure 7. Additional Data From Figure 6.

The particle far left and center height of screen has a circularity of 0.5179 while the particle at the top right of the screen has a circularity of .9734. The left side particle is much different in shape and that information is detected by the vision system. Obviously this information is useful in categorizing particle shape, however it can also be useful in detecting contaminant or defect particles which might alter the calculated particle distribution or ruin detract from the output if not detected and corrected. Almost all of the data displayed can be used as a filter which is a powerful tool for the user.

The manner in which data is output on screen is also user selectable. Graph options allow
selection of gradations from US Sieve standards to custom ranges. The actual data graphed is also user selectable. In addition to graphical output, several pieces of information, such as minor/major/mean axis, total volume, particles per frame etc… are tabulated with every graph update.

To demonstrate the effectiveness of these tools a particle analysis is performed on a sample made up of two constituents that differ in shape. The first distribution analyzes all particles. The second filters out one sample by removing those with an aspect ratio of 1.3 or greater. Although the distribution curves are similar, the filtered distribution has a lower mean (Dv 50), .366 as opposed to .417.

Figure 8. Unfiltered Distribution Data
CONCLUSIONS

Vision systems provide process engineers with a tool that gives them sight into the process and enables them to better understand the process mechanics and to better apply their knowledge of the process toward making improvements that increase quality and lower cost by eliminating the waste of raw materials and energy producing bad product. The visual aspect of the instrument provides confirmation to the user of its performance which, in addition to the aforementioned benefits of analysis, is an important advantage over other technologies in providing information throughout engineering disciplines. Often the improvement or repair of a process function is based on experimental methods which are themselves based on scientific theory. Conclusions are made by analyzing the results of the process changes. In many cases visual tools can provide details of functionality, either by image or video, that are far more descriptive and convincing than verbal or written methods of communication.

Presented at the 56th International Instrumentation Symposium, 10 – 14 May 2010, Rochester, NY; http://www.isa.org

How is your vision?
ISA Announces Location & Dates for ISA Automation Week 2011

The International Society of Automation (ISA), announced that ISA Automation Week 2011: Technology and Solutions Event will be held at the Arthur R. Outlaw Mobile Convention Center in Mobile, Alabama, USA, on 17-20 October 2011.

“The City of Mobile has welcomed us with open arms. From top to bottom, Mobile is a perfect match for ISA Automation Week 2011. The convention center is a state-of-the-art facility that will accommodate our expected growth and expansion and enable us to continue providing a quality experience for attendees,” said 2010 ISA President Nelson Ninin.

Winner of numerous architectural awards, the Arthur R. Outlaw Mobile Convention Center offers ISA Automation Week a flexible floor plan that will accommodate a planned expansion from 2010 in response to increased demand from industry.

“ISA Automation Week will continue to raise the bar for the technical conference. With an exhibitor waiting list of almost 50% of our total 2010 capacity, we’re expanding in response to the positive feedback and interest industry has shown this premier event. ISA’s unbiased technical content is, and has been for decades, unmatched by most other automation conferences in the US and perhaps the world,” said ISA Executive Director and CEO Pat Gouhin. “With early interest and demand, we are very excited about our 2011 annual event,” Gouhin continued.

Conveniently connected to the convention center via a skywalk, the Renaissance Mobile Riverview Plaza Hotel will serve as ISA’s official host hotel. Historic Battle House Renaissance Mobile Hotel & Spa will provide additional meeting space for auxiliary events held during ISA Automation Week 2011.

Mobile, along with most cities on the Gulf of Mexico, provides a great market base for ISA Automation Week exhibitors, with several key industries represented, including petrochemical, aerospace, automotive, steel, energy and general manufacturing. Its attractive coastal location offers attendees traveling from around the globe a welcome, relaxing venue as they pursue their professional development goals.

“The Mobile Section of ISA is looking forward to welcoming ISA Automation Week 2011 to the city of Mobile. We’re thrilled to contribute to ISA Automation Week and are looking forward to making it a huge success,” concluded ISA Mobile Section President Ryan McKee.

For exhibit and event partnership opportunities, please contact Carol Schafer at +1 919-990-9206 or cschafer@isa.org. For general information and for event updates, please visit www.isaautomationweek.org/2011.
Share your valuable knowledge and experience at ISA Automation Week

Becoming an automation professional doesn't always offer a clear-cut career path or defined study program which often leaves those entering the workforce without a way to gain valuable experience or an understanding of today's complex automation processes. Sharing your work experience and knowledge with others is important to help grow and sustain the automation profession, and your contribution to workforce education is crucial to the future of manufacturing. Help continue to build the automation profession and enhance your own career by sharing your expertise at ISA Automation Week: Technology and Solutions Event on 17-20 October 2011 in Mobile, Alabama.

Share your knowledge, experience, successes—even mistakes—with your fellow automation professional by submitting an abstract for presentation consideration at this year's ISA Automation Week technical conference so that together we can build a stronger, better workforce.

ISA Automation Week 2011 Call for Papers has been issued

The Call for Papers solicits abstracts that cover topics for the following tracks, as they relate to automation:

- Advanced Process Control Techniques
- Analyzers
- Automation and Control System Design
- Energy
- Human Asset Optimization
- Installation, Operations, and Maintenance
- Networks and Use of Data
- Safety
- Security
- Wireless Technology and Application

In order to be considered for presenting at ISA Automation Week, your abstract must be submitted on or before 28 March 2011.

For complete details, visit www.isaautomationweek.org.

About ISA Automation Week

Building on its initial success, ISA Automation Week will expand its technical conference content and exhibition floor in 2011 to accommodate market demand. ISA is pleased to bring ISA Automation Week 2011 to the beautiful Arthur R. Outlaw Convention Center in Mobile, Alabama on 17-20 October 2011. This bayside location is well situated among the many industries in the Gulf Region and will provide a variety of restaurants and entertainment options for conference attendees and exhibitors during leisure time.

Technical Conference

The quality of the technical program is ISA's top priority and serves as the cornerstone of the event. This world-class conference will cover multiple technical tracks in depth and will be designed with information critical to several identified automation and control career paths. ISA Automation Week provides you with the opportunity to get the best unbiased knowledge available to help you in your jobs and in your future.

Supplier Showcase

As an integral part of the conference, the supplier showcase gives you a low-pressure, more intimate atmosphere in which to work face-to-face with the vendors upon whom you rely for equipment, systems, software, maintenance, and