Rebar Detailing to Fabrication Workflows Using Building Information Modeling

Jeff Cochrane – Applied Systems Associates, Inc.

FB7276 The rebar fabrication industry has seen great progress in streamlining the rebar supply chain, from rebar estimating through detailing, fabrication, and installation. We can attribute much of this progress to the software used by rebar detailers and fabricators and to the integration of that software with the fabrication hardware. Still, there is an opportunity for the industry to improve how the rebar design is transformed into the product installed on site. Attendees will learn how to export 3D rebar detailed in Revit Structure Suite software to a leading rebar MIS (management information system) software product: Applied Systems Associates, Inc. (aSa). This process will drive fabrication processes in the shop and field. We will cover many topics, including effective practices for detailing rebar for fabrication, organizing rebar releases in Revit software, exporting data to aSa, and distributing 3D rebar data along the supply chain.

Learning Objectives

At the end of this class, you will be able to:

- Understand current workflow challenges in the rebar supply chain
- Create and manage releases, and export them to aSa for rebar fabrication
- Understand how rebar data can help drive efficiencies and quality in the field

About the Speaker

Jeff Cochrane grew up working in a family-owned rebar shop near Charlotte, North Carolina. He started in the shop operating and assisting with shearing and bending equipment before moving into the office, where he learned drafting, estimating, and detailing functions. After receiving a bachelor's degree in math and computer science from the University of North Carolina at Charlotte, he continued working in his parents' business, eventually taking on a position that combined estimating and detailing functions with sales responsibilities. During this time, he also began developing software to automate some of the operations of the business that he eventually began selling to other fabricators across the country. In 1998, he went to work for Applied Systems Associates, Inc. (aSa), the world's leading supplier of software for rebar fabricators. As director of Software Design, Jeff is responsible for the overall design of aSa's entire suite of products, with particular emphasis on engineering and operations modules.

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Who is aSa?

Company Overview

Founded in 1969, Applied Systems Associates, Inc. (aSa) was the first company in the world dedicated to developing software for the reinforcing steel industry … and rebar software is still the focus of our business. Today, we are the world's largest rebar software company. More than 6,000 users and 500 fabricating locations worldwide rely on aSa solutions.

With representatives in Australia, India, and the Middle East, and our headquarters near Pittsburgh, Pennsylvania, aSa offers nearly 24x7 service to our customers. Our software is currently available in seven different languages, and new languages will be added as we expand to serve new customers.

In addition to software, we provide computer systems, industrial controls, custom forms and supplies, multimedia training, material tracking equipment, and consulting services. aSa-developed procedures and presentation practices have become standards in the rebar industry. aSa is an active participant in the North American-based Concrete Reinforcing Steel Institute (CRSI).

Depth of staff and financial stability are important for any company. Our management team consists of 19 professionals who average more than 15 years of experience in our industry. Over the years the aSa staff has continued to grow and now stands at more than 60 employees.

Software Products

Reinforcing Systems

- Estimating
- Bar List/Order Entry
- Shearing
- Tags
- Scheduling/Planning
- Delivery Ticket
- Bundle Inventory
- Material Tracking
- Load Tracking

Business Solutions

- Rebar Financials
- Contract Management
- Job Pricing
- Inventory
- Sales Order
- Shipping
- Billing
- Accounts Receivable
- Field Placing
- Job Costing

Detailing

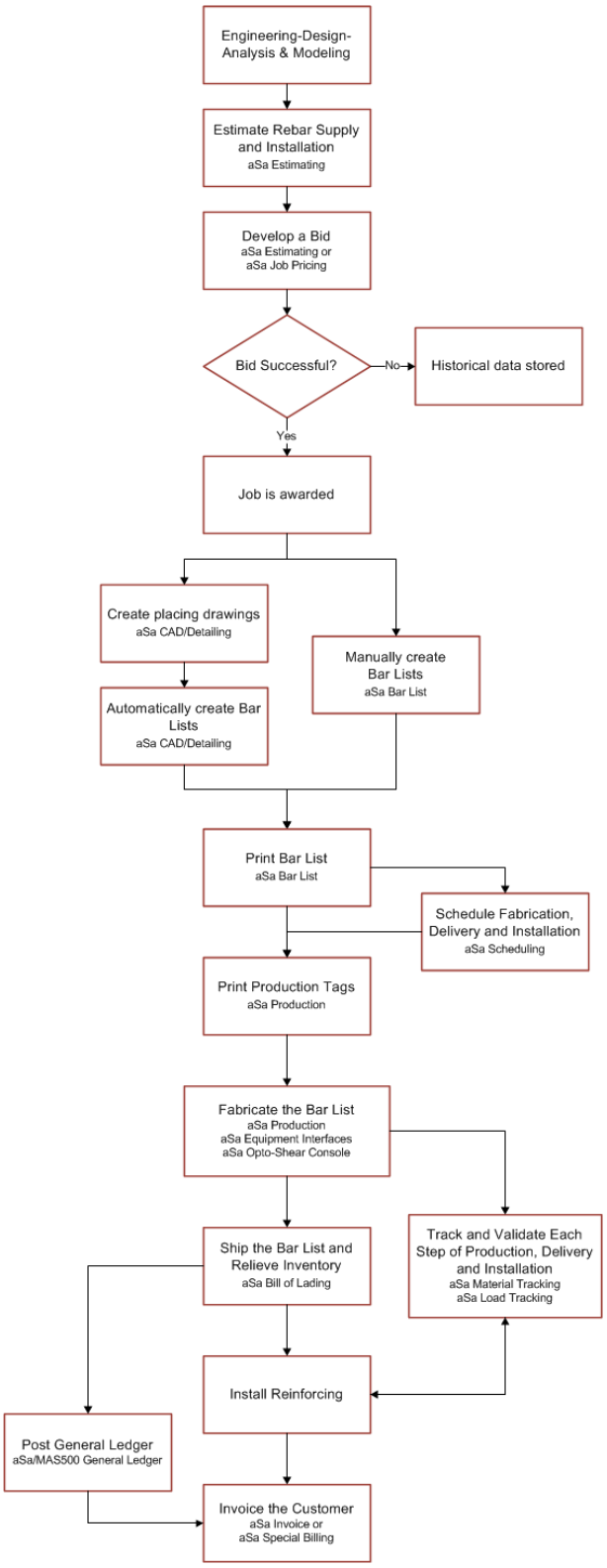
- aSa CAD/Detailing
- ProRebar® BIM Tools

Industrial Controls

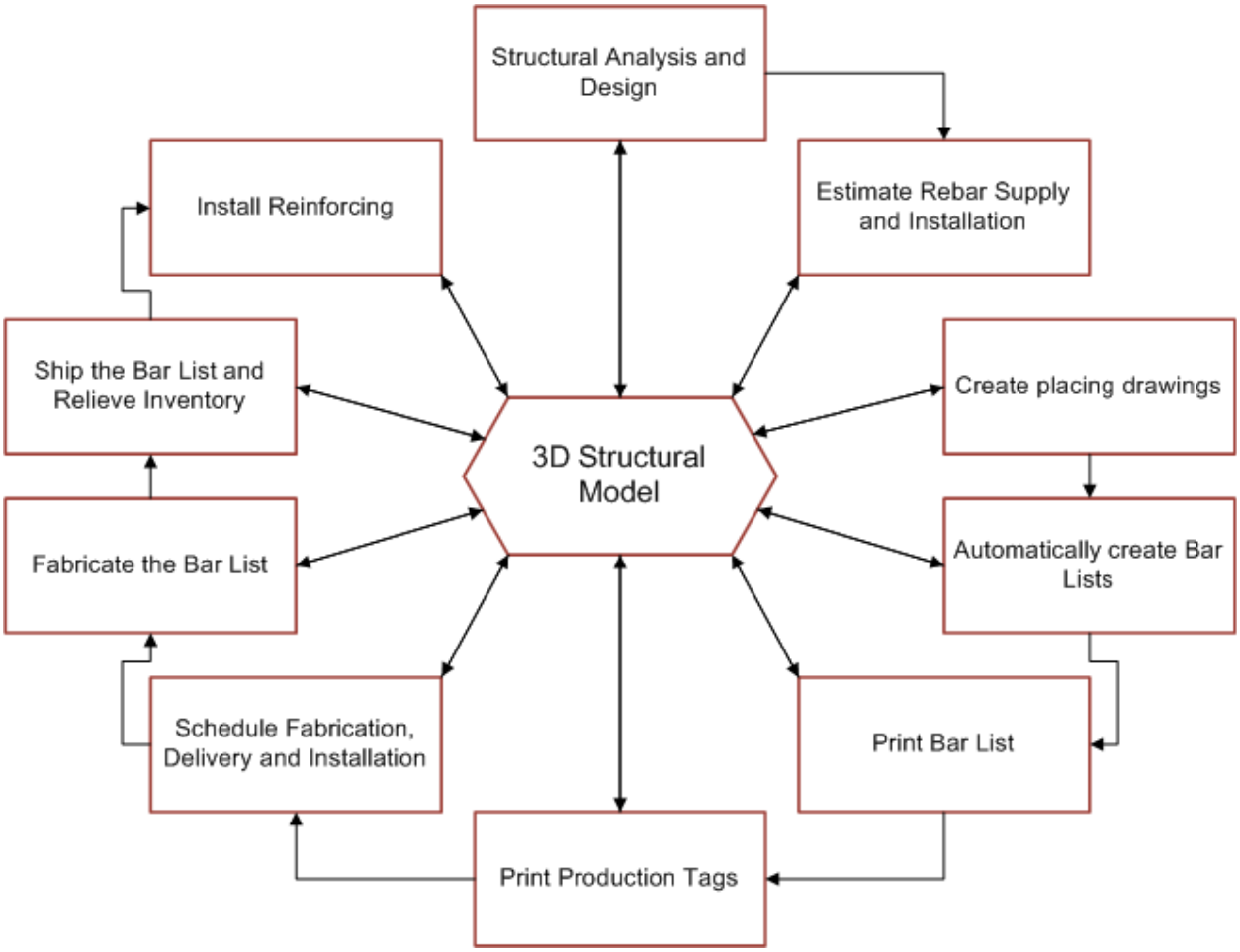
- Opto-Shear Console
- TouchTracker Industrial Touch-screen Terminal
- Equipment Interfaces to all major rebar fabrication equipment

Current workflow challenges in the rebar supply chain

The current process is fragmented and linear:



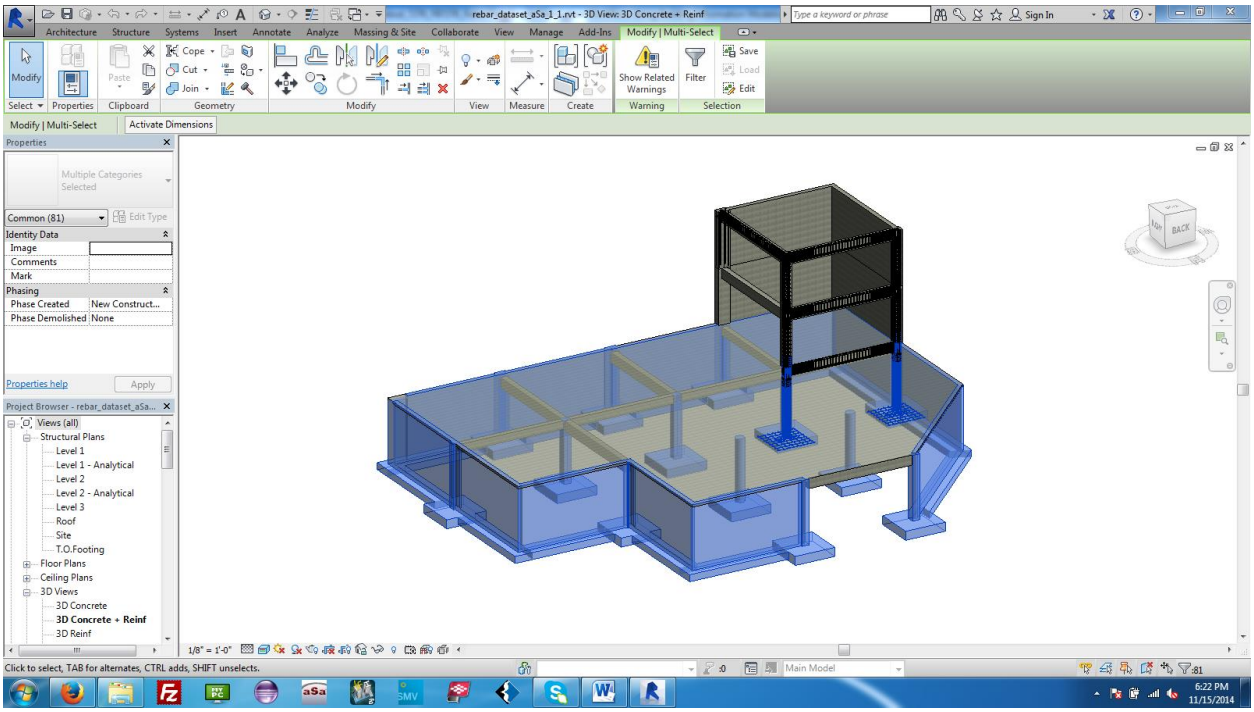
A more centralized approach would revolve around the 3D model, enabling better communication, change management, and decision making:



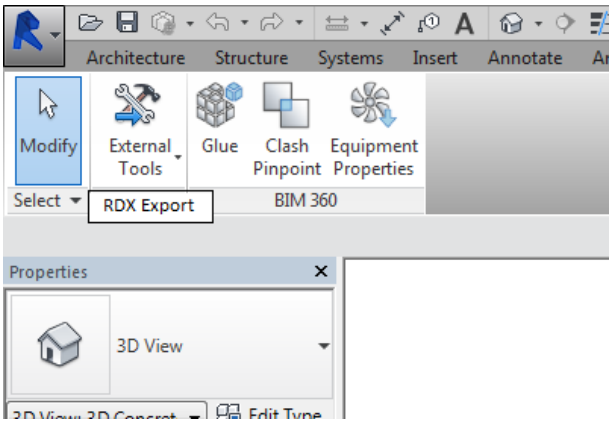
Create and manage releases, and export them to aSa for rebar fabrication

Export the release information to an RDX file

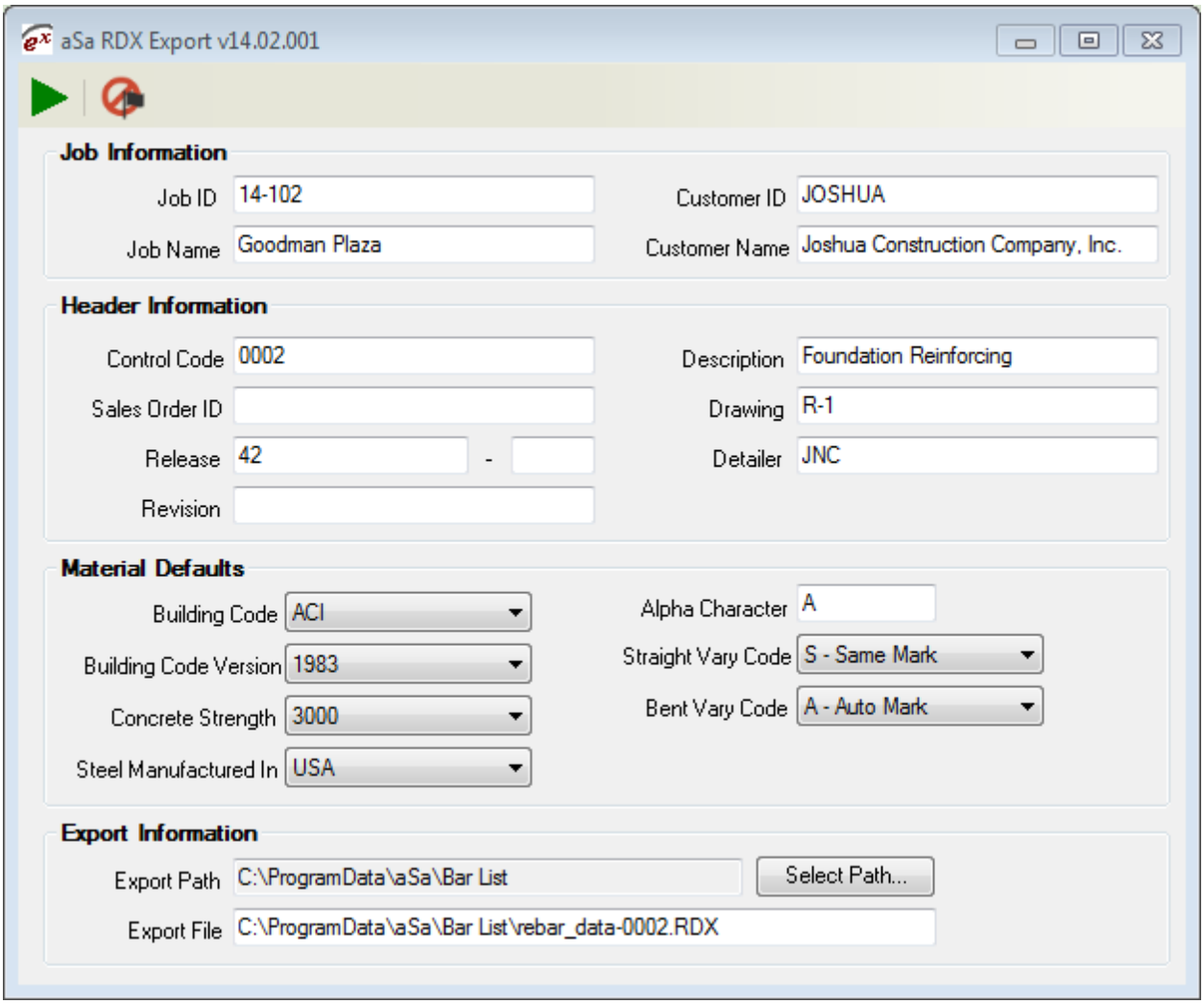
Open the 3D model in Revit and select the material to be released using any of the Revit selection methods:



From the ‘Add-Ins’ menu, open the ‘External Tools’ list and select ‘RDX Export’:



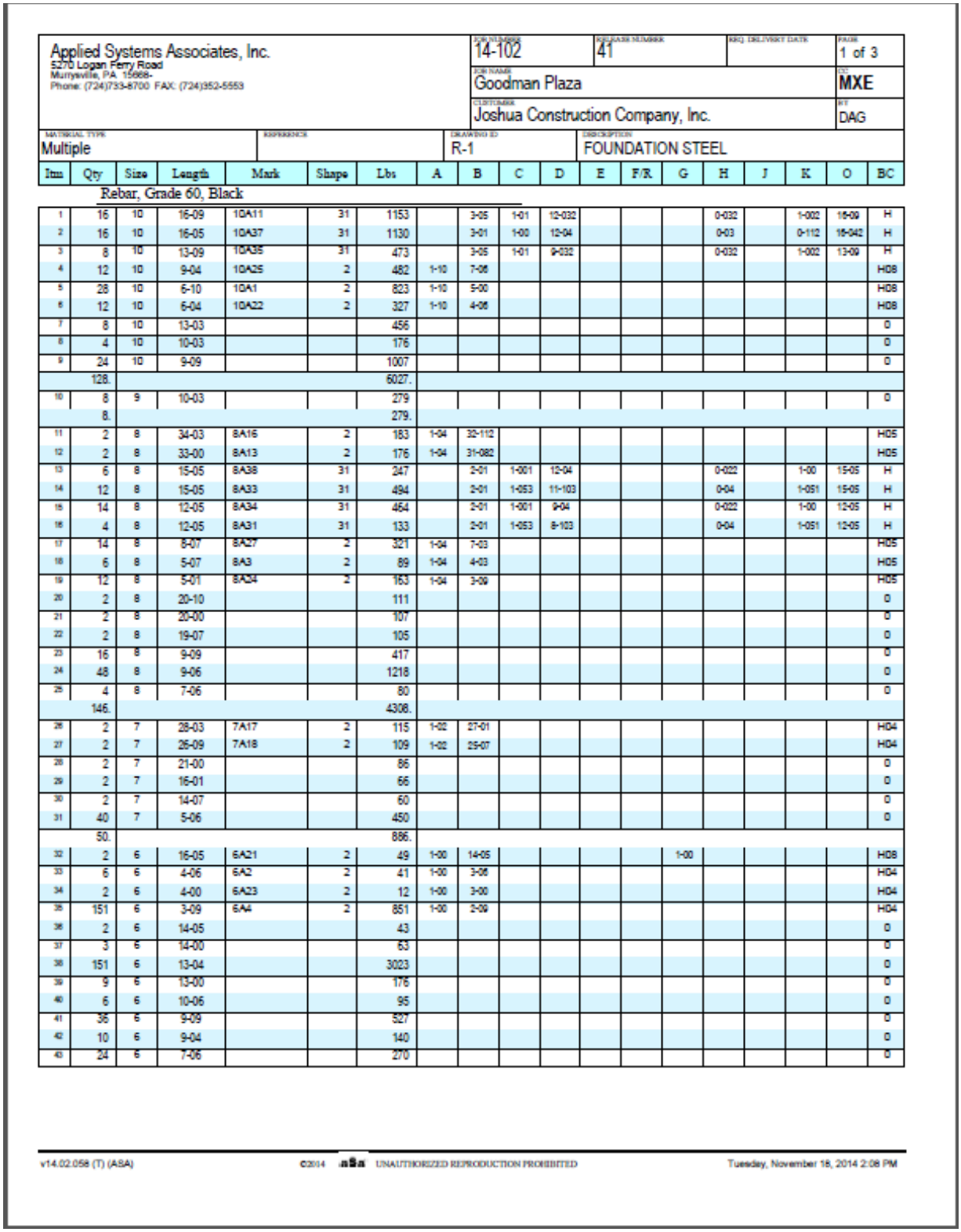
The following dialog displays. Fill in the necessary fields and click the ‘Proceed’ button:



The RDX file is exported and ready for use in the aSa Production system.

Import the file and run it through the production and fabrication process

After being imported into the aSa database, the release is ready to be run through production. First, a Bar List report (or bill of materials) is generated:



Applied Systems Associates, Inc.
5270 Logan Ferry Road
Murrysville, PA 15668-
Phone: (724)733-8700 FAX: (724)352-5553

JOB NUMBER: 14-102 | RELEASE NUMBER: 41 | REQ. DELIVERY DATE: | PAGE: 1 of 3
JOB NAME: Goodman Plaza | SET: MXE
CUSTOMER: Joshua Construction Company, Inc. | BY: DAG
MATERIAL TYPE: Multiple | REFERENCE: | DRAWING ID: R-1 | DESCRIPTION: FOUNDATION STEEL

Rebar, Grade 60, Black

Itm	Qty	Size	Length	Mark	Shape	Lbs	A	B	C	D	E	F/R	G	H	J	K	O	BC
1	16	10	16-09	10A11	31	1153		3-05	1-01	12-032				0-032		1-002	16-09	H
2	16	10	16-05	10A37	31	1130		3-01	1-00	12-04				0-03		0-112	16-042	H
3	8	10	13-09	10A35	31	473		3-05	1-01	9-032				0-032		1-002	13-09	H
4	12	10	9-04	10A25	2	482	1-10	7-06										H08
5	28	10	6-10	10A1	2	823	1-10	5-00										H08
6	12	10	6-04	10A22	2	327	1-10	4-06										H08
7	8	10	13-03			456												0
8	4	10	10-03			176												0
9	24	10	9-09			1007												0
	128.					6027.												
10	8	9	10-03			279												0
	8.					279.												
11	2	8	34-03	8A16	2	183	1-04	32-112										H05
12	2	8	33-00	8A13	2	176	1-04	31-082										H05
13	6	8	15-05	8A38	31	247		2-01	1-001	12-04				0-022		1-00	15-05	H
14	12	8	15-05	8A33	31	494		2-01	1-053	11-103				0-04		1-051	15-05	H
15	14	8	12-05	8A34	31	464		2-01	1-001	9-04				0-022		1-00	12-05	H
16	4	8	12-05	8A31	31	133		2-01	1-053	8-103				0-04		1-051	12-05	H
17	14	8	8-07	8A27	2	321	1-04	7-03										H05
18	6	8	5-07	8A3	2	89	1-04	4-03										H05
19	12	8	5-01	8A24	2	163	1-04	3-09										H05
20	2	8	20-10			111												0
21	2	8	20-00			107												0
22	2	8	19-07			105												0
23	16	8	9-09			417												0
24	48	8	9-06			1218												0
25	4	8	7-06			80												0
	146.					4308.												
26	2	7	28-03	7A17	2	115	1-02	27-01										H04
27	2	7	26-09	7A18	2	109	1-02	25-07										H04
28	2	7	21-00			86												0
29	2	7	16-01			66												0
30	2	7	14-07			60												0
31	40	7	5-06			450												0
	50.					886.												
32	2	6	16-05	6A21	2	49	1-00	14-05					1-00					H08
33	6	6	4-06	6A2	2	41	1-00	3-06										H04
34	2	6	4-00	6A23	2	12	1-00	3-00										H04
35	151	6	3-09	6A4	2	851	1-00	2-09										H04
36	2	6	14-05			43												0
37	3	6	14-00			63												0
38	151	6	13-04			3023												0
39	9	6	13-00			176												0
40	6	6	10-06			95												0
41	36	6	9-09			527												0
42	10	6	9-04			140												0
43	24	6	7-06			270												0

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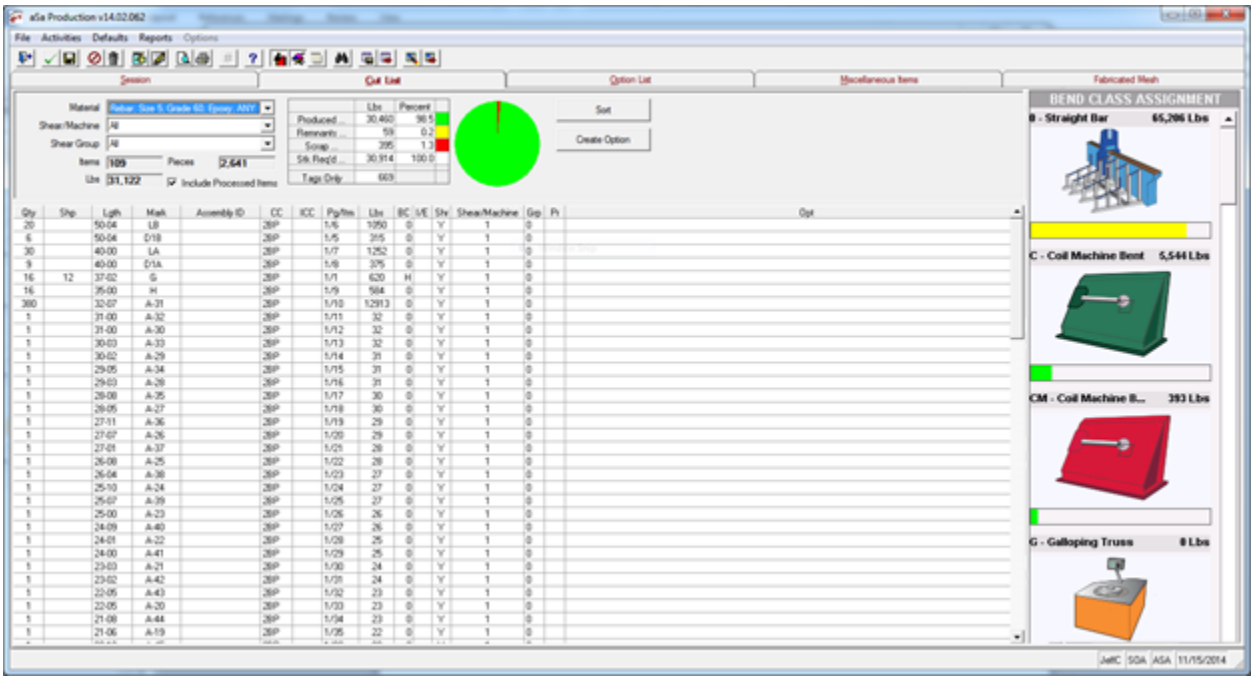
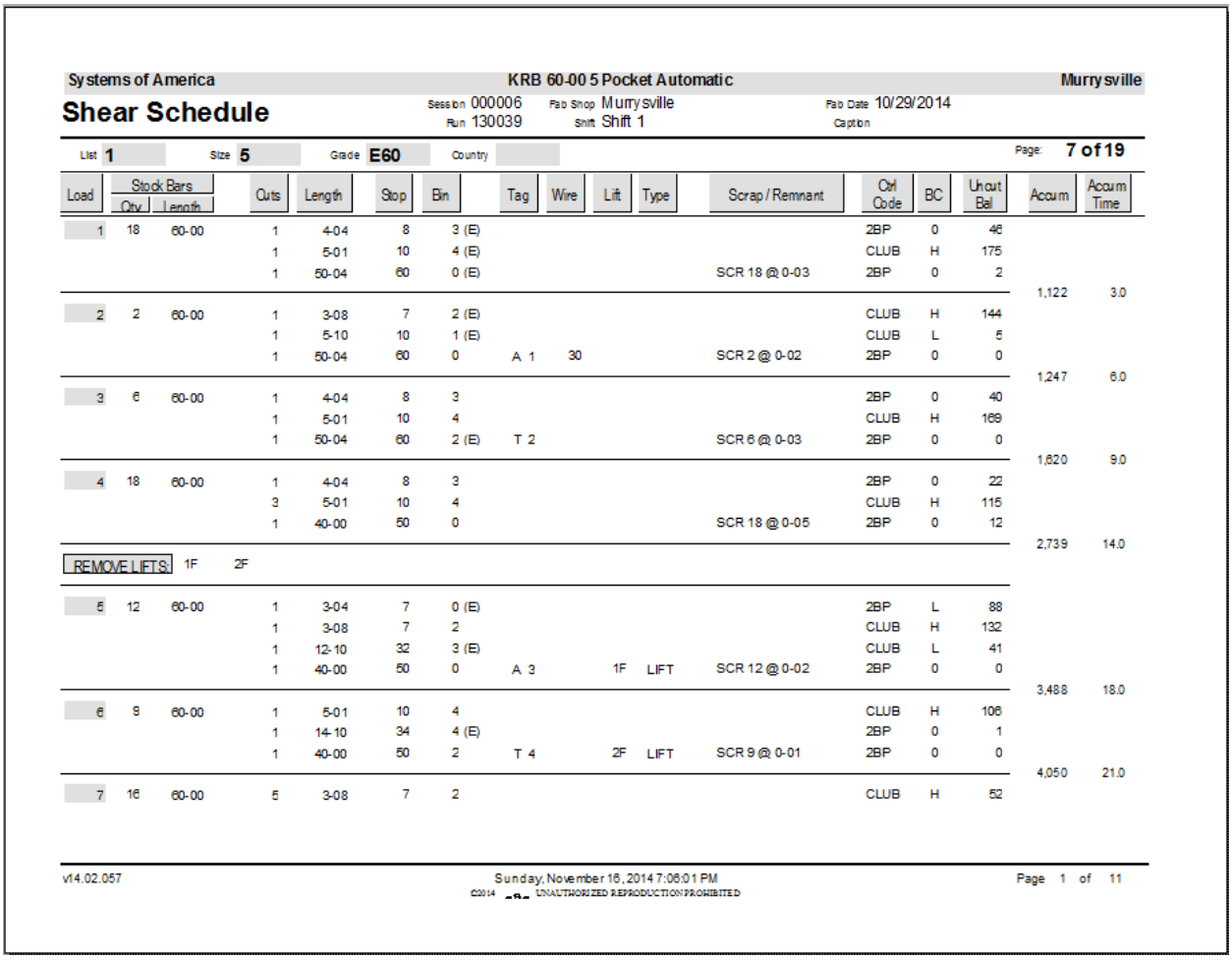
Next, an entire day's worth of releases are combined and fed into the production planning application. This program optimizes the cutting of the bars to provide better production rates with less scrap loss and improves material handling through the shop.



Among the output from the production program is the Shear Schedule Report, which provides detailed material handling instructions to the shop employees. This information can also be directly downloaded to most rebar machinery in use today.



Systems of America — KRB 60-00 5 Pocket Automatic — Murrysville

Shear Schedule

Session 000006 Run 130039 | Fab Shop Murrysville Shift Shift 1 | Fab Date 10/29/2014 Caption

List 1 | Size 5 | Grade E60 | Country | Page: 7 of 19

Load	Stock Bars Qty	Stock Bars Length	Cuts	Length	Stop	Bin	Tag	Wire	Lift	Type	Scrap / Remnant	Ctrl Code	BC	Uncut Bal	Accum	Accum Time
1	18	60-00	1	4-04	8	3 (E)						2BP	0	46		
			1	5-01	10	4 (E)						CLUB	H	175		
			1	50-04	60	0 (E)					SCR 18 @ 0-03	2BP	0	2		
															1,122	3.0
2	2	60-00	1	3-08	7	2 (E)						CLUB	H	144		
			1	5-10	10	1 (E)						CLUB	L	5		
			1	50-04	60	0	A 1	30			SCR 2 @ 0-02	2BP	0	0		
															1,247	6.0
3	6	60-00	1	4-04	8	3						2BP	0	40		
			1	5-01	10	4						CLUB	H	169		
			1	50-04	60	2 (E)	T 2				SCR 6 @ 0-03	2BP	0	0		
															1,620	9.0
4	18	60-00	1	4-04	8	3						2BP	0	22		
			3	5-01	10	4						CLUB	H	115		
			1	40-00	50	0					SCR 18 @ 0-05	2BP	0	12		
															2,739	14.0
REMOVE LIFTS:	1F	2F														
5	12	60-00	1	3-04	7	0 (E)						2BP	L	88		
			1	3-08	7	2						CLUB	H	132		
			1	12-10	32	3 (E)						CLUB	L	41		
			1	40-00	50	0	A 3		1F	LIFT	SCR 12 @ 0-02	2BP	0	0		
															3,488	18.0
6	9	60-00	1	5-01	10	4						CLUB	H	106		
			1	14-10	34	4 (E)						2BP	0	1		
			1	40-00	50	2	T 4		2F	LIFT	SCR 9 @ 0-01	2BP	0	0		
															4,050	21.0
7	16	60-00	5	3-08	7	2						CLUB	H	52		

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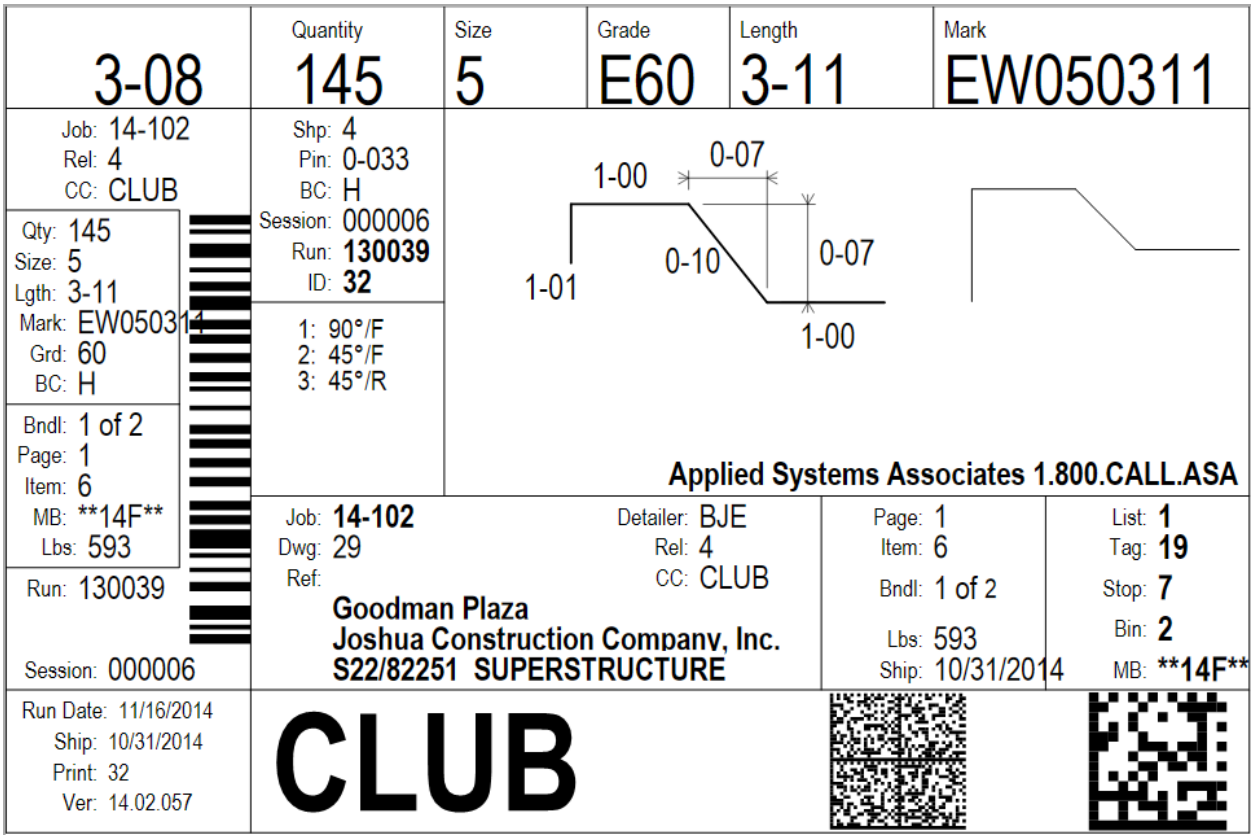
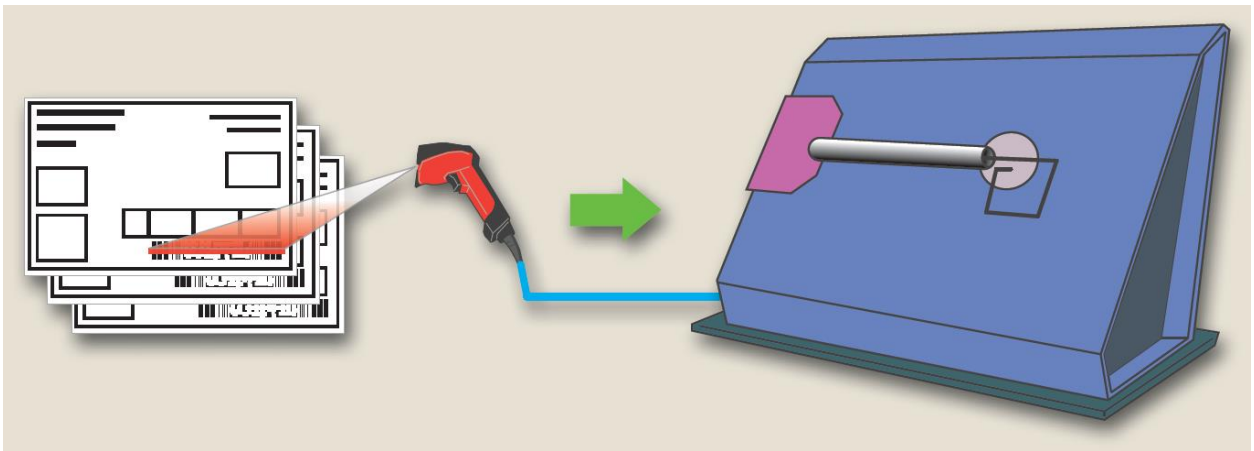
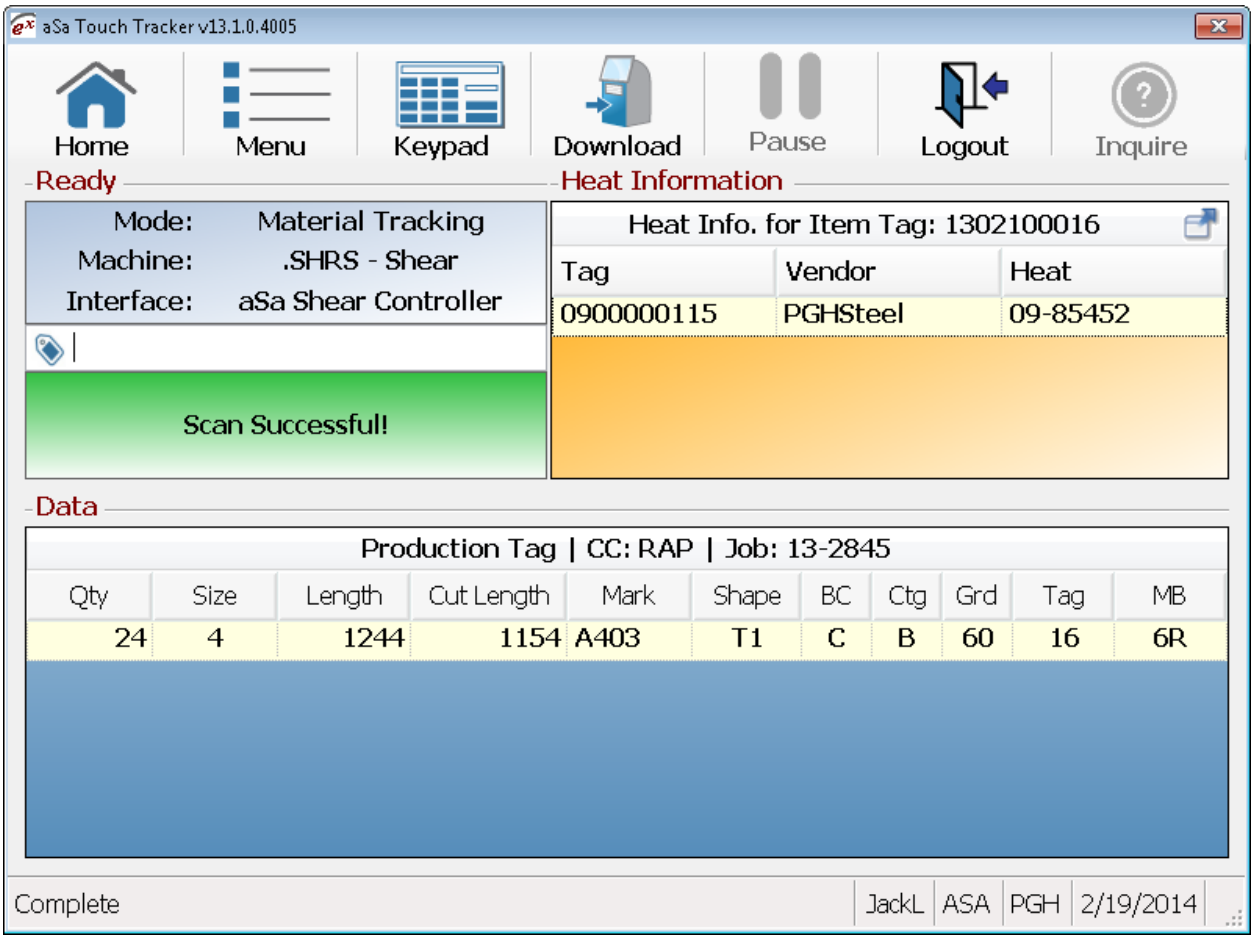
Bundle tags are also generated by the production application. These tags are printed on very durable material and are attached to every bundle of steel that leaves a shop.



The barcodes on the bundle tag are used for multiple purposes throughout the fabrication process. The first is for downloading instructions to fabricating equipment. Most modern rebar fabricating equipment has the ability to have a barcode scanner connected for the purpose of downloading instructions. Scanning a barcode on one of these machines will program it to fabricate the item.



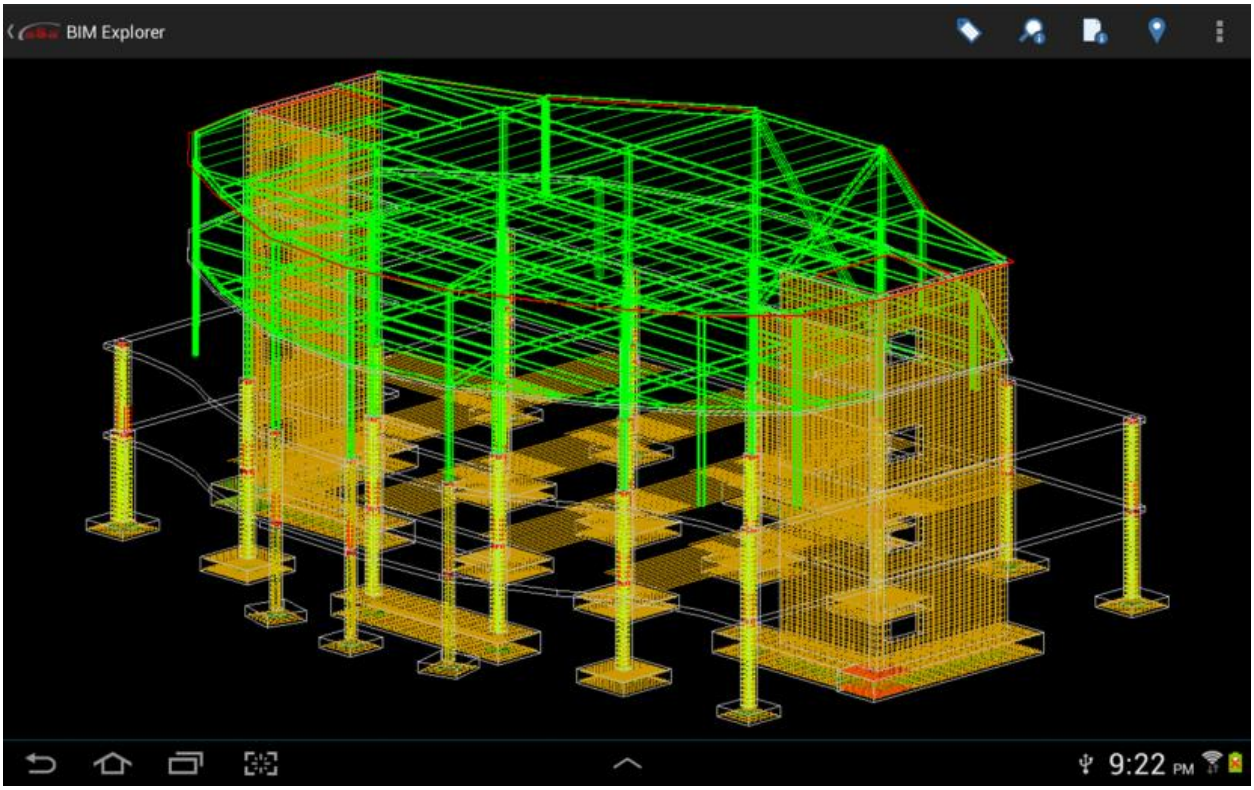
In addition to programming the machinery, barcodes can also be used to track an item as it moves through the fabrication process. Implementation of this type of system can provide a detailed record of every person who touches a bar from the time it's received from the mill until it is delivered and installed at the jobsite. Associations can also be made between the bundles of fabricated bars and the stock material that was used to fabricate them, allowing mill certifications to easily be provided on projects where they are required.



Rebar data helps drive efficiencies and quality in the field

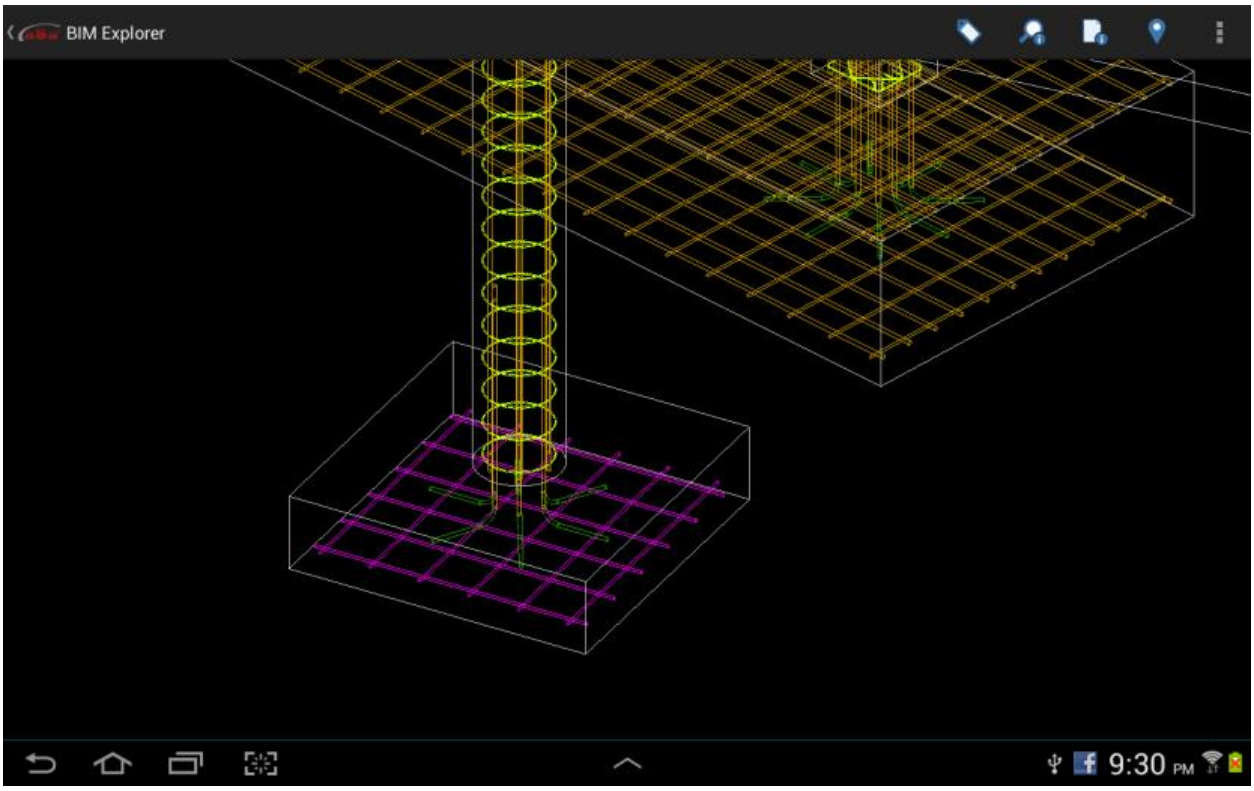
Once the material has made its way from the fabrication shop into the field, a combination of 'Cloud' technology and mobile applications can be used to bring model and fabrication data together to provide never before seen functionality to the jobsite.

3D models can now be viewed and interacted with on mobile devices. Many organizations are already beginning the process of doing away with paper drawings and moving in this direction.

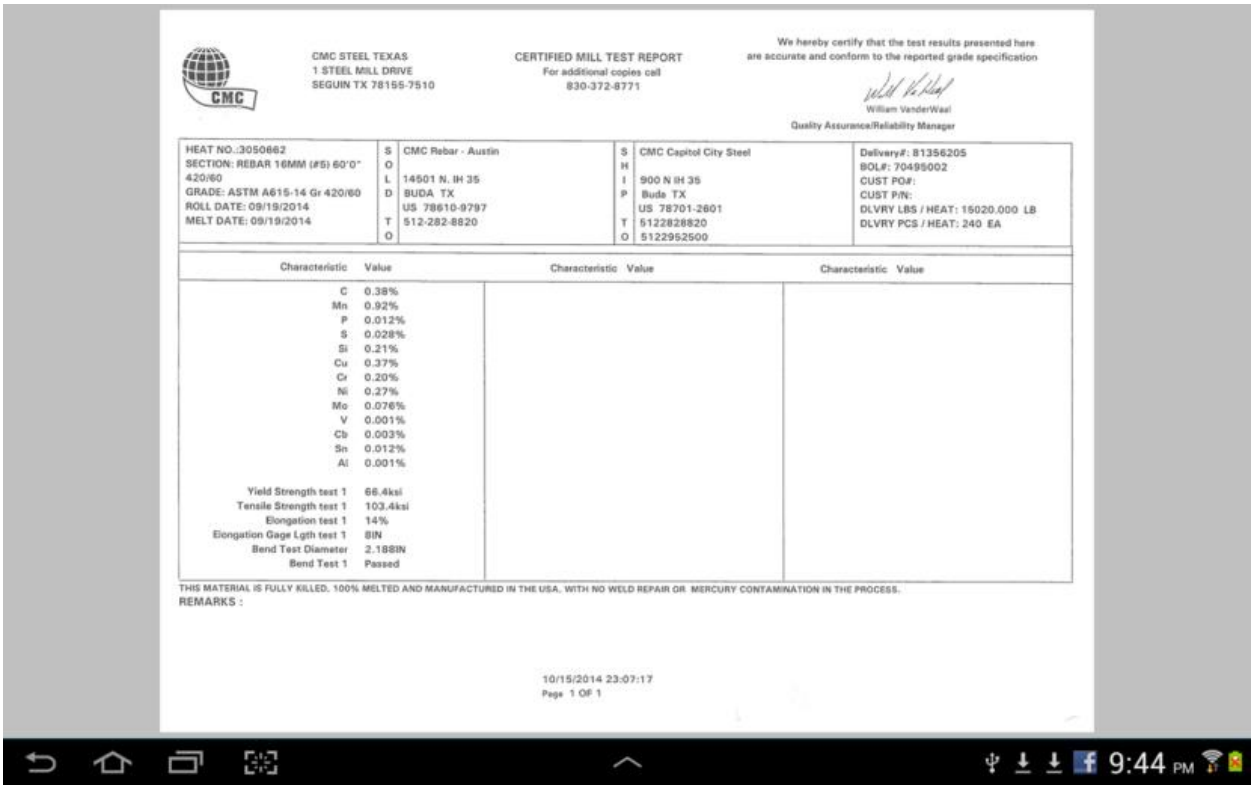


Now imagine the following scenario: You're on the construction site and have just received a delivery of steel from the fabricator. You have all of these bundles of steel lying around and no idea where they go. Simply activate the appropriate tool and use the device's built-in camera to scan the barcode on the bundle tag.

The matching bars can then be found in the model and the display updated to indicate their location.



Also, thanks to all of the scanning that took place during fabrication, we can select bars in the model and view any of the data that was captured, including the mill certifications of the stock bars that were used in their production.



CMC STEEL TEXAS
1 STEEL MILL DRIVE
SEGUIN TX 78155-7510

CERTIFIED MILL TEST REPORT
For additional copies call
830-372-8771

We hereby certify that the test results presented here are accurate and conform to the reported grade specification

William VanderWaal
Quality Assurance/Reliability Manager

HEAT NO.:3050662 SECTION: REBAR 16MM (#5) 60'0" 420/60 GRADE: ASTM A615-14 Gr 420/60 ROLL DATE: 09/19/2014 MELT DATE: 09/19/2014	SOLD TO	CMC Rebar - Austin 14501 N. IH 35 BUDA TX US 78610-9797 512-282-8820	SHIP TO	CMC Capitol City Steel 900 N IH 35 Buda TX US 78701-2601 5122828820 5122952500	Delivery#: 81356205 BOL#: 70495002 CUST PO#: CUST P/N: DLVRY LBS / HEAT: 15020.000 LB DLVRY PCS / HEAT: 240 EA

Characteristic	Value	Characteristic	Value	Characteristic	Value
C	0.38%				
Mn	0.92%				
P	0.012%				
S	0.028%				
Si	0.21%				
Cu	0.37%				
Cr	0.20%				
Ni	0.27%				
Mo	0.076%				
V	0.001%				
Cb	0.003%				
Sn	0.012%				
Al	0.001%				
Yield Strength test 1	66.4ksi				
Tensile Strength test 1	103.4ksi				
Elongation test 1	14%				
Elongation Gage Lgth test 1	8IN				
Bend Test Diameter	2.188IN				
Bend Test 1	Passed				

THIS MATERIAL IS FULLY KILLED, 100% MELTED AND MANUFACTURED IN THE USA, WITH NO WELD REPAIR OR MERCURY CONTAMINATION IN THE PROCESS.
REMARKS :

10/15/2014 23:07:17
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9:44 PM

Finally, when the reinforcing has been installed, the status in the production database can be updated with just a few taps on the mobile device. This allows extremely accurate and up-to-the minute information to be captured and used for progress billing and other reporting purposes.

Thank you for attending!

FB7276 - Rebar Detailing to Fabrication Workflows Using Building Information Modeling

If you have any questions or would like to discuss any of these topics in more detail, please don't hesitate to contact us:

Applied Systems Associates, Inc.
724.733.8700
www.asarebar.com