

THE MTS JOURNAL

American Society of Appraisers

The Journal of the International Machinery
& Technical Specialties Committee of the American Society of Appraisers

Volume 33, Issue 4, 4th Quarter 2017



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MTS Journal Editorial

Brad Hartsburg, ASA, CPPA, CSA



Season's Greetings from the North! I welcome you to the fourth edition of the MTS Journal for the 2017 calendar year edition Volume 33, Issue 4, 4th Quarter 2017. Hope you enjoy these pictures of the northern lights from two recent appraisal projects in Inuvik and Tuktoyaktuk, Northwest Territories. Was it cold? – Was it snowy? An adventure for sure --just right!

I continue to look for interesting articles our members and readers want to learn from. If there is a topic you are passionate about, and you are wondering if it's relevant, please do not hesitate to contact me. There are plenty of you out there with unlimited knowledge and many looking to learn from it. I am more than willing to work with you on your article. I again wish to thank all of you that assisted with interesting articles for this issue, there is a lot of great information and we hope it assists you with your daily work and activities.

- Our Chairman, Sam Shapiro, ASA has written his Xmas report and passes on Best Wishes of the Christmas season to all.
- Our Governors, David Crick, ASA and Rick Berkemeier, ASA have updated us on the happenings of education in our MTS discipline and the society as a whole.
- Jean White has written about quality standards is Writing: A Critical Attitude?
- John Mathe, ASA has sent us the update on the successful International Australian conference
- Chris Condon, ASA has penned an article about finance and railcar equipment



- Joel Gonia, ASA, ARM & MTS / M & E has sent us an interesting article in regards to Scope of Work
- Alan C. Iannacito, FASA has written an article called FOLLOWING THE CHANGES IN THE MINING SECTOR and an update on the ME214 Mining course.
- Jack Young, ASA—MTS/ARM has written an article about Gauging Competency in Appraisal Review, which is becoming a hot topic in the appraisal world.
- Alan C. Iannacito, FASA has written the Part Two follow-up article called “The Craft Brewing Craze and the Valuation of Brewing Equipment
- John Hagist has shared an article entitled: The State of the Evolving Manufacturing Sector
- Irontrax LLC and Joe Santora, ASA have sent us their insight for the Mining and Trucking Industry as well as an insight into battery powered, emission free, autonomous driving semi trucks
- The MTS Journal Advertising Media Kit has been included for your information by Yours Truly
- Please find included all the information for the Cleveland Equipment Conference as well as the International Conference in Anaheim, CA this year. These have a terrific line-up of speakers and are great networking events, not to mention the spectacular location, great food & wine and friendly locals.
- And finally, the list of Archived Articles Available for Your Library by your MTS Journal Editor -- Brad Hartsburg, ASA, CPPA, CSA

I hope that you enjoy this edition of the MTS Journal! Check your calendars and plan to attend the many interesting conferences and courses that are planned for this year. I will look forward to seeing you there! For more information, please see the ASA website: www.appraisers.org



Santa is here and this is the season of good cheer! How's everyone there? I wish I could come over to your place on Christmas Eve to exchange presents. However, this letter will have to suffice!

Here's wishing you and your family a very Merry Christmas!

I hope all your dreams this year come true, and that the past year has been a good one. Here's to a great year ahead!

Respectfully submitted,

Brad Hartsburg, ASA, CPPA, CSA and MTS Journal Editor

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Chairman's Corner

Samuel Shapiro, ASA

Dear MTS Members:

First and foremost I wish you all a Happy and Healthy Holiday and New Year.

As we draw to the end of 2017 it has been an interesting year. We have now reached 1,328 members of the MTS and we are looking at a goal of 1,500 by the end of 2018. We have been working on new courses and classes and we are excited that we will have live webinars and face to face classes more frequently in the New Year. Both Rick Berkemeier and Paul Cogley as well as others have been working to bring live education to closer to your computer screen.

This year has sadly seen the departure of Jim Hirt the CEO of the ASA. Jim's tireless efforts to streamline the ASA and bring it to a higher national and international level were seen by many as extremely successful. Jim's untimely departure leaves us with much to catch up on and accomplish in a short time. Jim did express his sincere best wishes for ASA going forward.

As we come into 2018 we will see some expected tax reforms and accounting changes that will raise our profession to another level as we sort through the implications of these tax reforms & accounting changes and how they may affect our appraisals and reviews.

We have all seen the horrific hurricanes and storms as well as other catastrophic occurrences this year. This has and will lead to more appraisals being required. We are all reminded that many people have lost their lives and others have been homeless and without water and food for months. I can only suggest that during this holiday season we all look at giving to those most in need and help those less fortunate who cannot help themselves during not only the holidays but though out the year each and every year.

We have another great conference in Cleveland [June 4, 2018](#) and we would like to see a continued increase in attendance and support. This is one of the most sought after events of the MTS discipline. Please show your support and attend.

We also have the Annual international conference in Anaheim, California scheduled for [October 7-10, 2018](#). This is another great event where you can meet and your fellow members and have some wonderful experiences and memories while being educated. We need all your support to make this and all events successful. Please plan early to attend.

Let me also remind anyone interested that we are always looking for you to attend our Committee meetings and participate. Your voice counts. We are also looking for people interested in serving on our MTS Committee. If you have interest please send an e-mail to our secretary, Paul R. Cogley Jr., ASA, and advise of your interest.

If you have any concerns or questions please e-mail them to me at info@unitedappraisal.com and I will try to address the same in a timely manner.

I would like to take this opportunity to wish all a healthy , happy and prosperous new year. May all be safe.

A special thanks to our Armed Forces here and around the world , Police, Fire and emergency people both local and national and all others who keep our countries safe for us all to enjoy.

Samuel Shapiro, ASA
MTS Chair

Governor's Bulletin

Richard Berkemeier, ASA and David Crick, ASA, MTS Governors



December 2017

Dear MTS Members:

I've been in transit from the USA for a few days and now I'm in very remote Northwestern Australia where the only connection to the real world I have are the blazing sun at 46C (115 F) and the poisonous animals wishing I was nowhere near them. Please scroll down to see the aerial photo.

Since our last report, there has been good news to report from ASA International Governance every month.

The MTS discipline has been steadily growing in membership numbers in the last few months with double digit growth in Australia and some other regions. Also the year is finishing in a strong push ready to launch into a successful 2018 with some terrific classes and conferences lined up.

The ASA is your society. If you have questions we'll do our best to answer them or connect you with the person that can. If you have comments you would like to share let us know and we can bring them to headquarters, the board or the executive committee.

We strongly encourage all to attend the Cleveland Equipment Conference in June this year (see two page ad in the issue for details) as well as the 2018 International Appraisers Conference in Anaheim, CA which goes from October 7, 2018 to October 10, 2018. These are significant educational networking events and would be beneficial to any appraiser.

To all members and MTS Journal readers: Merry Christmas, have a tremendous start to the New Year!

Yours enthusiastically, email or call if you need anything

Richard Berkemeier
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David Crick
david@davairgroup.com



Aerial picture from Northwestern remote Australia

The MTS Journal 2017-18 Media Kit

American Society of Appraisers

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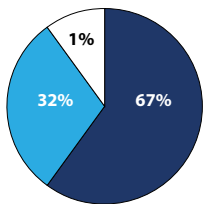


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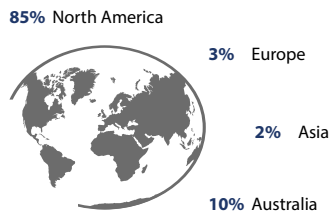
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Breakdown by Credentials



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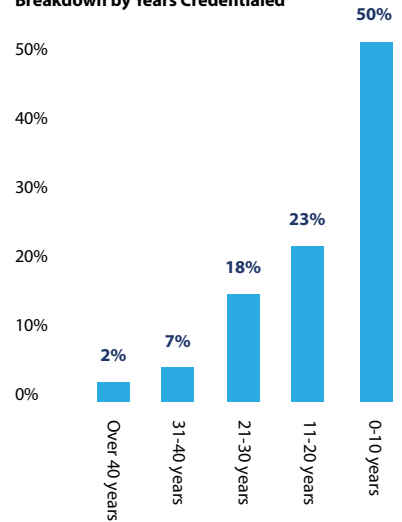
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66% More than five years
15% Three to five years
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Breakdown by Years Credentialed



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Editorial Calendar (subject to change)

- **1st Quarter 2017**
Issue Closes: *January 15* | Materials Due: *January 30*
- **2nd Quarter 2017**
Issue Closes: *April 15* | Materials Due: *April 30*
Bonus Distribution: *ASA Equip. Valuation Conf.*
- **3rd Quarter 2017**
Issue Closes: *July 15* | Materials Due: *July 30*
Bonus Distribution: *ASA Intl. Appraisers Conf.*
- **4th Quarter 2017**
Issue Closes: *October 15* | Materials Due: *October 30*
- **1st Quarter 2018**
Issue Closes: *January 15* | Materials Due: *January 30*
- **2nd Quarter 2018**
Issue Closes: *April 15* | Materials Due: *April 30*
Bonus Distribution: *ASA Equip. Valuation Conf.*
- **3rd Quarter 2018**
Issue Closes: *July 15* | Materials Due: *July 30*
Bonus Distribution: *ASA Intl. Appraisers Conf.*
- **4th Quarter 2018**
Issue Closes: *October 15* | Materials Due: *October 30*

Ad Size	Width	Height
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Questions

Additional promotional opportunities available, contact us for your customized proposal.

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Coal Is King No More: When Do
Alan C. Iannacito, FASA



Peabody Energy (NYSE:BTU), the largest non-state owned coal miner in the world, may have to seek bankruptcy protection after it missed a \$70 million interest payment yesterday. (<http://www.mining.com/worlds-largest-private-coal-company/>) This March 17, 2016 announcement follows earlier announcements by the three largest U.S. coal producers seeking Chapter 11 Bankruptcy protection. The current U.S. and international coal industry is on a teeter-totter. The industry is substantially affected by economic obsolescence, i.e. the undercutting by natural gas, a cheap and cleaner commodity, and continuing pressure from the U.S. Energy Department. This is largely due to the current U.S. administration and has a predictability of the coal industry as we knew it. Further, Democratic presidential hopeful, Hillary Clinton, on one hand, has announced plans to save coal miners and coal U.S. coal companies with 30-billion dollars in education, regulation, rhetoric and government action is a direct route to economic depreciation. "Approximately 44% of U.S. electrical power is still generated by coal. Europe has a different energy mix, Germany, for example, has a huge coal industry although the country is pushing for taxation to support alternative sources like wind, solar, and water power. So, what is happening in other parts of the world despite a general slowdown. The big player in all of this is China. China, largely self-sustaining, still influences the world's commodity prices. China was the fastest growing economy driving the world's commodity prices. China is thereby cutting into the former high international demand for fossil fuels, hard



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Writing: a Critical Attitude?

Jean White



"Depend upon it, sir, when a man knows he is to be hanged in a fortnight, it concentrates his mind wonderfully."

- Samuel Johnson (1709-1784)

I hope you are not under this kind of pressure. Even if you aren't, there must be times when you would rather face the hangman than write.

Unfortunately for reluctant scribes, writing (document preparation) is often a critical part of professional responsibilities. For example, as a quality management consultant one of my first tasks in a contract is to review the documentation, get rid of anything that is redundant and make sure the rest is fit for purpose. It is one thing, however, to identify which documents are needed (and well done if you have managed that) but another to make sure they contain verified information.

Clarity and intention sometimes part company when documents are written by people who are experienced in the processes which they are describing. Many years ago I was given a contract by a national railway company to work with retired engineers who were revising maintenance procedures for locomotives. Their idea of a procedure was to extract lumps of information from General Motors and other Original Equipment Manufacturers (OEMs) instruction manuals and compile them into their own versions. The result: documents with ambiguous chapter headings and dubious continuity. I persuaded them eventually to create a logical sequence of events with the readers' needs in mind; e.g., if oil on a hot engine was a safety hazard, then Page 88 was not the place to state it. Warnings, (especially safety) had to be on Page 1, Para 1.

We are in a "process" world where everything is changing rapidly, so we must be able to recognise a logical sequence of events and present that sequence of events to our readers. The readers' needs are paramount; if they lose interest you have wasted their time (and worse, yours). You can't make a big splash when the tide is out.

Before you write the first word ask these critical questions:

- Who are the readers?
- What do they need to know, and in what sequence?
- When and where do they need to know?
- Who approves the first and subsequent drafts and authorises publication?

The questions above could lead you into more questions and possible delay, but better that than copious revisions after the documents have been issued.

Brevity

Your reader rightly expects that what is presented to him/her will be the result of careful planning, with all the information given as briefly and clearly as possible.

The word "jargon" once meant "the babbling of birds". Nowadays it refers to language that sounds ugly and is difficult to understand. Jargon is often used by people who wish to be seen as part of a mysterious "inner circle", knowing more than the rest of us uninitiated mortals. If you insist on using even professional jargon to an uninitiated audience, however, you will simply irritate them.



Jean White (beige jacket) joins her happy clients as they celebrate ISO9001:2008 certification

Consider this extract from a scientific report:

"The substance was placed in a glass tube sealed at one end and energy was supplied to it from a Bunsen-type heat production device. Monitoring of the experiment was undertaken until such time as an ebullition process was observed to commence." By the time we get to the end of this paragraph, we don't care what happened; we have lost interest.

Much of your writing might be complicated, but it can and should be as brief as possible. Sort your ideas, references and facts with your reader always in mind and your writing will be lean and attract and retain your reader's attention.

To conclude: to get on in life, professionally and personally, we need to express ourselves clearly and be understood. The following humorous example shows how one lapse into ambiguity can have disastrous consequences.

Operation Halley's Comet

A Colonel issued the following directive to his Executive Officers:

"Tomorrow evening at approximately 2000 hours, Halley's Comet will be visible in this area, an event which occurs only once every 75 years. Tell the men to fall out in the battalion area in work clothes, and I will explain this rare phenomenon to them. In case of rain, we will not be able to see anything, so assemble the men in the theatre and I will show them films of it."

Executive Officer to Company Commander:

"By order of the Colonel tomorrow at 2000 hours, Halley's Comet will appear above the battalion area. If it rains, fall the men out in fatigues, then march to the theatre where this rare phenomenon will take place, something which occurs every 75 years."

Company Commander to Lieutenant:

"By order of the Colonel in fatigues at 2000 hours tomorrow evening, the phenomenal Halley's Comet will appear in the theatre. In case of rain, the battalion area, the Colonel will give another order, something which occurs every 75 years."

Lieutenant to Sergeant:

"Tomorrow at 2000 hours, the Colonel will appear in the theatre with Halley's Comet, something which happens every 75 years if it rains, the Colonel will order the comet into the battalion area."

Sergeant to Squad:

"When it rains tomorrow at 2000 hours, the phenomenal 75 year old General Halley, accompanied by the Colonel, will drive his comet through the battalion area theatre in fatigues."

(From a speech by Dan Bellus of Dan Bellus and Associates, Santa Monica, California.)

About the Author

Jean White is a quality management consultant with 27 years' experience in the application of international quality management standards across industry and service organizations in Canada and the UK. She has a B.A. in English Language and Literature (University of Alberta, Canada) and has written and taught extensively on quality management issues and various guest speaker engagements.

Jean has worked with many businesses in Canada and the United Kingdom to implement and improve their ISO9000 international quality management systems. Her published work includes 14 articles and three books, one of which is entitled: "A Writers' Guide", (recommended reading for University of British Columbia, English 101) and another "ISO 9000: The Easier Way", a guide to ISO 9000 implementation, (recommended by HSBC Bank)

Jean specializes in quality management documentation through her company, Qualidoc -- website www.qualidoc.co.uk, and in helping people to improve their writing skills through her books. She has also recently published her first children's book, "Billy Beaver's Adventures".

After living and working for many years in Canada Jean now lives in Gloucestershire, U.K.



10th ICVPME 2017 - Sydney, Australia – September 4-6

John Mathe, ASA

Conference Wrap Up!

The International Conference on the Valuation of Plant, Machinery & Equipment recently held its 10th anniversary conference in Sydney Australia. The dedicated international committee produced an outstanding conference gathering the world's leaders in industrial valuations.

The conference was reported as one of the most successful thanks to the great support from the ASA, the many sponsors, the generous presenters and delegates. The conference attracted delegates from over 20 countries and demonstrated the power of networking with like-minded colleagues sharing information freely and contributing to the appraisal profession.

The ASA was heavily represented at the conference with speakers, committee members, original founders and delegates supporting what is a unique and important international event in the appraisal calendar.

The theme of the conference was "How Technology Is Impacting Valuation" which proved to be an extremely relevant theme that attracted many impressive presentations and thanks to the interactive software, the audience engagement was at a record level. The fact that presenters could instigate live polling of the audience only enhanced the interaction and audience participation.

Part of the success of the conference was the round tables that hosted a panel leading professionals discussing the latest trends in appraisals. The first of the panels was the banking panel hosted by Mr Richard Berkemeier ASA wherein he teased out the important issues facing the appraisal community.

Another highlight of the conference was the 'Professionalism' round table hosted by Bob Morrison ASA. The round table explored how professionalism affects appraisers and was one of the most engaging sessions of the conference.



An indigenous Australian welcome ceremony



A welcome from the host chair – Mr. David Crick ASA



The Banking round table hosted by Mr. Richard Berkemeier ASA



The Professionalism round table hosted by Mr. Robert Morrison ASA.



Ms. Sharon Desfor ASA International President with Mr Jim Hirt ASA CEO.



Ms. Sharon Desfor and Mr Richard Berkemeier learning Indigenous dancing at the Gala Dinner.



Sam Shapiro ASA MTS Chair with Roberto Raya MTS Committee member.



ASA Australian Chapter President Mr Craig Bowring with ASA International President Ms. Sharon Desfor giving a speech at the chapter's Welcome Reception.

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Equipment Appraised Values In Light of Equipment Finance Documentation and End of Lease Returns

Chris Condon, ASA, CSA



Equipment is often appraised in the context of equipment financing, be it at inception to determine the collateral value, midterm to determine the distress value, or at the end of a lease term to determine a purchase price. In all of these scenarios the Appraiser must consider certain aspects of the 'financing documentation' as it pertains to equipment condition, definition of value and perhaps the situation. For discussion purposes I shall focus on railroad cars as an example. Appraisers of rail equipment are often employed by Owners, Operators, Lessors, Lessees, or Debtors to inspect, assess and appraise equipment which is subject to equipment financing, commonly at the beginning of a lease or loan to determine the value to establish the amount to be funded, but also at the end of a true lease term with purchase and return options whereby the parties are attempting to negotiate a fair market value purchase price, or perhaps negotiating a return of the equipment to the Lessor. In such cases, the equipment condition and value is generally a primary concerns. However, in such scenarios the value of the equipment rests not only within itself, but can in large part be related to the

lease documentation, specifically as it relates to condition and return requirements. All parties must be knowledgeable about their respective obligations and requirements and how those affect the applicable transaction defined value of the equipment in order to reach a reasonable conclusion.

The original specification, as well as documenting the actual condition and specification of the equipment at the beginning is important, critically so if the railcars are previously used. It is also critical to obtain and provide this information to the appraiser so they are cognizant of the 'starting point' for the analysis be it at inception or termination. Occasionally there are modifications made or attributes added or removed during the duration of a lease financing which may have a positive or negative effect on the value or desirability of a railcar.

It is important that the appraiser understand the definition of value applicable to the purpose and that which is defined in the document if applicable, typically a concept of fair market value and commonly in use. However, lease documents generally define it specifically and the definition can vary from lease to lease; and over the years it has varied in our experience. So one should begin with identifying the definition of value applicable to the situation at hand and not assume it is simply fair market value in exchange.

Appraisers are frequently asked to inspect and appraise equipment to determine compliance with regulations of use, in railcars that includes those of AAR Interchange, FRA and DOT. For example AAR interchange rules provide for a minimum standard of condition for transit between railroads (e.g. good operating condition, safety appliances in good working order etc.) Frequently the lease documents may contain higher standards, such as being returned 'without rust, corrosion or deterioration' which may apply to the exterior and or the interior; and the 'wheels meet or exceed minimum measurements, be free of defects, flat spots, cracks and welds'. Many products are naturally corrosive and may be loaded in cars which are also used for non-corrosive materials (e.g. same/similar cars may carry different products which have different effects on the car and maybe value). Some leases limit the use of cars to the product anticipated and or specified at lease inception with the Lessor anticipating the positive or negative effect on the cars in the future, such that if used for other commodities it could be detrimental and non-compliant with the lease.

As with most leases, the nuances of such requirements are not consistently found within all leases or in the same sections or places with the lease. Typically they are found within some combination of sections including Use, Location, Maintenance, Repair and Return, but frequently these may be amended in individual lease Schedules. Absent providing the appraiser with the complete lease document including schedules and exhibits the true nature of applicable requirements may be overlooked and excluded from the appraised value. The result may be a generic AAR Compliant Value which can be several thousands



Dover Management Group, Inc. performing an End of Lease field inspection in December 2016 on (449) coal cars being returned in July 2017, part of our overall end of lease management assignment with the Client.

of dollars less than a specific lease Compliant Value. It should be noted that this applies to collateralized loans as well. The appraiser should understand the past, current and expected product use to understand and opine on values if possible or note extraordinary assumptions.

In a soft rail equipment market, where we find some car types today, this may become increasingly more important for all parties to understand and accurately assess, particularly in the case of equipment being returned to Lessors. During such times the strict enforcement of compliance with the requirements is not necessarily in the best interest of any of the parties. For instance, if cars are being returned and going into storage, a large Lessee investment to bring the cars into complete lease compliance may not be necessary or desirable if the repairs don't provide a quick return of the investment or worse any future return is unlikely. If the cars are in AAR Interchange condition and generally salable and suitable for loading, but have additional lease requirements that mandate repairs, the Lessor may accept a cash settlement to forego full enforcement while the Lessee may agree if the monetary amount and logistical burden is less than the "cost" to comply. Both parties benefit. Obviously the nature of the out of compliance issues, their materiality, and so forth are large factors in such potential settlements.

Physical return requirements, notably timing and location, and obligations of each of the parties can be another area of misunderstanding, but can provide potential for mutually beneficial compromise. For instance, having cars returned as close as possible to their current location is usually beneficial to the Lessee as they are typically responsible for freight to a return destination, the increased distance potentially being more costly. If the Lessor can maximize their value or avoid a cost upon an accepted return point, there is an opportunity for mutually beneficial outcome. Additionally, there are non-monetary conditions worthy of consideration for discussion among the parties. For instance, if the Lessee is obligated to return 400 cars on the lease expiration date, is likely to be difficult for the operations department to do so. Conversely it may be a difficult for the Lessor to arrange for receipt of 400 cars at one place and point in time. Again a logical, professional negotiated settlement may be beneficial to all parties.

In summary, the value of the equipment when financed may be influenced by the specifics of the underlying documents. Absent the Appraisers having access to such documents, equipment is generally appraised 'as is' or to the minimum standard of AAR Interchange compliance and to a generic fair market value in exchange concept of value. Relative to end of lease equipment returns, a full understanding of both the equipment, lease requirements and situational analysis of all parties involved can lead to mutually beneficial compromises, mostly notably in times of a soft equipment market.

About the Author

Chris Condon, ASA, CSA is a seasoned veteran with over twenty-nine years of financial services industry experience having held many management positions throughout several economic cycles with Bank Of Boston, Fleet Financial Group, American Finance Group/Guaranty Capital Corporation and BTMU Capital Leasing & Finance, Inc., and is the founder of Dover Management Group, Inc.

He has twenty-six years' experience in the commercial equipment-leasing sector with a focus on the Equipment Management, specifically portfolio management, residual setting, equipment related documentation drafting

and negotiation, collateral valuations, distress asset recovery and management, end of lease negotiations and equipment remarketing and dispositions. He has developed, trained and supervised professional equipment management departments for several financial institutions, and through Dover Management Group, Inc. provided professional out-sourced retainer based Equipment and Portfolio Management services and ad-hoc professional equipment appraisals, inspections and remarketing to many financial institutions.

Mr. Condon's equipment expertise and experience covers all commonly financed equipment types including all modes of transportation assets (air, rail, marine, over the road), manufacturing and processing (automotive, semiconductor, metal, plastic), construction and mining (aggregate, earthmoving, reclamation, material handling, coal, copper, iron ore, gold, silver), energy (offshore and land, oil, gas, solar, wind), information technology & software, medical, and commercial real estate. Chris can be reached at chris@dovermanagementgroup.com or 508-785-1277.

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Scope of Work within Appraisal Review

Joel D. Gonja, ASA – ARM & MTS / M&E



The **Scope of Work** allows us to fine tune each review to specific criteria based on the intended use. The burden for determining the Scope of Work is on the appraiser ... and often we forget this. Also, the Scope of Work must be disclosed in the report – The appraiser must disclose what he or she did not do as well as what he or she did do. This article will focus on the Scope of Work disclosure for use within the Review Report.

The review process allows for broad flexibility in how the review is performed. USPAP provides minimum requirements with limited explanation and discussion. Review Appraisers are encouraged to supplement / expand this process based on their unique application, knowledge, and expertise. We are attempting to insure, as part of the overall review process, that the level of detail within the original report is sufficient for the intended user to understand the methodologies employed to reach the stated value conclusions.

The foundation for our appraisal review, including the development and reporting requirements, are contained within USPAP. I will address the key Standards that deal specifically with Scope of Work issues and have included comments regarding each. Footnotes are provided so you can quickly review USPAP.

Standard 3 / 3-3(iii) / 3-5(g) (Disclosure)

In developing an appraisal review assignment, an appraiser acting as a reviewer must identify the problem to be solved, determine the scope of work necessary to solve the problem, and correctly complete research and analyses to produce a credible appraisal review.¹ Consistent with the reviewer's scope of work, the reviewer is required to develop an opinion as to the completeness, accuracy, adequacy, relevance, and reasonableness of the analysis in the work under review given law, regulations, or intended user requirements applicable to the work under review.² Because intended user's reliance on an appraisal review may be affected by the scope of work, the appraisal review report must enable them to be properly informed and not misled. Sufficient information includes disclosure of research and analyses performed and may also include disclosure of research and analyses not performed.³

It is our responsibility as the review appraiser to identify the appropriate scope of work and disclose within the report. Is it an administrative review for internal procedures? Is it to be used externally within financial reporting per SEC requirements? Who are the intended users? Is the reviewer to include an opinion of value? These are all scope of work elements to be disclosed within the review report. Otherwise, a reader may be misled and not fully understand the intended use. I recommend locating the scope of work discussion toward the front of the report, either immediately after the Letter of Transmittal or Executive Summary or after the Table of Contents.

It is equally important to state what we did not do, or have not been requested, as what we did. These disclosures help to eliminate questions that may arise regarding the extent of the review and services provided. Research and / or analyses may be further limited or restricted by use of an Extraordinary Assumption or Hypothetical Condition. The scope of work should provide reference to the validity of these assumptions.

Standard 3-1(a) (Competency)

The reviewer must have the knowledge and experience needed to identify and perform the scope of work necessary to produce credible assignment results. Aspects of competency for an appraisal review, depending on the review assignment's scope of work, may include, without limitation, familiarity with the specific type of property or asset, market, geographic area, analytic method, and applicable laws regulations and guidelines.⁴

The review appraiser must be competent to adequately perform the assignment based on conditions set forth within the scope of work. The appraisal review report includes a quality of work statement regarding whether the content, analyses, and conclusions stated in the report under review are (or are not) in compliance with applicable standards and requirements, and if the value conclusions are accepted or rejected. If the scope of work includes a separate opinion of value, then obviously, the review appraiser must have the necessary knowledge and experience to complete the appraisal, even if on a limited or restricted basis. If it does not, he or she should be familiar with the methodologies typically used to appraise the subject.

For this reason, very few review appraisers are competent to appraise multiple types of assets. An appraiser who is experienced in commercial real estate typically isn't familiar with the unique methodologies used to appraise metalworking machine tools. Nor is the business appraiser familiar with the jewelry market, and so on. It is not enough to understand that multiple approaches to value are used, you must understand how to correctly employ each to the market for subject assets. Additionally, very few appraisers have a good understanding of USPAP beyond their primary appraisal practice. The American Society of Appraisers encourages its membership to only provide appraisal services within their personal expertise. Additionally, in light of potential lawsuit, it is good common sense.

Standard 3-5(i) (Development of an opinion of value)

When the scope of work includes the reviewer's development of an opinion of value, review opinion, or appraisal consulting conclusion related to the work under review, the reviewer must:

- State which information, analyses, opinions, and conclusions in the work under review that the reviewer has accepted as credible and used in developing the reviewer's opinion and conclusions;
- At a minimum, summarize any additional information relied on and the reasoning for the reviewer's opinion of value, review opinion, or appraisal consulting conclusion related to the work under review; and
- Clearly and conspicuously state all extraordinary assumptions and hypothetical conditions connected with the reviewer's opinion of value, review opinion, or appraisal consulting conclusion related to the work under review and state that their use might have affected the assignment results.⁵

When this service is requested, make sure to identify it within the Scope of Work section of your report as a unique service. Further, it should be referenced prominently within the Letter of Transmittal or Executive Summary. This is a separate service apart from providing a quality of work statement. If including both services, review and opinion of value, within one review report, is important that you identify the two services within separate sections. Each service must be fully discussed within the report and comply with all applicable USPAP Standards:

- Real property – Standards Rule 2-2(a)
- Personal Property – Standards Rule 8-2(a)
- Review – Standards Rule 3-5
- Mass Appraisal – Standards Rule 6-8
- Business Appraisal – Standards Rule 10-2(a)

Personally, including a separate opinion of value within the overall review report can become problematic and confusing to the reader, and I typically submit two separate reports: One for the review and one for the appraisal.

Additionally, any limitations, restrictions or assumptions should be disclosed within the scope of work. It is critical to state what you did and did not do. As an example, if the original bundle of assets under review includes multiple assets, you may be requested to only appraise a sampling of assets, and report your conclusion as compared to the original appraisal. Disclosure of the extent of research and analyses performed to develop your conclusion of value is important as well, particularly if you use different data than the original appraisal.

Scope Of Work Rule⁶

I encourage you to read the entire USPAP Scope of Work Rule, accompanying Advisory Opinions and discussion regarding appraisal review and scope of work. This knowledge will assist in preparing review reports that are understood and not misleading, including research and analyses used to develop your quality of work statement and value conclusion.

- Scope of Work Rule on pages 14 – 15
- Advisory Opinion 28, *Scope of Work Decision, Performance and Disclosure*, page 170 – 173 Advisory Opinion 29, *An Acceptable Scope of Work*, page 174 – 176
- *FAQ – Appraisal Development – Scope of Work Issues*, page 279 – 306

About the Author

Joel D. Gonia, ASA, ARM & MTS / M&E is one of the few appraisers to spend his entire career within the valuation industry – 30 years and counting! His expertise within the Machinery & Equipment Appraisal industry began with a contract with the U.S. Small Business Administration providing equipment appraisals to update their portfolio throughout the Southeastern US – Over 600 loans on all types of assets!! He has considerable knowledge regarding numerous types of equipment and has established a solid reputation for providing straight-forward “real world” values.

Mr. Gonia received his initial professional credentials from the American Society of Appraisers in 1989, as an Accredited Senior Appraiser (ASA) within the discipline of Machinery / Technical Specialties, with emphasis in Industrial and Commercial Machinery & Equipment. He received the accreditation for Appraisal Review & Management in 2016.

As the Senior Review Appraiser at KATS M&E, LLC, Mr. Gonia is responsible for all work performed by the firm, including value accuracy and consistency, USPAP compliance, internal policies and procedures, and continuing education. Clientele consist primarily of professional service providers for middle market firms, providing valuation and consulting services for financial reporting, commercial lending, tax and litigation purposes.

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855 466-4200 toll free

¹The Appraisal Foundation. “Uniform Standards of Professional Appraisal Practice 2016-2017 Edition.” (Jan 2016): Standard 3, page 29. Print

²Ibid. Std 3-3(iii), page 32

³Ibid. Std 3-5(g), page 34

⁴Ibid. Std 3-1(a), page 29

⁵Ibid. Std 3-5(i), page 34

⁶Ibid. Scope of Work Rule, page 14 – 15; Advisory Opinion 28, *Scope of Work Decision, Performance and Disclosure*, page 170 – 173; Advisory Opinion 29, *An Acceptable Scope of Work*, page 174 – 176; *FAQ – Appraisal Development – Scope of Work Issues*, page 279 – 306.



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Following the Changes in the Mining Sector

Alan C. Iannacito, FASA



ASA Education makes effort to remain on the upside of technology and market changes. The society does this through continuing education, designed, tweaked and promoted towards current market demands. Mining and ore processing are one of the ASA industry discipline offerings that we endeavor to keep current.

On September 13 through September 15, 2017, the ASA, MTS discipline, presented *ME214, The Identification and Appraisal of Mining and Mineral Processing Equipment*, presented, again, in Tucson, Arizona. This year's is particularly relevant in a politically and environmental sensitive industry.

ASARCO Mission Mineral Discovery Center, Sahuarita, Arizona

The ASARCO Mission open pit mine and copper ore processing plants have always offered a comprehensive and safe environment for ASA to hold this class. The ASARCO Mineral Discovery Center at ASARCO's Mission Mine, Sahuarita, Arizona Information Center offered a special day for an ME214 tour.

This is our third event here since 2010 and 2014. ASARCO goes out of their way, in this environmental sensitive industry, to get people involved. It is one of the best venues for ME214 because we see how the pit extracts overburden and values headed for reduction and processing in the mill. The program is initiated by videos and displays in the very complete visitors center at the property where we had an exceptional guide with a complete tour around the property.

As emphasized during the tour, copper, is a strategic mineral processed into everything we use or consume daily. We would not survive without mining. In our immediate sight, think of cell phones, transportation, electrical transmission and infinitum.

ME214 covers most aspects of mining and how technology and economics affect the values of remote mining operations and ore processing facilities. We discuss everything from extraction methods in coal and hard rock mining to precious metals and the concentration of values.



ASARCO Mission Mineral Discovery Center, Sahuarita, Arizona

The class uses the first day, usually a Wednesday, to head out to the mine and mill tours. In the past, we have taught the course in Arizona, Colorado, Minnesota and Montana. Every one of these venues has been very instructive. A perk with the Arizona mine tour is about three hours, on the return to Tucson, of the Pima Air and Space Museum in Tucson, Arizona. This is a magnificent display of over 300-hundred, restored and maintained, vintage aircraft and spacecraft. The museum offers access to the adjacent U.S. Armed Forces "Bone Yard." Tour aka the 309TH Aerospace Maintenance and Regeneration Group (AMARG) Facility on the Davis-Monthan Air Force Base.

The second days covers mining from basic entry to various extraction methods in both coal and hardrock mining. The third day includes ore and mineral processes from all types of ore bodies. We have shortened the hours to accommodate student air travel. However, part of the exercise is an exam discussion of the course in total. We break up into groups; this time groups of three, and go through the main points of the last three days. After the students have time to digest and work the exam, we discuss our solutions in open discussion.

This is an advanced ASA course, beyond the required ASA course work, and offers 30-CE credits towards the 100-CE credits required every five years.

In addition to ME214, ASA Instructor, Bill Ruth, ASA, who audited the course, has put together a very successful advanced mining course, ME217, that he teaches in the U.S. and Australia.

Here are a few photos from ME214, Tucson, AZ September 2017. Thank you all.



The Center's comprehensive display



The mill section of the plant that we saw.





2017 Participants:

James C. Cavalieri, Northbrook, IL.,
 Mathew L. Chapman, Louisville, KY.
 Gerald H. Coyne, Jr., Ewing, NJ.
 Justin A. Doucette, ASA, Northbrook, IL.
 Joseph Ferrari, Northbrook, IL.
 Michael H. Kaburu, ASA, Nairobi, Kenya
 Tyler J. Magnuson, Northbrook, IL.
 Michael R. Ostrom, ASA, Costa Mesa, CA.
 Anthony J. Petrucci, Carpentersville, IL.
 Frank F. Rimsa, ASA, Lisle, IL.
 Gerald Robert, Hawkesbury, Ont. Canada.
 Emmett Solien, Northbrook IL.
 Bill Ruth, ASA, ME217 instructor, Silver City, New Mexic

Instructors



Alan C. Iannacito, FASA. Littleton, Colorado. Fifty-years in machinery and equipment buying, selling, rebuilding, manufacturing and appraisal. Iannacito is a co-instructor for ASA MTS214 the Identification and Appraisal of Mining and Ore Processing Machinery.



Alan K. Bowles: PE Mining, Allan Bowles' 40 plus year career in the mining, equipment, and mining reclamation and regulatory compliance area has included feasibility studies, conceptual planning and economic evaluation of proposed new mining operations and acquisitions. After graduation from the Colorado School of Mines Allan worked for a mining construction contractor involved with the initial construction work on the Henderson Molybdenum Mine, Empire Colorado and had various mine management positions over his career.

Pertinent Website Links

ASARCO Mineral Discovery Center: a complete video explaining copper refining: <http://www.asarco.com/about-us/our-locations/asarco-mineral-discovery-center/making-copper/>

Pima Air and Space Museum: <http://www.pimaair.org/visit/plan-your-visit>

Gauging Competency in Appraisal Review

Jack Young, ASA—MTS/ARM, CPA



While gauging competency in appraisal review is similar to using a limit gauge in order to determine whether a part is within prescribed limits of tolerance, it's not, of course, that simple. An appraiser's competency depends on a number of factors, ranging from experience with the equipment and its market to the intended use of the appraisal and the analytical method best used to value the equipment. This mixture of experience, knowledge, skill and training all contribute to the appraiser's ability to appropriately and thoroughly identify and understand the appraisal situation and then to provide an appraisal that meets USPAP criteria in the 5 areas of accuracy, reasonableness, relevance, adequacy and completeness, as discussed in USPAP Comments regarding Standards Rule 3-3(a).

It turns out that directly judging an appraiser's competency can be a tricky and unrewarding process as well as exposing the reviewer to charges of libel and defamation. A more pertinent and useful approach in appraisal review is to focus on reviewing the appraisal—not the appraiser.

For instance, in an appraisal review report we recently reviewed for the ASA ARM designation process, our reviewer spent several pages explaining why the appraiser who wrote the report under review was incompetent to provide the valuation on this particular type of equipment. Buried later in the report was a complete expose of the appraiser's documented misunderstanding of the equipment being appraised. By re-framing the report to focus on this information, the reviewer was able to "show not tell," leading readers to their own conclusion of incompetency. This change in focus created a clearer review report. Just as importantly, eliminating all statements charging incompetency freed the reviewer from fear of being charged with libel or defamation. Believe it or not, this is an important consideration in appraisal review practice!

An Appraisal Institute article states that defamation lawsuits targeting appraisal reviews are on the rise and suggests that "The best way to minimize the risk of a defamation claim is to stick to the assignment and simply review the appraisal." In the American Society of Appraisers Appraisal Review classes (ARM 201 & 204), we emphasize that this means reviewing the appraisal report and not the appraiser who produced it.

An appraiser's job is to present a report that clearly and competently explains a story of value. An appraisal reviewer's job is to gauge the degree to which that story is supported within prescribed USPAP limits of accuracy, reasonableness, relevance, adequacy and completeness.



About the Author

Jack Young, ASA—MTS/ARM, CPA When Jack was 15 years old he went shopping for a truck. He found a pair of junked 1952 Chevy pickups and spent the summer transforming them into one functional truck. His inventiveness and persistence have been a trademark in his career as well. He went to college for agriculture and ended up with a degree in accounting. Years after his first accounting position with international firm KPMG, he was running an auction company, where he discovered the equipment appraisal industry. He quickly earned accreditation and opened his current business, NorCal Valuation. A few years ago, he earned his accreditation in Appraisal Review and Management and has since become one of the leaders in the field. Jack's CPA experience had already introduced him to the importance of appraisal review. During the S&L crisis of the late 1980s, on the day that the US congress authorized the Uniform Standards of Professional Appraisal Practice (USPAP), Jack was auditing a failed California S&L, surrounded by stacks and file cabinets full of appraisals that were nearly impossible to make sense of.

Over the years, as he continued to review loan files at financial institutions, he experienced first-hand how appraisals became more comparable and standardized under USPAP. Today USPAP is an integral part of the appraisal industry in which Jack works and serves. He is a past president of the northern California chapter of the American Society of Appraisers, serves on the ASA committee for international appraisal review and management, and appraises equipment and machinery throughout California. He also wrote and continues to teach the appraisal review and management accreditation classes currently being offered by the ASA.

The Craft Brewing Craze and the Valuation of Brewing Equipment

Alan C. Iannacito, FASA



Part Two – Downstream Filling and Packaging.

Continuing interest in craft brewing and smaller breweries from, *The Craft Brewing Craze and the Valuation of Brewing Equipment, Part 1*, MTS JOURNAL Volume 33, Issue 2, 2nd Qtr. 2017; Part 2 introduces the filling and packaging of the product.

Look for craft beer anywhere for an eclectic experience in brews. You will find brands like New Belgium-*Fat Tire*, SKA Brewing-*Pink Vapor Stew*, Bell's Brewery-*Two Hearted IPA*, Deschutes-Fresh Squeezed IPA, Russian River-*Piney the Elder IPA*, Left Hand-*Nitro Milk Stout*, Surly Brewing-*Todd the Axeman*, and my personal favorite, today, ODD13 Brewing-Codename: *Superfan IPA*. The number of craft breweries using trendy, unbalanced names, is extraordinary. You may speculate that craft brew titles are possibly inspired by someone under the influence, composing on a wet bar napkin.

This aside, consider the opportunities for valuation and financing the sensational number of craft breweries who may have begun in a garage, expanded to a warehouse with good water, electricity, cooling and handling facilities and off to market they go. Success requires upgrades.

At the end of the brewing process a craft brewer is looking for market and distribution. Beer is adversely affected by light, heat and oxygen. The new craft brewer may want the latest in filling and packaging equipment. There are several craft and traditional equipment manufacturers in the Americas, Europe and the Eastern continent.

Filling cans, bottles, kegs? A brewery's market and demand for appropriate containers can also depend on volume. Micro-breweries and brew pubs may go right to kegs and growlers from brite tank or storage.

“CASKS,” BARRELS and KEGS: A traditional barrel is 31 Gallons. But, barrels and kegs come in various sizes and configurations.

According to www.thespruce.com,

Although a few brewers still use wooden casks, most modern casks are made of metal. Traditionally, brewers fill casks with unpasteurized, still beer along with a measured amount of sugar and then seal them. Since there is still yeast in the beer, the sugar kicks off a secondary fermentation that carbonates it. (Bryce Eddings, The Spruce)



(courtesy: eightdegrees.ie and public domain)

BARRELS: traditionally wood stave. Beer in wooden kegs, once tapped, has the tendency to take in oxygen, and oxidize, thereby spoiling or changing the flavor of the brew unless consumed within a few days.

Brewers today use metal to sanitize, pressurize and refrigerate beer in kegs for better transportation and longevity.

Traditional sizes range from 7.15gallon Micro Keg (1/6 barrel), 7.75gallon (1/4 barrel), 15.5gallon (1/2 barrel).

Growlers range from small vacuum bottles to easily obtained 64oz (1/2 gallon) to 128oz (1 gallon) easily carried containers. Appraisers can find a variety of manufacturers and price structures of most containers on the internet.

BOTTLES AND CANS:

Bottled beer has been available for over a century. Canned beers, considered before, but shelved during prohibition, were commercially available in 1935. The development, particularly of cans, materials, linings and tab openings have been an ongoing study since.

BOTTLES – Glass:

Pictured below is a 6-bottle, counter pressure, beer filler. This is about as economical as a craft brewer wants. It is also labor intensive and slow and probably has a capacity range of 250 to 300 bottles per day. There is much on YouTube today about the development, set up and use for these manual machines. During the time of writing this article, a 4-Bottle Meheen machine was offered at \$21,000. David Meheen has developed these un-complicate machines all the way up to automation and higher capacity.



(courtesy: Wikipedia.org)



Beer Kegs (courtesy: publicdomainpictures.net)



(courtesy: kegking.com)

In addition to filling, part of the filling includes rinsing, capping, drying, labeling, cartoning and casing.

For any volume, a brewer will consider a Monoblock continuous system including rinsing, filling, pressurizing, capping, labeling machine. Below, new, offered on ebay.com at \$80,000.

Once the product is filled in a bottle or can, air is evacuated, perhaps carbonated, and the bottle crown or can end lid is attached.

Thanks to the internet and YouTube, you can educate yourself on types of machines and flow charts that make up a craft brewer. One of the best sites today is Climax Packaging Machinery at www.climaxpackaging.com. This company manufacturer's or supplies the industry from filling to packaging both bottles and cans. Their *YouTube* demonstrations are instructive and worth viewing before going onto the client's physical plant.

CANS: The preferred beer can is aluminum with a pull-tab lid. Cans can be filled on the same or similar equipment as a bottle, depending on throughput, and the line requires a lid seamer once the cans are cleaned and filled.

Bottles and cans can be preprinted, labelled, code dated using traditional labelling equipment or press on labels. Preprinted cans are easier to assemble and rinse without the label coming off. There are several options from hand labeling to high-speed machine labelling.

Next is packaging either in six-packs and onto normal 4x12 cardboard can trays with plastic overwrap. Prior to assembling to the cardboard tray, brewers with any volume, will connect a six-pack with a secured plastic neck bander and provision to allow for hand carry. These traditional carriers are being replaced or influenced by more eco-friendly and various design characteristics.

PakTech rigid plastic six-pack HDPE, recyclable, carrier-cover is one such innovation.

Craft brewing, handling, packaging and storing of craft beer is based on production. Smaller craft brewers have manual labor versus larger craft brewers who have successfully bridged the gap between local and regional demand.

Everything presented in this article is subject to the brewer's preference and what works for them. For example, brewpubs are likely to keg their product and bring down to temperature in the cooler. A line from the keg to the tap is relatively simple and logistically sound.



(Courtesy: bing.com YouTube)



(Courtesy of ebay.com, pacificcoastbeverage.com)



(courtesy Climax Packaging Machinery)

As the craft brewer increases capacity, the need for more automated machinery can evolve from less than a few bottles or cans a minute to high-speed, high-volume machinery and handling.

Special equipment that can be found in the packaging end may include, keg wraps, cleaners, carbonators, plate heat exchangers, sanitary tubing and piping, rinse tunnel, and other equipment that the craft-brewer artisan thinks is necessary to control production and quality.

With the internet, the craft-brewing process and markets are well informed by sites from YouTube to individual manufacturers. The high interest in the crafting of beer, because of consumer trends, will ebb and flow. However, today's consumer savvy looks for variety, flavor and appeal that can only be found in craft-brewing.

Below are some of many websites accessible and informative for your craft-brewing questions. A researcher will log onto interesting sources throughout the Americas, Europe and the Far East.

TYPICAL SITES: Brewery and Packaging Equipment.

<https://www.bid-on-equipment.com> Listing used equipment and asking/bid prices.

<http://www.probrew.com/> New, high production equipment with good visuals.

<http://www.lehuicraft.com/brewing-equipment/> Complete engineering and equipment from brew-pub to high production.

<http://bestpackagingsystems.com/craft-brewery-equipment/#/> Design and quotes for complete packaging systems.

<https://www.wgcanning.com/systems/> This company, Wild Goose Canning, Boulder, Colorado, will allow you to input capacity and volume with an almost immediate recommendation.

www.packleaderusa.com. THE CRAFT BREWERS GUIDE TO LABELLING EQUIPMENT, is available from this source.



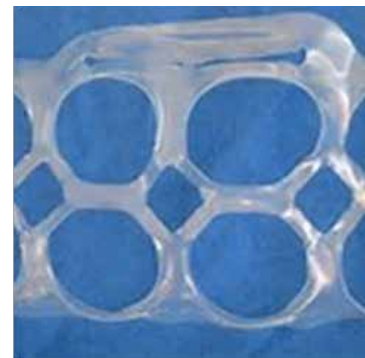
(courtesy: bing.com)



Closeup of lid with tab feeder.(bing.com)



Courtesy: GreenPhillyBlog.com and PlasTech.



Traditional Plastic Carrier

About the Author

Alan C. Iannacito, FASA is a senior accredited appraiser with over forty years' experience as an appraiser, former process equipment dealer, buyer/seller/rebuilder/manufacture of process machinery and equipment. He specializes in chemical, food, ore processing, manufacturing and mining equipment.

Iannacito is a Charter member of the ASA MTS Committee, Former MTS Chairman, Governor and contributor to the MTS textbooks. Iannacito co-teaches a mining and mill processing course, ASA-MTS21e, and continues to write nonfiction, fiction and poetry.

The State of the Evolving Manufacturing Sector

John Hagist



As a firm that actively engages in the buying, selling, auctioning, appraising and financing of used industrial assets, the questions we're being asked the most these days are "what is the state of the manufacturing sector? What has been happening in the past quarter? What about the past year?" Our firm's core focus and area of expertise is strictly from the machinery and equipment market, so we couldn't begin to comment on a manufacturer's ability to innovate during these odd market times. However, the historical notion is that when the new equipment market stagnates there is greater movement in the used market.

It's important to understand that any capital-intensive industry such as industrial machinery is cyclical.

On a simple and practical basis, this translates into monies being spent and invested in hard assets are with a long-term plan in place. Investments in capital assets are made to increase production or efficiency or both. So, what happens when it's not the best of times or there isn't a clear path?

Companies squeeze and wait, buy used equipment, or replace components to keep machines running and buy new when there is no other option.

One year ago was the lead up to one of the more hotly contested and divisive Presidential elections in history. The normal trend is that in the run up prior to an election there is a collective holding of the breath and a small wait and see attitude is adopted. Last year was clearly no different than past elections. Okay, it was! The result is firms are still waiting and still holding their breath, to a large extent.

Earlier this year PwC published an article on manufacturing trends stating that the International Monetary Fund (IMF) predicts just a 3.4% increase in the global demand for manufactured goods in 2017. Here we are early in the 4th quarter, a year into this new administration, and politics is still getting in the way of business, and companies are still waiting. However, they still need to produce products, earn revenues, grow their businesses and keep innovating.

No one can wait in a vacuum, and that is why the economy is still chugging along.

What are we seeing in the marketplace?

From an appraisal perspective, it's been noted that many firms have pushed their equipment to the very end of its replacement cycle. This continues to affect opinions of value. The value trend over the last several years has been that to retain any significant value, equipment must be newer. Generally speaking, 'old' used to mean a manufacture date of ten years or more, but over time that has moved to seven years, and now, in some cases, that is coming to mean five years or older. There is a value perspective wherein if equipment is expected to trade on the used market under the concept of Forced Liquidation Value or Orderly Liquidation Value, there is little value remaining for this older equipment. New equipment needs to be five years or younger from a hard components perspective. Controls/PLC's and technology can and do move the value curve. If the equipment is kept current, maintained well and kept in use it can hold its value longer.

Repeat appraisals over the last year are showing little investment in new assets, but are showing continued investment in existing plant assets or the recognition that the equipment they have in place will need to hold up as long as possible before consideration is given to purchasing new. Obviously there are exceptions.

Almost a year has passed since the election and companies are now starting – only very recently – to spend and invest. There is an overwhelming sense of political uncertainty in all three branches of our government, it's likely we will see changes in NAFTA, and potentially even a wall being built. Divisive attitudes are still at play and will continue to shape the national dialogue as well as expenditures in the manufacturing space, and this will continue to be reflected in appraised values.

The equipment financing perspective ties closely into the opinion of the appraisal market, as most often the appraisal clients are either banks or finance companies. It would be bold to suggest that from a lending perspective, there have been few lessons learned from 2007 and 2008. There is an abundance of 'dry powder' and financial institutions are fighting to lend every dollar they can in a buyers' market. Deals are being chased downstream. Smaller banks are lending into deals where the previous norm wouldn't permit them to do so, but would instead be financed by non-bank lenders, and that trend now continues all the way up into the major banks.

The used industrial asset marketplace remains cautiously busy for all the reasons previously mentioned. The competition this last year has not, for the most part, been against the client choosing to purchase a new piece of equipment rather than used, but instead has been against the client waiting to purchase regardless of new or used. Activity remains steady because firms need to replace, improve efficiency and/or increase production and they are looking to do so in the most economically efficient way possible. Often the used industrial asset dealer can supply the needed asset faster than the OEM and though it may not be exactly the specs desired, it can be close enough to the desired output needed and available now for often a fraction of the cost.

Manufacturing investment became hesitant starting months before the 2016 election and it has continued to remain hesitant thus far in 2017. The sector will remain hesitant. Consolidations will continue, redeployment of existing assets will continue, plant closures will continue, squeezing out greater efficiencies will continue and the usage of assets that are at or past their replacement time won't end anytime soon. That being said, new expenditures are just starting to occur, investment is happening, new lines are being installed, new controls to make lines more efficient are being purchased and both new and used equipment orders are happening. While there are still concerns about the financing that is available, that financing is starting to drive the industrial space.

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About Loeb

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IRONTRAX LLC Mining Industry Insight (Fall 2017)

Joseph Santora, ASA



This document focuses on a number of topics that pertain to the mining industry as a whole, including the advantages of having a diverse energy grid, the outlook for the coal industry, actions taken by the EPA to scrap the Clean Power Plan, the growth in oil demand anticipated by OPEC, the implications of Caterpillar's strong performance, and a brief summary of trends in used equipment values.

Hot Topics

Diverse U.S. Energy Grid Provides Potential Means of Minimizing Impacts of Natural Disasters:

The series of powerful storms that recently swept through Texas, Florida and cities throughout the Caribbean caused catastrophic damages to infrastructure, with millions of people expected to be in the dark for weeks. With mass power outages across the southeast, both the U.S. government and the American people have acknowledged a need to do more to secure America's energy grid.

One way to address potential supply challenges is to utilize a mix of different fuels, including coal, natural gas, nuclear, and renewables. Diversity in the energy market provides a means of minimizing disruptions when any one fuel source is challenged. In fact, recent polling by Morning Consult on behalf of the National Mining Association shows that 85% of American voters agree that the U.S. should act to protect the diversity of its energy grid to minimize potential impacts from natural disasters like hurricanes Harvey and Irma. The U.S. is in a unique position to do so as it is home to a wealth of natural resources that can keep the electric grid up and running even during the most trying times. America is home to enviable coal reserves that can provide affordable, reliable electricity and power households and businesses for hundreds of years to come. Our country is also home to an estimated \$6.2 trillion worth of minerals like copper, silver, molybdenum, zinc and iron – just to name a few – that comprise the solar panels and wind turbines that make renewable energy possible. In addition, nuclear power wouldn't be possible without the help of the estimated 60 million pounds of uranium reserves found right here at home.



Coal Industry Outlook:

Over the last few years, the U.S. coal industry has been challenged by stringent environmental regulations. Under former President Obama's Clean Power Plan, coal as a fuel source was pushed back further by increasing the usage of natural gas and renewable energy sources to produce electricity. However, conditions for the coal industry have started to change for the better after the election of the new president. Donald Trump wants to revive the industry and relax regulations that are hurting its prospects. He has started to act on his campaign promises and has taken measures to repeal the Clean Power Plan. Trump also walked out of the Paris Climate Agreement. The Clean Power Plan and Paris agreement have the same objective of lowering emission levels. Coal usage to generate electricity and in other heavy manufacturing industries are the primary sources of greenhouse gas emissions. No doubt we will see extended use of coal in different industries, which will help coal companies progress through these difficult times.

Coal is currently mined in more than 50% of U.S. states. According to the U.S. Energy Information Administration (EIA), the top five coal-producing states – Wyoming (40% of the total), West Virginia (11%), Kentucky (8%), Illinois (6%) and Pennsylvania (6%) – contribute the major share of the total coal production of the country. Unfortunately, all major U.S. coal producers have been affected by the drastic fall in demand, and consequently prices have dipped. However, demand for coal is rising again as a result of helpful legislation and the hike in natural gas prices. Revival of demand from China is also going to have a positive impact on the overall demand. This industry has seen difficult times, with a decline in demand and prices, and major companies filing for bankruptcy protection. However, Arch Coal Inc. (ARCH) and Peabody Energy (BTU) have successfully completed their financial restructurings and are trading again. Per a recent release from the EIA, since 1978 U.S. coal production touched its lowest point in 2016. However, the EIA expects that given the gradual revival in demand and export of coal, U.S. coal production will improve by 4.7% and 1.5% year over year in 2017 and 2018, respectively. Per EIA data, in the first eight months of 2017, 527,879 thousand short tons of coal was produced in the U.S., compared with 463,600 thousand short tons produced in the same period last year.

EPA Scraps Clean Power Plan:

On Tuesday, October 17, 2017, Scott Pruitt, Environmental Protection Agency Administrator, said that he will revoke the Obama-era plan, which set emission-reduction goals for every state but which critics believed ended up handcuffing states. When he announced the repeal, Pruitt said that the Obama administration's decision to enact the plan in 2015 was overreaching, "ignored states' concerns and eroded longstanding and important partnerships." The repeal follows a March 28 executive order by President Donald Trump directing federal agencies to "immediately review existing regulations that potentially burden the development or use of domestically produced energy," which he touted as a move to end "the war on coal."

Coal- and natural-gas-fired power plants are responsible for about one-third of America's carbon dioxide emissions. When the Clean Power Plan was unveiled in 2015, it was expected to cut power sector emissions by 32% by 2030, relative to 2005. While many states are already shifting away from coal power for economic reasons, experts say scrapping the rule could slow that transition. Environmental groups and several states plan to challenge the repeal proposal in federal courts, arguing against Mr. Pruitt's move on both scientific and economic grounds. While industry groups cheered the announcement, they also indicated they would prefer that Mr. Pruitt replace the Clean Power Plan with a new, more modest regulation on power plants in order to deter any court challenges. The EPA is still required to regulate greenhouse-gas emissions because of a 2009 legal opinion known as the endangerment finding. Greenhouse gases are those that trap heat in the atmosphere. These gases include carbon dioxide, which enters the atmosphere through the burning of fossil fuels (coal, natural gas, and oil), solid waste, trees and wood products, and also as a result of certain chemical reactions (e.g., the manufacture of cement).

OPEC Anticipates Healthy Oil Demand Growth to 2022:

In a recent statement, the head of the Organization of Petroleum Exporting Countries (OPEC) stated that he believes oil demand will grow at a "healthy pace" over the next five years as renewables show the fastest expansion of any type of energy. On October 15, 2017, OPEC Secretary General Mohammad Barkindo said Crude demand will climb an average of 1.2 million

barrels per day through 2022 and slow to 300,000 barrels per day in 2035 to 2040. Wind, solar, geothermal and photovoltaic sources will be the fastest-growing energy, increasing by an average of 6.8% per year from 2015 to 2040, though still accounting for less than 5.5% of the world's total energy mix by 2040, he said. Russia and other suppliers are debating whether to extend output cuts that are set to expire in March, in an effort to drain the oil glut – fed partly by U.S. shale – and shore up prices. Benchmark Brent crude, which traded at \$57.17 a barrel in mid-October, is up 0.6% this year as the cuts, which began in January, have taken effect. OPEC plans to meet next month in Vienna to weigh its options.

With the global economy growing and oil demand expected to grow by 1.45 million barrels per day this year, oil market indicators are "rapidly improving," Barkindo said. At the beginning of the year, inventories in developed nations were 338 million barrels above the five-year average, OPEC's main criteria for assessing the re-balancing of the market. In August, they were at 159 million barrels, he said. The amount of crude in floating storage has also declined, down an estimated 40 million barrels since the start of the year. Backwardation in the Brent market is one more sign of improving market conditions. "Retaining sustainability in market stability beyond 2018 is an absolute prerequisite for investments to be able to cover future oil demand," Barkindo added.

"Beyond our forecasts and the positive momentum we are seeing now, there is still the fundamental need to ensure sustainable stability, so that the market does not stall once the necessary stocks are withdrawn."

Caterpillar Performance Denotes Strength of World Economy:

Caterpillar Inc. delivered another upbeat quarter with adjusted earnings per share surging 129% year over year to \$1.95 for the third quarter of 2017. Earnings also beat the Zacks Consensus Estimate of \$1.22 by a wide margin of 60%. The better-than-expected performance can be attributed to surprisingly strong demand for its construction equipment in North America, robust sales in China, as well as improvement in other markets and disciplined cost-control efforts. Sales surged 27% in North America as the U.S. oil and gas industry cranked up, while China's growing construction market helped sales in the Asia Pacific region balloon 31%. The mining and construction equipment giant also hiked 2017 guidance, citing strength in a number of industries and regions.

Some would say as Caterpillar goes, so goes the world economy. Long seen as a bellwether for global growth due to its exposure to multiple industries, Caterpillar's third quarter results reinforced the view that the international economic expansion is the most synchronized since the start of the decade. The Deerfield, Illinois-based company projected 2017 sales of \$44 billion, marking a third straight increase in annual revenue forecasts, but what stood out was the breadth and demand of its products.

Trends in Used Equipment Values

Since our last update, there has been little change in the market for most used mining equipment, which continues to be very soft. At the same time, the demand for new equipment with current technology and greater efficiencies continues to grow, driven by digital improvements, automation enhancements, the transformation of the workforce, and the coal mining business which is more active now than it has been in many years. Although used mining equipment prices appear to have stabilized, they are still very low due to a number of factors. Over the past few years, a disproportionate number of mines have either ceased operations or been acquired by others who generally retain the purchased equipment. Additionally, smaller or less profitable manufacturers of mining equipment have been acquired by industry giants such as Caterpillar Inc. and Komatsu Ltd. Finally, the global push to raise emissions standards is having an adverse impact on the market for older non-complying equipment. These developments have caused an oversupply of used mining equipment, and holders are reluctant to sell in the current market in which prices are depressed. As such, only a small portion of such equipment is coming to auction, thus making it difficult to gauge its value with any degree of precision. On a positive note, although the environment for those selling most used equipment has been challenging, the relatively high cost of newer equipment is causing some users to continue to search for good used rebuilt equipment.

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IRONTRAX LLC Trucking Industry Insight (Fall 2017)

Joseph Santora, ASA



This document focuses on a number of topics that affect the trucking industry as a whole, including expectations regarding higher compensation for truck drivers, President Trump's targeting of truck drivers to sell his tax reform plan, Warren Buffett's purchase of Flying Pilot J, the forecast for trucking industry revenue, and recent actions taken by the Alliance for Driver Safety & Security to adopt additional truck-safety technologies. It also includes a brief summary of trends in used equipment values.

Hot Topics

Compensation for Truck Drivers Expected to Increase as Industry Braces for Shortage to Get Worse:

According to a recent report issued by the American Transportation Research Institute, driver wages now top fuel as the biggest operating expense for motor carriers, and industry insiders are predicting wages and benefits will continue to rise as companies compete to retain drivers. "While the shortage is a persistent issue in our industry, motor carriers are constantly working to address it. We already see fleets raising pay and offering other incentives to attract drivers," said American Trucking Association (ATA) economist Bob Costello at the ATA's Management Conference & Exhibition in October. At the conference, the ATA also issued a report projecting the driver shortage will reach 50,000 positions by the end of 2017 and could grow to more than 174,000 positions by 2026.

In addition to companies being challenged by ongoing issues such as irregular schedules, long periods away from home and difficulty in obtaining insurance for inexperienced drivers, there is also an anticipated surge in the construction industry following the recent hurricanes in the U.S. and the trucking industry is expecting to see its talent pool shrink even more. Eric Fuller, chief executive of U.S. Xpress, also warns that the Trump administration's national infrastructure initiative will take away even more workers and put the industry into an "absolute crisis." "We are absolutely scrambling for drivers," Fuller says. "Each month it gets a little bit worse. Large double-digit increases will be needed to bring new drivers into the industry." He



predicts driver wages could climb 30% to 40% over the next two years and that we may also be seeing a change in how truck drivers are paid. Until now, most drivers have been paid by the load or the mile, but Fuller believes this pressure on wages will likely result in hourly pay becoming the norm within the next 10 years. He also believes these changes will continue forcing companies to demand higher shipping charges and to reevaluate how they charge their customers.

Trump Appeals to Truck Drivers to Help Sell New Tax Plan:

President Trump is now targeting truck drivers to sell his tax reform plan to America's low and middle-income earners. While the tax plan has been criticized for mostly catering to high-income earners at the expense of lower- and middle-class earners, the White House is saying otherwise. "Truckers will be the No. 1 beneficiaries of President Trump's tax plan," White House Press Secretary Sarah Huckabee Sanders said during an October press conference. "They keep our economy moving, literally, and they are excited about the president's tax reform plan, which will create more jobs and empower workers and families to keep more of their hard-earned money."

Trucking is the number one employer in about 29 states around the country and President Trump believes the GOP tax-reform framework will benefit truckers by lowering their tax rates, boosting manufacturing and making it easier for families to pass their trucking businesses onto their children. Additionally, the plan will simplify tax filing for truck drivers and provide for a larger standard deduction, as well as cuts to the small business tax rate, which he says would benefit those who file their taxes as pass-throughs. In addition to appealing to truck drivers, Trump also believes that the typical American family would get a \$4,000 pay raise under the tax plan.

Warren Buffet to Buy Majority of Pilot Flying J:

Early in October, Warren Buffett's Berkshire Hathaway Inc agreed to buy a major stake in Pilot Flying J, the largest U.S. truck stop operator, and will become the majority owner over a six-year period. The chain, which comprises the 15th largest private company in the U.S., has 750 locations across the U.S. and Canada, employs more than 27,000 people and boasts annual revenues of \$20 billion. It sells gas, diesel fuel, and convenience goods, and offers trucks more than 70,000 parking spaces and 5,000 diesel lanes. Berkshire Hathaway will initially acquire a 38.6% stake in the company and plans to boost ownership to 80% in 2023. The controlling Haslam family retained a 50.1% stake, and will own the remaining 20% once Buffett takes over. As he normally does when buying family-run companies, Buffett will leave Pilot Flying J's management in place. Financial terms were not disclosed, so it isn't yet clear as to how much of Berkshire's roughly \$100 billion in cash will be used. Adding Pilot Flying J is a significant boost to Buffett's bet on U.S. economic growth.

"Pilot Flying J is built on a longstanding tradition of excellence and an unrivaled commitment to serving North America's drivers," Buffett said in a release. "Jimmy Haslam and his team have created an industry leader and a key enabler of the nation's economy. The company has a smart growth strategy in place and we look forward to a partnership that supports the trucking industry for years to come."

Forecast for Trucking Shows Revenue Growth Headed Toward \$1 Trillion:

Freight Transportation Forecast report, trucking industry revenue is projected to top \$1 trillion by 2024. Industry revenue is expected to keep growing annually by a projected 5.4% between 2018 and 2023. Growth is then expected to slow to 4.7% through 2028, with motor carrier revenue totaling \$1.24 trillion by the end of that year. This growth will be driven by manufacturing, consumer spending and international trade.

ATA's annual report provides an outlook as to what the industry can expect to see in terms of tonnage and revenue over the next 12 years. ATA constructs its freight and revenue forecast by using data from several sources, including proprietary data and data from the U.S. Army Corps of Engineers, Energy Information Administration, Bureau of Transportation Statistics Commodity Flow Survey, ENO Transportation, and IHS Energy, among others. "As the U.S. population grows and the economy increases with it, we will see continued gains in demand for freight transportation," said Bob Costello, chief economist for ATA. Although trucking will remain the dominant freight mode — moving 10.73 billion tons of freight in 2017 — all forms of freight movement are on the rise.

Truck tonnage for truckload, less-than-truckload and private carriers reached 10.419 billion tons in 2016. ATA forecasts total truck tonnage to be 12.579 billion tons in 2023 and 13.916 billion tons in 2028, representing an annual growth rate of 2.7% in 2018-2023 and 2.0% in 2024-2028. Although for-hire carrier revenue fell 3.8% to \$368 billion in 2016, it is expected to rise 5.4% annually between 2018-2023, to \$538 billion, and should hit \$679 billion by 2028. Truckload carrier revenue is forecasted to reach \$454 billion by 2023 and \$568 billion by 2028. This revenue will experience an average annual increase of 5.4% in 2018-2023 and 4.7% in 2024-2028.

Trucking Alliance Adopts AAA Advanced Safety Tech Recommendations:

On November 1, the Alliance for Driver Safety & Security (Trucking Alliance) announced that in order to qualify for membership, carriers must adopt the following four truck-safety technologies that the AAA Foundation for Traffic Safety has concluded are critical to reducing large truck crashes and saving lives.

1. Lane Departure Warning Systems, which detect when the vehicle drifts out of its lane and warn the driver
2. Video-based Onboard Safety Monitoring, which utilizes in-vehicle video cameras and sensors
3. Automatic Emergency Braking Systems, which detect when the truck is in danger of striking the vehicle in front of it and brake automatically if needed
4. Air Disc Brakes [on tractors], which are superior to traditional drum brakes

The Trucking Alliance said it is the first U.S. carrier-based organization to adopt these technologies as conditions for membership. "These technologies can make the highways safer for our drivers and the public and that's why the Trucking Alliance carriers are installing them on new trucks," said Steve Williams, president of the Trucking Alliance and Chairman/CEO of Little Rock-based Maverick USA.

The AAA Foundation found that by installing automatic braking systems and air disc brakes on all new trucks, 7,705 accidents, 92 deaths and 4,200 injuries could be avoided. It also projected that if onboard cameras and lane departure warning systems were installed on all new and existing commercial trucks, another 69,372 large truck accidents could be avoided, saving 408 lives and avoiding 24,105 injuries.

Trucking Alliance carriers have also adopted the following additional standards for membership, which exceed federal requirements to operate as a motor carrier.

1. Installation of Electronic Logging Devices or the existence of Automatic On-Board Recording Devices in all interstate trucks, to verify hour-of-service compliance
2. Utilization of Truck Speed Limiters, which set a maximum speed of no greater than 65 mph
3. Transition to hair testing to identify lifestyle drug users and opioid addicts
4. Maintaining liability insurance coverage that is significantly higher than the minimum federal requirement
5. Installation of collision mitigation systems in all newly purchased Class 8 trucks, including the four safety technologies mentioned above
6. Utilization of extensive pre-employment screening processes and ongoing driver training

"The trucking industry can't be satisfied, until we dramatically reduce the number of injuries and loss of life from large truck crashes," added Williams. "We must ensure that truck drivers are well trained, well rested, drug- and alcohol-free, and operating trucks with the latest technologies."

Trends in Used Equipment Values

In October, America's Commercial Transportation (ACT) Research Co. issued a report on the used commercial vehicle market revealing that used Class 8 truck same-dealer sales volumes rose by two dozen units in September. ACT is recognized as the leading publisher of commercial vehicle industry data, market analysis and forecasting services for the North American market.

The research company's latest release on the state of the industry shows that retail used truck sales were up in both monthly and yearly comparisons in the Class 8 market. "Long-term, the outlook is positive, with volumes up 19% year to date compared to same period last year," said Steve Tam, vice president at ACT Research. "Looking at the individual market segments, the retail segment was up 9% month over month and 28% year over year, but the auction and wholesale segments reported mixed results." The average price of used Class 8 trucks marked its largest sequential increase since December 2016, rising 5%. However, prices were still 3% lower compared to last September. "The year-to-date deficit narrowed slightly, to 7%," added Tam. All three market segments reported month-over-month increases, but long-term price deficits. It is our opinion that the values of used commercial vehicles will remain mostly flat through 2018.

On another note, it is likely that hundreds if not thousands of Class 8 trucks, and many more medium and light duty commercial vehicles, were totaled during the two-week period that hurricanes Harvey and Irma wreaked catastrophic damage to large parts of Texas and Florida. This loss of property, combined with the need for construction trucks to participate in the rebuilding process, should result in a moderate increase in the demand for commercial vehicles of all types in upcoming months.

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IRONTRAX LLC Electric, Self-Driving Trucks — The Way of the Future

Joseph Santora, ASA



The overall medium- and heavy-duty truck market is projected to continue its reliance on conventional diesel powertrain for the next decade. However, Navigant Research, a research and consulting team that provides in-depth analysis of global clean technology markets, predicts that hybrid and electric powertrains will increase, with the number of these vehicles expected to grow from about 125,500 in 2017 to 1.66 million in 2027. This is up from their 2016 prediction of 332,000 by 2026.

With the potential to provide lower operational costs, noise reduction, and environmental benefits, electric trucks are attractive to fleets. Although high up-front costs are still prohibitive, manufacturers continue to work toward commercially viable electric trucks due in large part to mounting pressure from governments to reduce pollutants from diesel fuel combustion and tackle greenhouse gas emissions. As heavy- and light-duty diesel engines get phased out for government work, and emissions regulations become stricter, both plug-in and pure electric trucking solutions will become more prevalent. Over the next few years, trials and small-scale deployments by major fleets and

manufacturers will help clarify potential cost benefits and could set in motion a significant increase in orders for electrified trucks. Based on recent developments, such as those summarized below, this effort appears to be well underway.

Tesla Unveils Electronic Rival to Semi Trucks:

Elon Musk, Tesla's chief executive officer, is on a quest to remake the multibillion-dollar trucking industry. On November 16, 2017, he unveiled a prototype for a battery-powered, nearly self-driving semi truck that the company believes will be more efficient and less costly to operate than the diesel trucks, while emitting no exhaust. The electric truck would be less expensive to operate, in part because it has fewer components that require regular maintenance (i.e., no engine, transmission or drive shaft). Instead, the truck, called the Tesla Semi, is powered by a giant battery beneath the cab. It has two rear axles, each outfitted with two electric motors, one for each wheel. The truck can go from zero to 60 miles per hour in five seconds without a trailer, and in 20 seconds when carrying a maximum load of 80,000 pounds, less than a third of the time required for a diesel truck.

Mr. Musk said Tesla expects to begin producing the truck by the end of 2019, but at a hefty price. Recent indications are that the new semi will start at \$150,000 for a model with a 300-mile range and \$180,000 for a 500-mile version with a larger

battery pack. Tesla also envisions building a network of solar powered superchargers throughout the U.S. and Canada. In December, PepsiCo Inc. reserved 100 trucks adding to orders placed by more than a dozen companies, including Walmart, J.B. Hunt, Anheuser-Busch, and Sysco Corp. According to Reuters, this brings the number of reservations for Tesla trucks placed to date to 267. While Tesla continues to make progress with its electric trucks it will face formidable competition from those



such as Daimler who have experience in the truck market and have already begun testing electric trucks and self-driving technology.

Daimler Steps Up Plans in Electric Truck Rollout to Compete with Tesla:

Shortly before Tesla unveiled its prototype, Daimler AG, the world's largest manufacturer of commercial vehicles, announced it is stepping up its plans to roll out electric powered trucks. It has started initial production runs of an urban delivery truck and expects such models to compete with traditional diesel versions in the near future as the cost of batteries decreases. The company is seeking to stay competitive as cities step up measures to improve air quality. Jorge Rosa, head of Daimler's Tramagal plant in Portugal, believes it will be possible to produce an electric vehicle at the same price as a diesel vehicle within two years. The main driver is the cost of batteries, which is dropping sharply.

In September 2017, Daimler also introduced a light-duty hauler known as the eCanter in Manhattan and supplied a fleet to several New York City non-profits. It also signed the United Parcel Service Inc. as its first commercial customer in the U.S. The truck, with a range of 60 to 80 miles between charges, is coming to market as customers demand products better-suited to rising delivery demand in cities. Rosa indicated that after assembly trials, Daimler will start mass production of the eCanter at the end of 2018 or start of 2019. "The speed at which electric mobility will introduce itself will be quite a lot faster than what was foreseen two or three years ago," Rosa said. "There are many cities that have already announced dates from which they will stop carbon fuel vehicles from entering downtown areas."

Nikola and Bosch Team Up to Design Hydrogen-Electric Trucks:

Nikola, the other automotive company that pays homage to famed inventor Nikola Tesla, just announced plans to team with automotive supplier Bosch to develop next-generation powertrains for two hydrogen-electric semi trucks. The partnership aims to produce a line of semis that would blow current trucks off the highway, with double the horsepower of anything currently on the road, while cutting emissions entirely. Unlike Tesla, rather than depending on batteries alone Nikola's design will harness hydrogen fuel cells for an estimated range of up to 1,200 miles. The class 8 semi trucks, dubbed the Nikola One and Two, are slated to hit the market by 2021. Nikola credits Bosch's work on its modular eAxle drive system, which was designed to make electrification easier for automakers in smaller vehicles, as a major reason the collaboration will be able to shoot for wide scale production in just four years. The two companies will work together to make a dual-motor eAxle design for the long-haul trucks, which will place the motor, power electronics, and transmission all onto one unit. Extra power will come via a new fuel cell system, which is also being developed as part of the partnership, which will depend on hydrogen to push the range of the trucks to that massive 1,200-mile range. Bosch will also contribute to the development of the trucks' control software and hardware systems. All-electric cabs all have limited range estimates of a few hundred miles per charge and pale in comparison to Nikola's range. It may be that hybrids, not full-on electric vehicles, might be better solutions for the long-haul rigs of the future.

Self-driving Trucks, a Step Beyond Hybrid and Electric Powertrains:

There seems to be little disagreement that trucks will someday drive themselves out of warehouses and cruise down freeways without the aid of humans or even a driver's cab. The question is how soon that day will come. Billions of dollars and a growing parade of companies, from tiny start-ups to the country's biggest trucking operations, are betting it will be here sooner than most people think. This year, companies and investors are on pace to invest just over \$1 billion into self-driving and other trucking technologies, 10 times the level of three years ago, according to CB Insights, which tracks the venture capital industry. The recently unveiled Tesla-semi already has some self-driving capabilities, Daimler recently demonstrated an electric tractor-trailer and Embark, a Silicon Valley start-up, has been testing its self-driving technology as part of a three-way partnership with the truck-leasing company Ryder and the appliance giant Electrolux. "We are trying to get self-driving technology out on the road as fast as possible," said Alex Rodrigues, Embark's chief executive. Unlike autonomous cars, which face questions about navigating chaotic urban streets, trucks spend a lot of time heading straight on desolate highways. Additionally, while the advent of the self-driving car rests on the decisions of individual consumers, logistics companies are unemotional operators

that will upgrade their fleets the moment it makes financial sense. The trucking industry is a fat target for automation. Autonomous technology will help trucking companies reduce labor costs in the long run, first by extending the number of hours trucks are in operation, and later, by reducing the number of drivers. The industry spends billions of dollars a year on accidents that are largely caused by human error, and billions more on insurance premiums that should go down if and when self-driving technology is proven to be safer than human drivers. The result is a furious race not just to develop self-driving trucks, but to get them on the road and making money.

While the concept of autonomous trucks appears to have many advantages for the trucking industry, companies have a lot to get through before they can start legally operating trucks without drivers. Beyond technical and regulatory hurdles, the industry is sure to be challenged by wild cards like how human drivers react to seeing an unmanned truck gliding down the highway and how regulators respond when the first deadly autonomous-trucking accident occurs. But whenever self-driving trucks arrive, there will be economic ripples, affecting insurance premiums, truck stops, vocational schools and the roads themselves. "This is the most powerful thing to hit us since the building of the superhighways in the 1950s," said Noel Perry, an economist at FTR Research, which tracks the logistics industry.

Putting Things in Perspective:

There is no doubt that the concept of electric, self-driving trucks is growing in popularity, continues to progress and is very likely the way of the future. The long-term advantages these trucks provide make a lot of sense. From an ecological standpoint they emit no exhaust and are less noisy. Additionally, these battery-powered, nearly self-driving vehicles are more efficient, less costly to maintain (they have no engine, transmission or drive shaft), and have better responsiveness, handling and acceleration than their diesel counterparts.

However, as promising as the future of electric trucks would appear to be, it may be some time before they overtake the conventional diesel powertrain due to several key factors. They are currently priced from \$150,000 to \$200,000 or more, significantly higher than the \$120,000 price tag for a comparable diesel rig. In addition, depending on the particular model, the distance they can travel on a single charge is limited to a range of 300 to 500 miles. Until the network of charging stations is expanded, this range limitation can present a major challenge for those drivers with strict delivery deadlines, who find themselves searching for the next charging station. There is currently no highway charging network suitable for heavy-duty vehicles, and with diesel fuel as cheap as it is, there's little incentive for operators to switch from conventional trucks. Also, although the battery life for electric trucks is significant, replacement battery packs can be costly. Finally, there is the question of consumer acceptance. People need to be convinced that change is a good thing. Nonetheless, manufacturers continue to work toward commercially viable electric trucks due to mounting pressure from governments to reduce pollutants from diesel fuel combustion and tackle greenhouse emissions. In that regard, and in what is a very competitive industry, no manufacturer wants to be left behind.

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About the Author

Joseph Santora, ASA is the Founder & Managing Partner of Irontrax LLC. Irontrax specializes in asset management, consulting, appraisal, and the remarketing of bank-owned construction, transportation, and mining equipment. Irontrax also consults for lease-end negotiations, workouts, and litigations. Santora sits on the American Society of Appraisers (ASA) Machinery & Technical Specialties Committee. He is also Past Vice Chair of the Ohio Contractors Association and current Conference Chairman for the ASA Asset Identification and Valuation Conference held in Cleveland each year, usually in June.

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