

Model-Based Steel Fabrication: Connecting the Model to Fabrication (and Back)

Chris Moor

V.P. North America – Steel Projects Corp | A FICEP Group Company

@chrisamoor



About us



- Part of FICEP Group
 - Global leader in design/manufacture of CNC equipment and integrated systems
 - Est. 1934
- Steel Projects
 - Software 'division'
 - 1,500+ customers
 - 90+ countries
 - Est. 1994
 - Focused on Steel Fabrication



Class summary

When 3D modeling replaced 2D CAD, only the detailing method changed—not the way data gets transferred to steel fabricators. So, while detailers benefited, steel fabricators are still getting the same information in the same format.

Now it's possible for fabricators to extract better information from the Advance Steel software model using AISC's IFC for Steel Fabrication Specification.

The new workflow involves sending a single file that a fabricator can use to extract all the information needed for fabrication. From there, it's possible to manage and organize the project ready for fabrication, optimize material, and create the data required to drive and track computer numerical control or manual workstations.

This class will work through the process and review the benefits of model-based fabrication.



Key learning objectives

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

- Understand the benefits of using model-based exchange over file-based exchange
- Understand how fabricators can utilize model-based information to organize and track steel fabrication
- Discover the IFC specification for Steel Fabrication and how and why it was developed
- Understand the importance of having a digital representation of the capabilities of a fabricator workshop

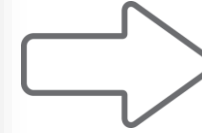
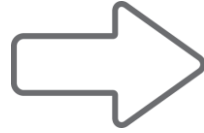


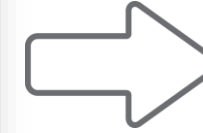
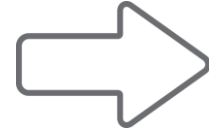
Introduction

A Brief History of Driving Shop Floor Production

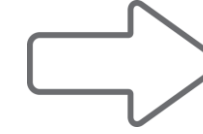
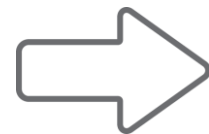








Drive your production



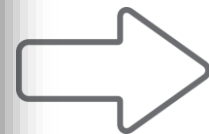
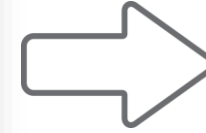
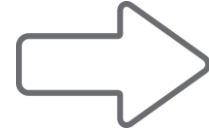
GTL Log

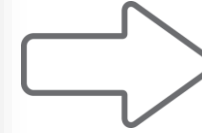
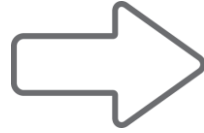
SERIAL	NUMBER	DATE	INV#	MODEL	BRIDGE	CONTROL	NECK	COLOR	PO
	27397	1/16/91	24713	3 SC3	4G11	55L	62RW	7BLK	334
	27398	10/24/90	4637	ASAT	N/V	2C	2MP	BLD	356
1	27399	11/8/90	4608	SC3	G1L	3C	2RW	WHITE	346
2	27400	9-27-90	116114	S-500			5HP	BLK	382
3	27401	11/10/90	4647	NEW S-500	G1L	4C	2MPL	BLACK	381
4	27402								AVG24814
5	27403	12/6/90	4681	KEY	G1L	3C	2EW	BLOND	356
6	27404	11/28/90	4684	ASAT	N/V	2C	2MP	BLOND	372
7	27405	12/3/90	4687	ASAT	N/V	2C	2MPL	BLK	355
8	27406	10/30/90	4661A	ASAT	N/V	3C	2RW	BLOND	371
9	27407	9-6-90	4634	Bm S/S			5HP	C-513	344
10									

REMARKS
Unit moved from base camp to site 10.30 am. 8-10.30 Camera crew out. Hotties for Mitchell Camera which was delivered from Customs 9.00 16.4.91. Two hour delay on Mitchell Camera due to the fact it was sent out with faulty cable. Tower Hotties fell from tower during shooting. Sir Bruce shot in leg by arrow during shooting, accident report to follow. Jack Curran searching for Rich. Call from home. He stills taken due to equipment still held by customs.

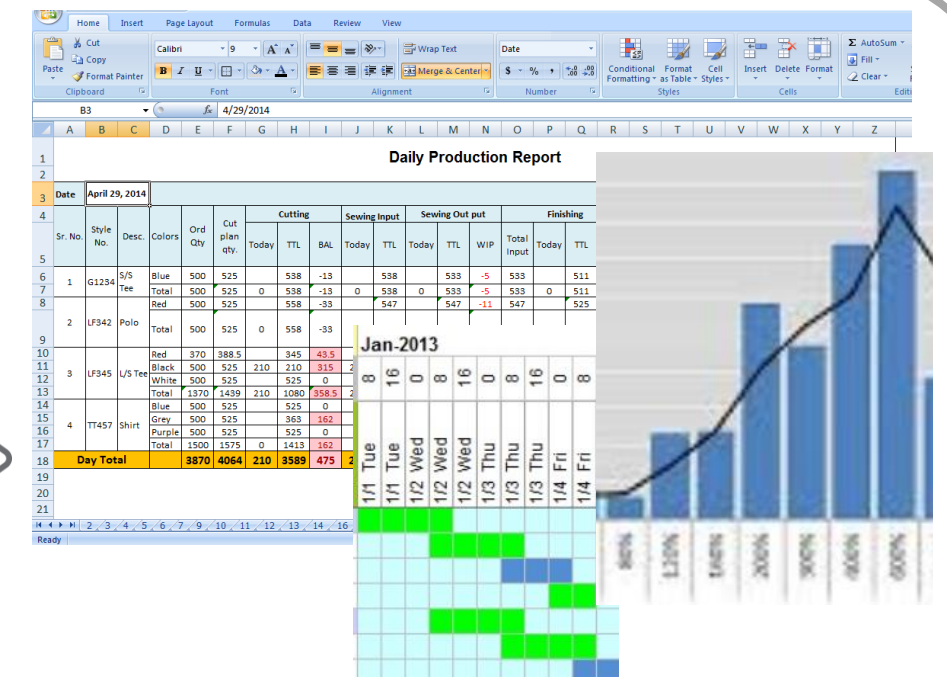
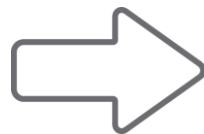
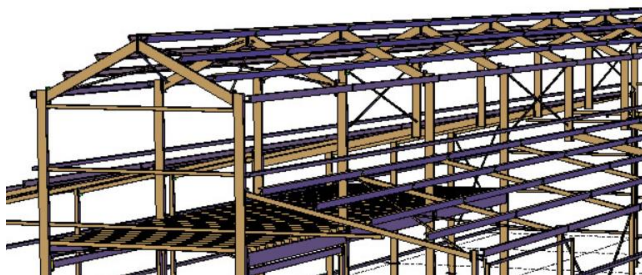
PREVIOUSLY REPORTED
10/24/90
PO DATE

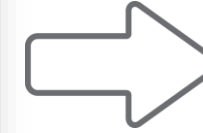
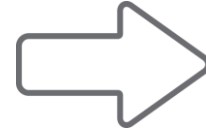
SIGNED
John Goodson

[illegible]

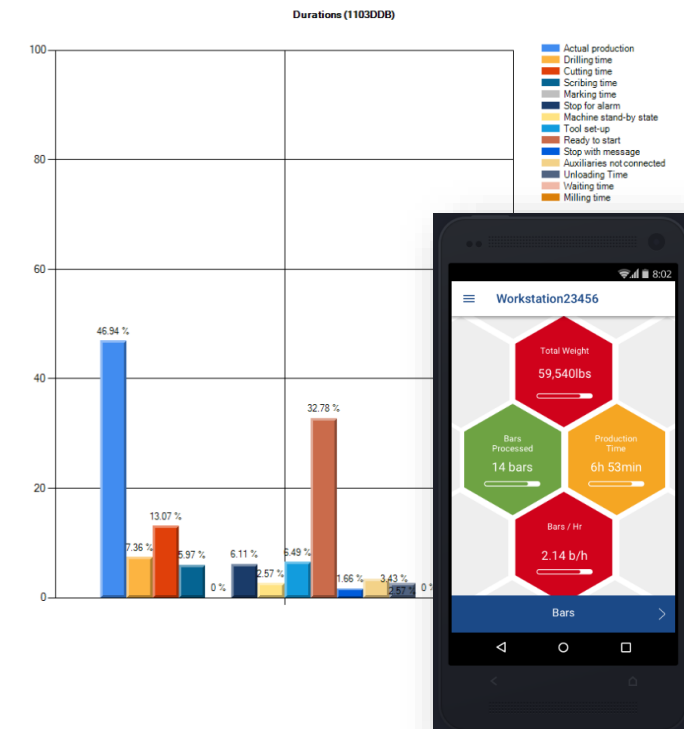
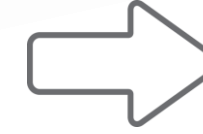
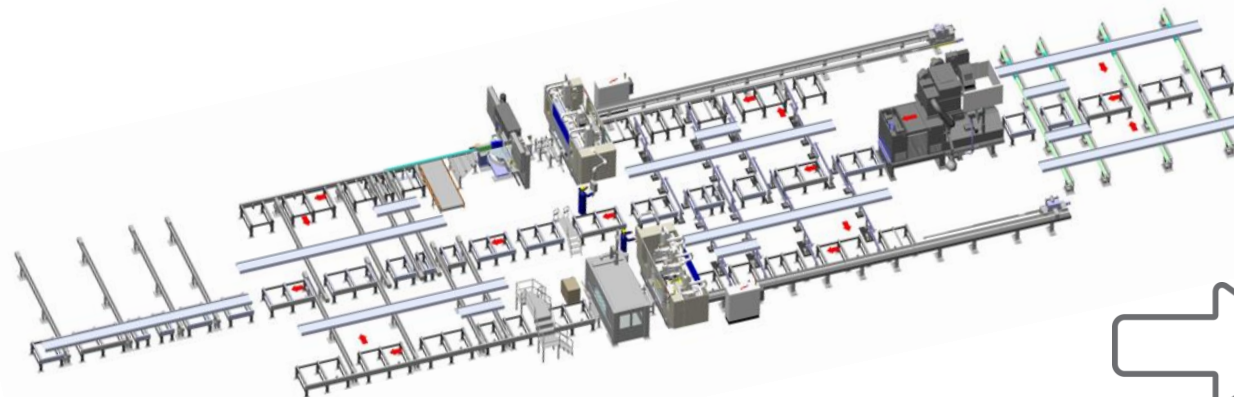
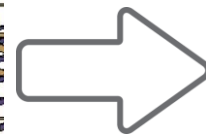
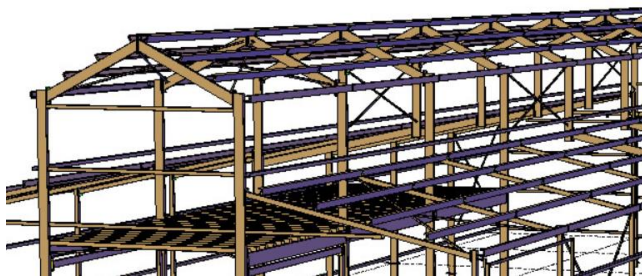


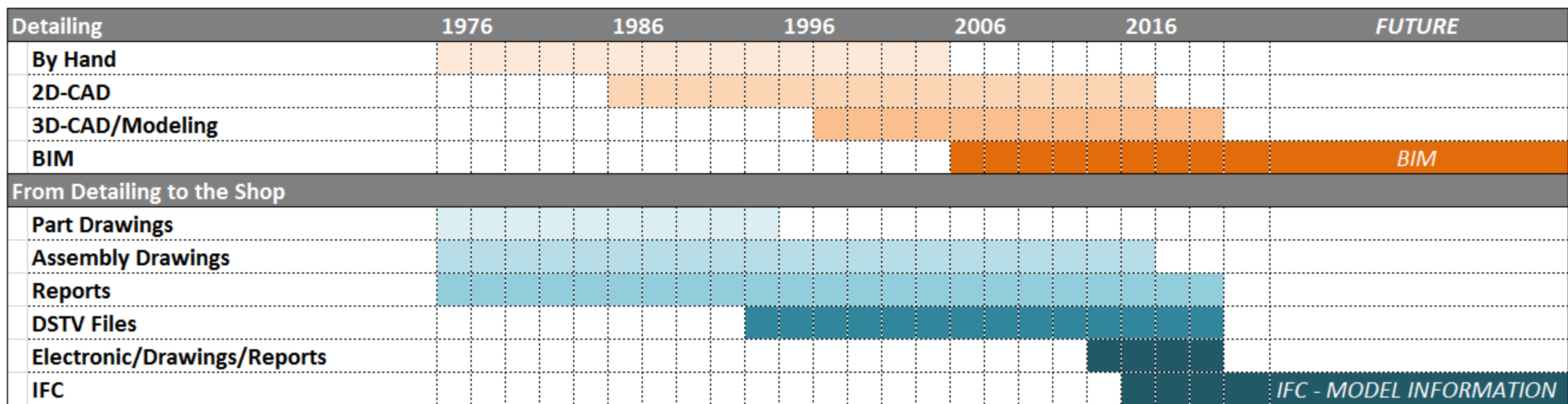
Drive your production





Drive your production





FUTURE



Shop Floor Capability

[illegible]

FUTURE

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100																																																																																																													
Population	7,811,000	7,860,000	7,909,000	7,958,000	8,007,000	8,056,000	8,105,000	8,154,000	8,203,000	8,252,000	8,301,000	8,350,000	8,399,000	8,448,000	8,497,000	8,546,000	8,595,000	8,644,000	8,693,000	8,742,000	8,791,000	8,840,000	8,889,000	8,938,000	8,987,000	9,036,000	9,085,000	9,134,000	9,183,000	9,232,000	9,281,000	9,330,000	9,379,000	9,428,000	9,477,000	9,526,000	9,575,000	9,624,000	9,673,000	9,722,000	9,771,000	9,820,000	9,869,000	9,918,000	9,967,000	10,016,000	10,065,000	10,114,000	10,163,000	10,212,000	10,261,000	10,310,000	10,359,000	10,408,000	10,457,000	10,506,000	10,555,000	10,604,000	10,653,000	10,702,000	10,751,000	10,800,000	10,849,000	10,898,000	10,947,000	10,996,000	11,045,000	11,094,000	11,143,000	11,192,000	11,241,000	11,290,000	11,339,000	11,388,000	11,437,000	11,486,000	11,535,000	11,584,000	11,633,000	11,682,000	11,731,000	11,780,000	11,829,000	11,878,000	11,927,000	11,976,000	12,025,000	12,074,000	12,123,000	12,172,000	12,221,000	12,270,000	12,319,000	12,368,000	12,417,000	12,466,000	12,515,000	12,564,000	12,613,000	12,662,000	12,711,000	12,760,000	12,809,000	12,858,000	12,907,000	12,956,000	13,005,000	13,054,000	13,103,000	13,152,000	13,201,000	13,250,000	13,299,000	13,348,000	13,397,000	13,446,000	13,495,000	13,544,000	13,593,000	13,642,000	13,691,000	13,740,000	13,789,000	13,838,000	13,887,000	13,936,000	13,985,000	14,034,000	14,083,000	14,132,000	14,181,000	14,230,000	14,279,000	14,328,000	14,377,000	14,426,000	14,475,000	14,524,000	14,573,000	14,622,000	14,671,000	14,720,000	14,769,000	14,818,000	14,867,000	14,916,000	14,965,000	15,014,000	15,063,000	15,112,000	15,161,000	15,210,000	15,259,000	15,308,000	15,357,000	15,406,000	15,455,000	15,504,000	15,553,000	15,602,000	15,651,000	15,700,000	15,749,000	15,798,000	15,847,000	15,896,000	15,945,000	15,994,000	16,043,000	16,092,000	16,141,000	16,190,000	16,239,000	16,288,000	16,337,000	16,386,000	16,435,000	16,484,000	16,533,000	16,582,000	16,631,000	16,680,000	16,729,000	16,778,000	16,827,000	16,876,000	16,925,000	16,974,000	17,023,000	17,072,000	17,121,000	17,170,000	17,219,000	17,268,000	17,317,000	17,366,000	17,415,000	17,464,000	17,513,000	17,56

Detailing	1976				1986				1996				2006				2016				FUTURE			
By Hand																								
2D-CAD																								
3D-CAD/Modeling																								
BIM																								
From Detailing to the Shop																								
Part Drawings																								
Assembly Drawings																								
Reports																								
DSTV Files																								
Electronic/Drawings/Reports																								
IFC																								
Shop Floor Capability																								
Manual Equipment																								
CNC - Manual Programming																								
CNC - Automatic Programming																								
Automatic Factories/Linked Machines																								
Robotic Welders/Assemblers																								
Production Feedback/Diagnostics																								
Manual																								
MIS/Manual																								
Shop Floor Remote Capture																								
Automatic Feedback																								



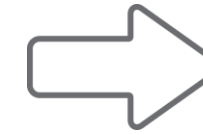
Detailing	1976	1986	1996	2006	2016	FUTURE
By Hand						
2D-CAD						
3D-CAD/Modeling						
BIM						BIM
From Detailing to the Shop						
Part Drawings						
Assembly Drawings						
Reports						
DSTV Files						
Electronic/Drawings/Reports						
IFC						IFC - MODEL INFORMATION
Shop Floor Capability						
Manual Equipment						
CNC - Manual Programming						
CNC - Automatic Programming						CNC
Automatic Factories/Linked Machines						INTELLIGENT FACTORIES
Robotic Welders/Assemblers						ROBOTICS
Production Feedback/Diagnostics						
Manual						
MIS/Manual						
Shop Floor Remote Capture						MOBILE APPS/CAPTURE
Automatic Feedback						AUTOMATIC UPDATES



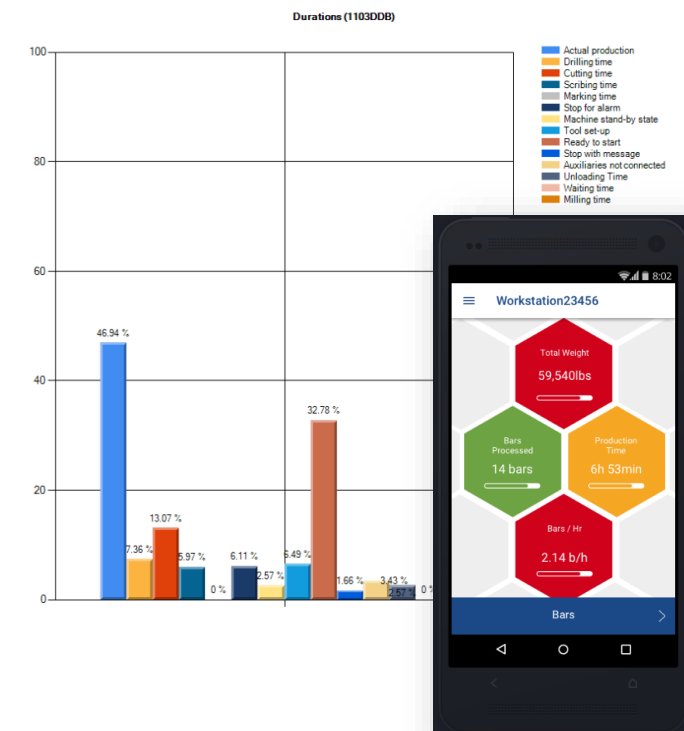
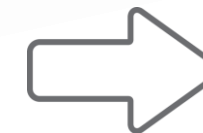
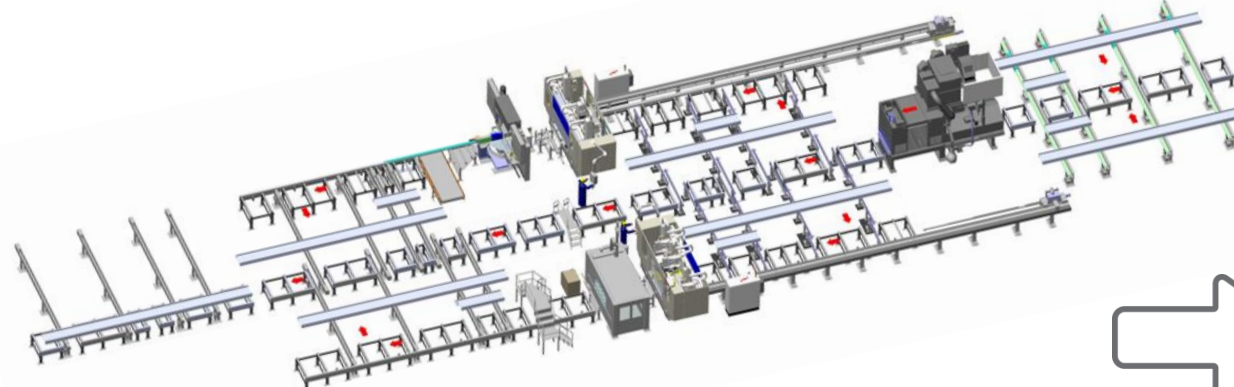
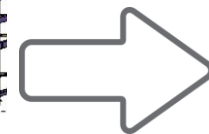
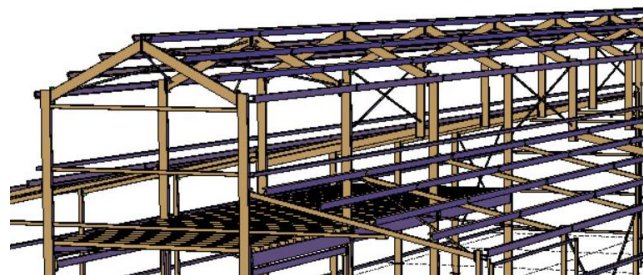
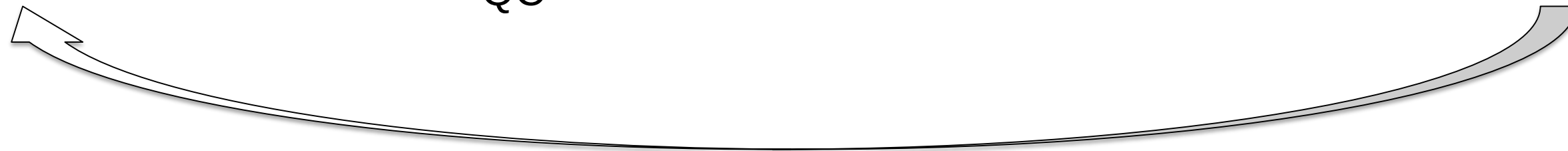
BIM

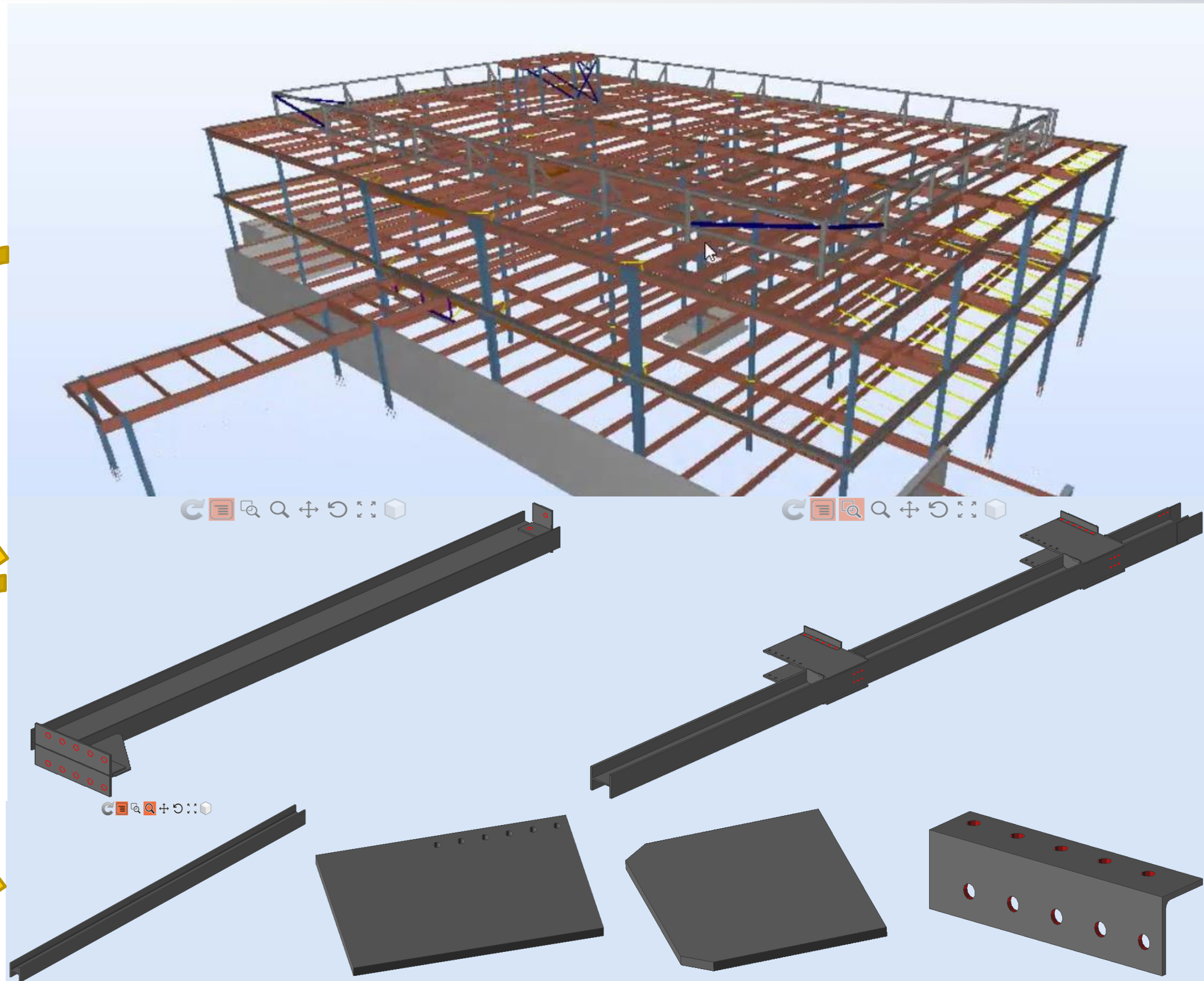


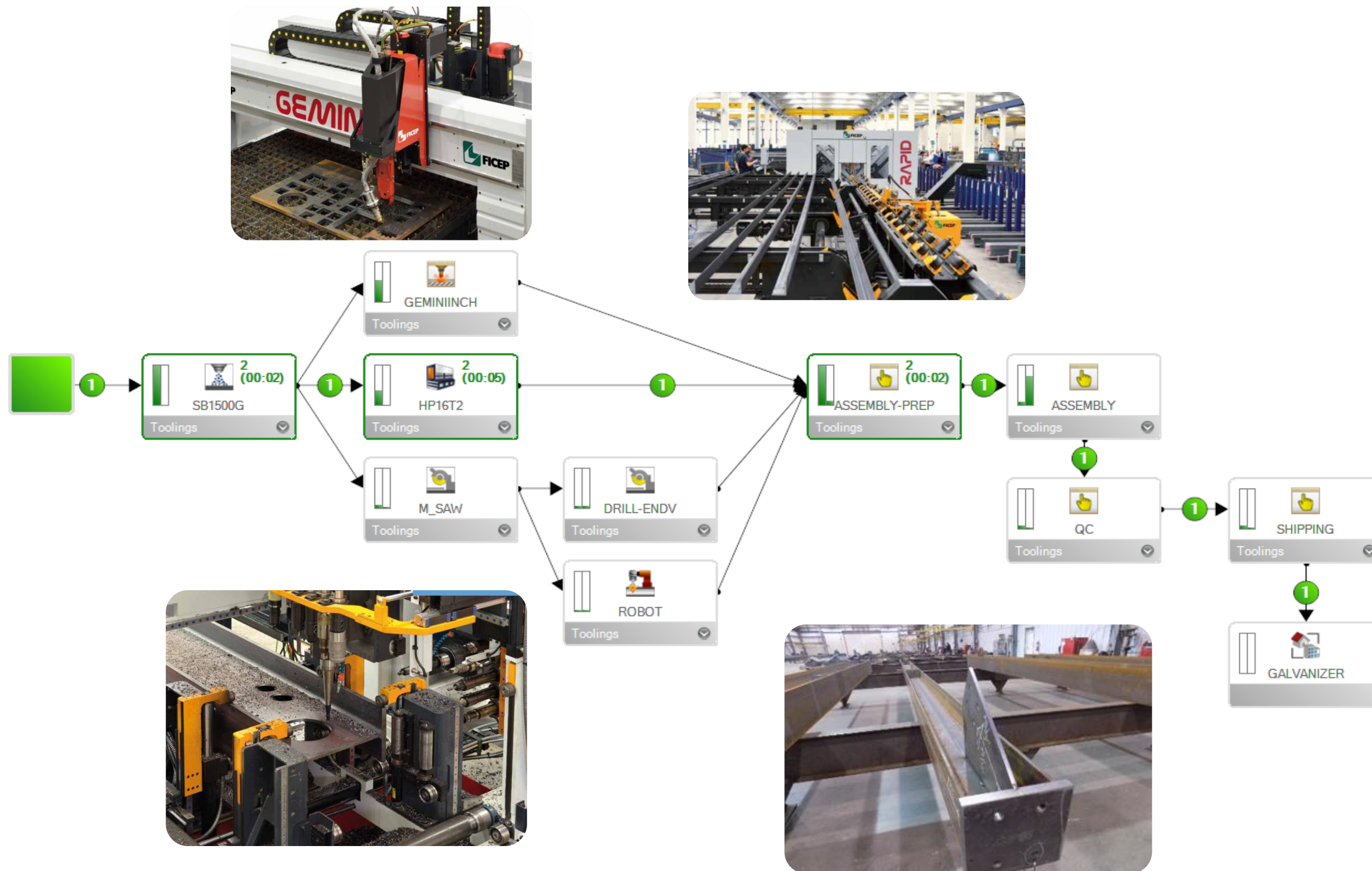
- CNC Equipment
- Automatic Factories
- Robotics
- Assembly Stations Model Data (assembly views, material list)
- QC

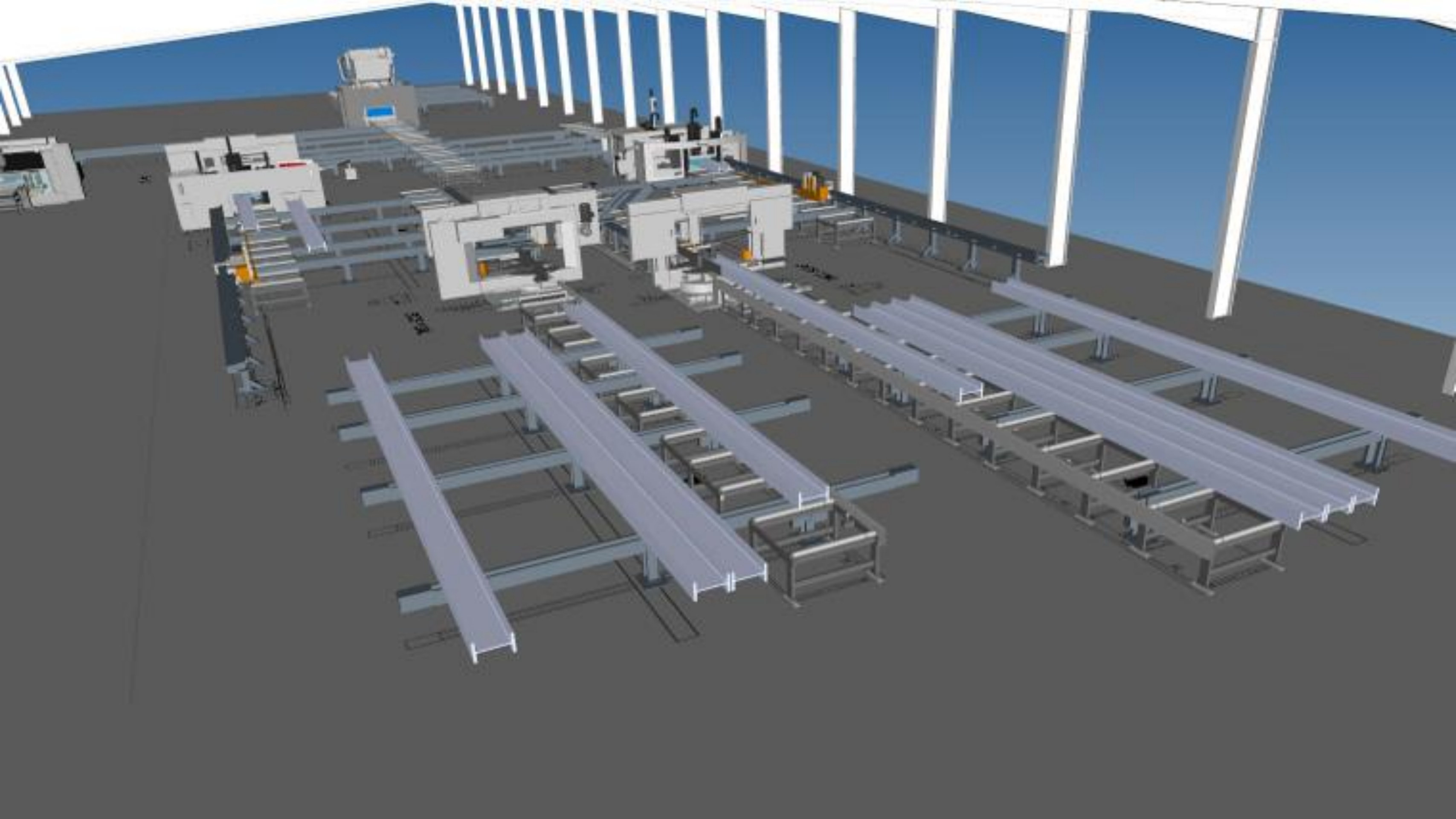


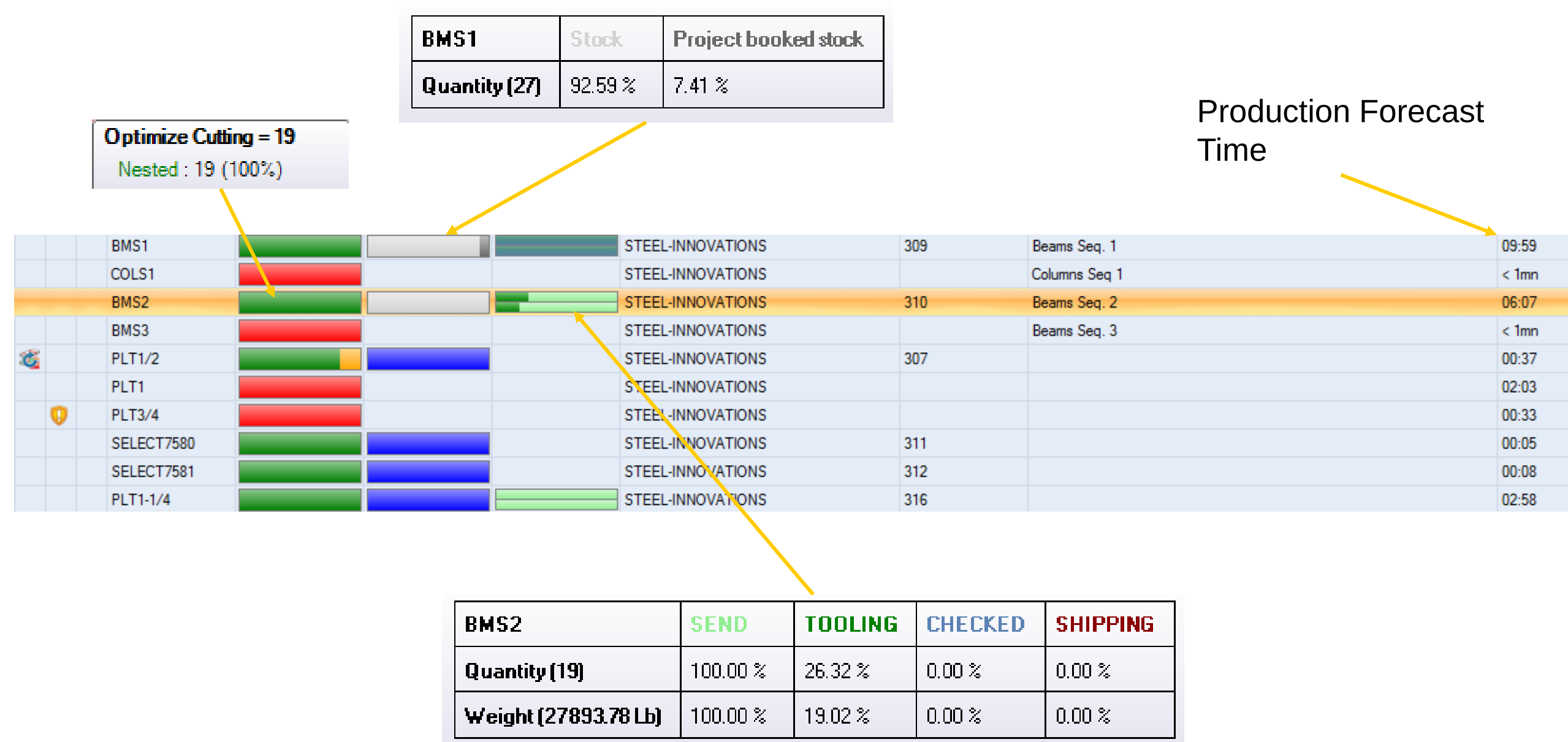
- Automatic Capture
- Mobile Apps – Accessible Data







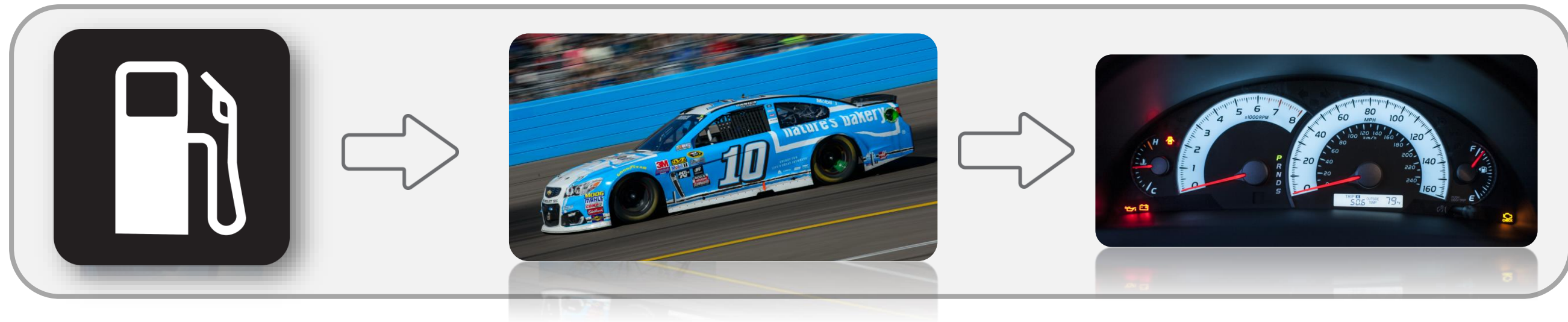




The Model Based Steel Fabrication Process



The Model Based Steel Fabrication Process

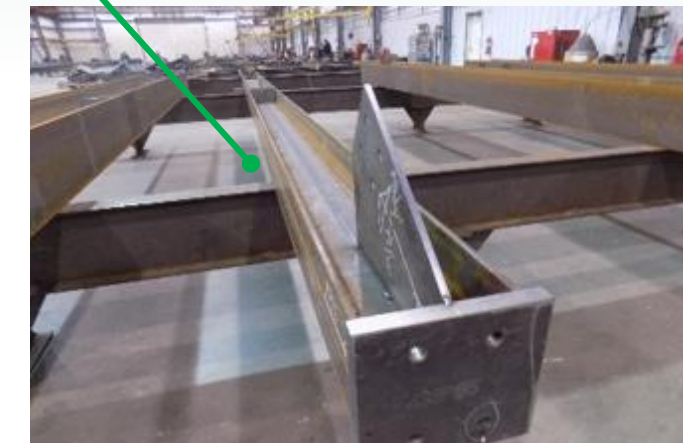
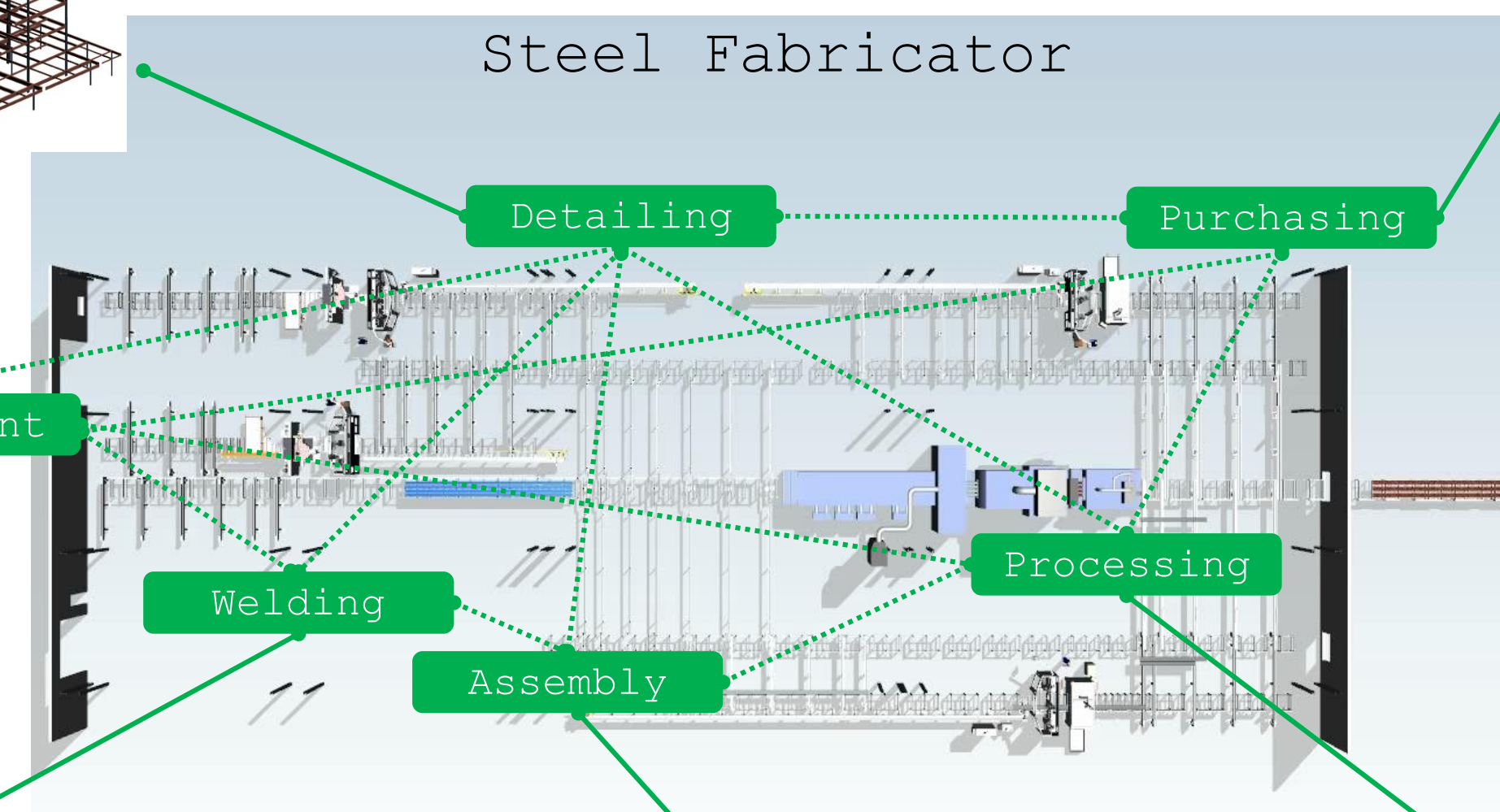
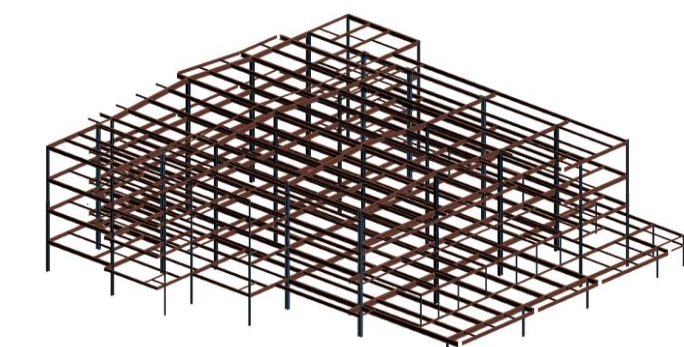


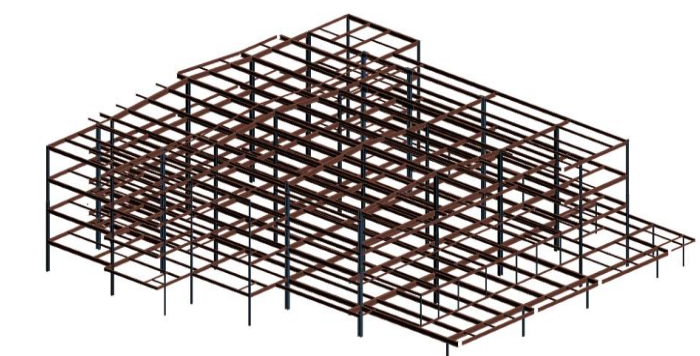
1. Build a Digital Workshop
2. Import Knowledge – and Check the Imported Data
3. Organize, Batch, Route and Forecast
4. Optimize Material
5. Produce Workshop Data and Reports
6. Track, Monitor and Share Production Progress

The Model Based Steel Fabrication Process



1. Build a Digital Workshop





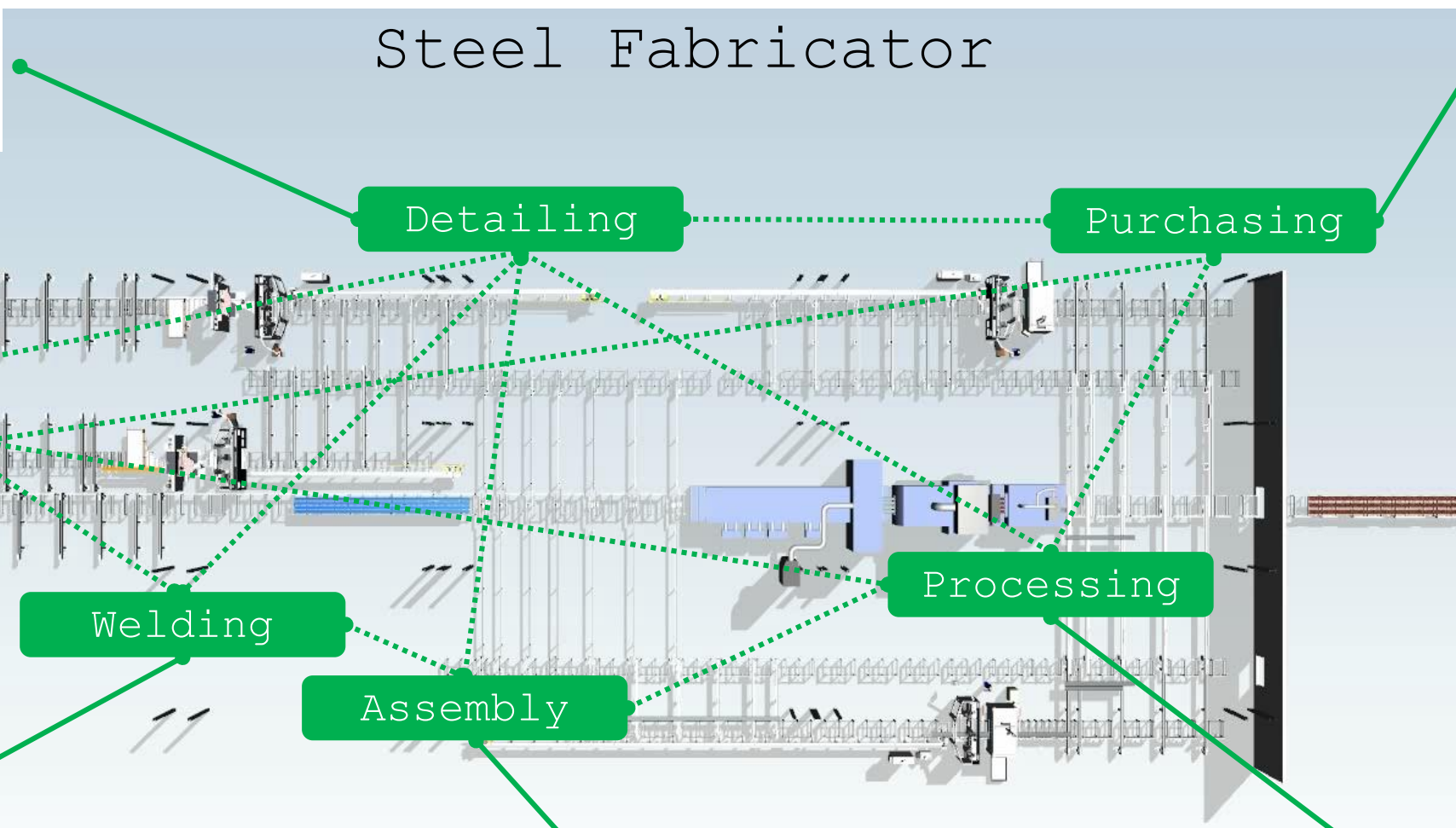
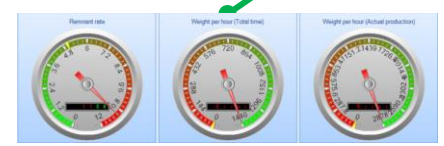
- Importing data from the model
- Getting data back from the shop



- Ecommerce
- Steel availability

- Status tracking
- Project visibility

Project Mgmnt



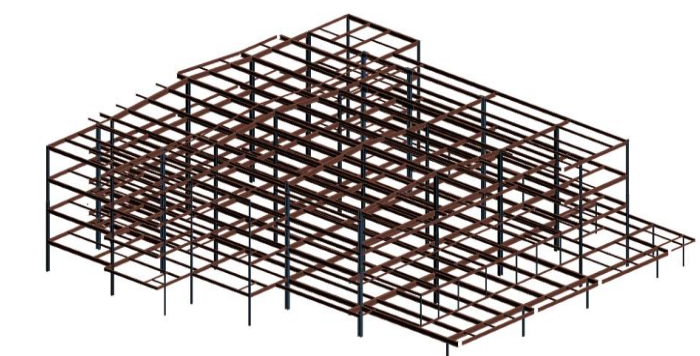
- Weld cells
- Welding data



- Layout marking
- Inspection



- CNC machines
- Other processing



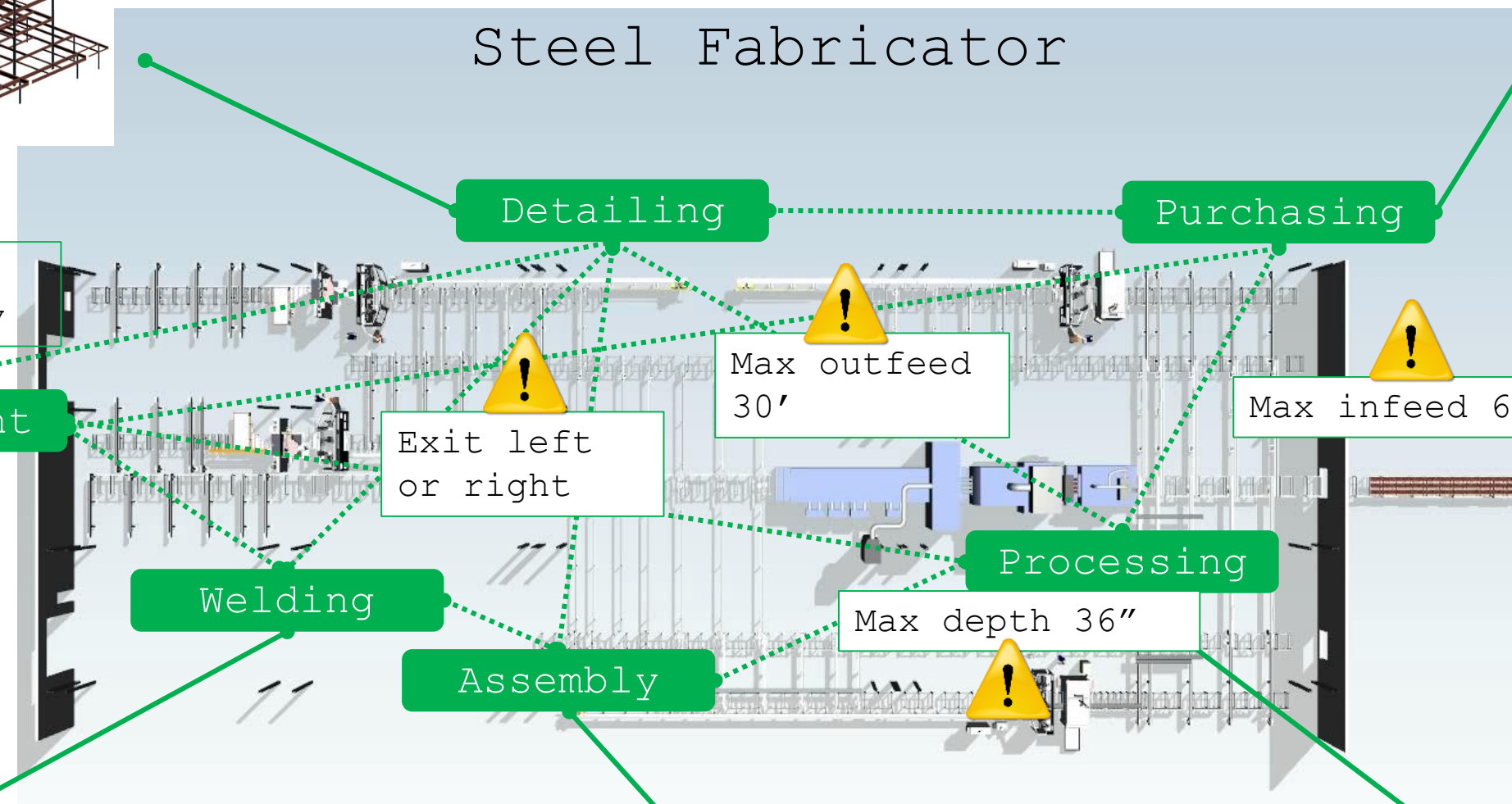
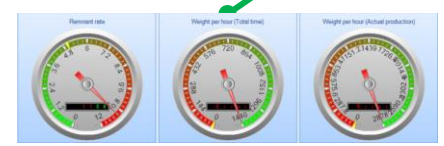
- Importing data from the model
- Getting data back from the shop



- Ecommerce
- Steel availability

- Status tracking
- Project visibility

Project Mgmnt



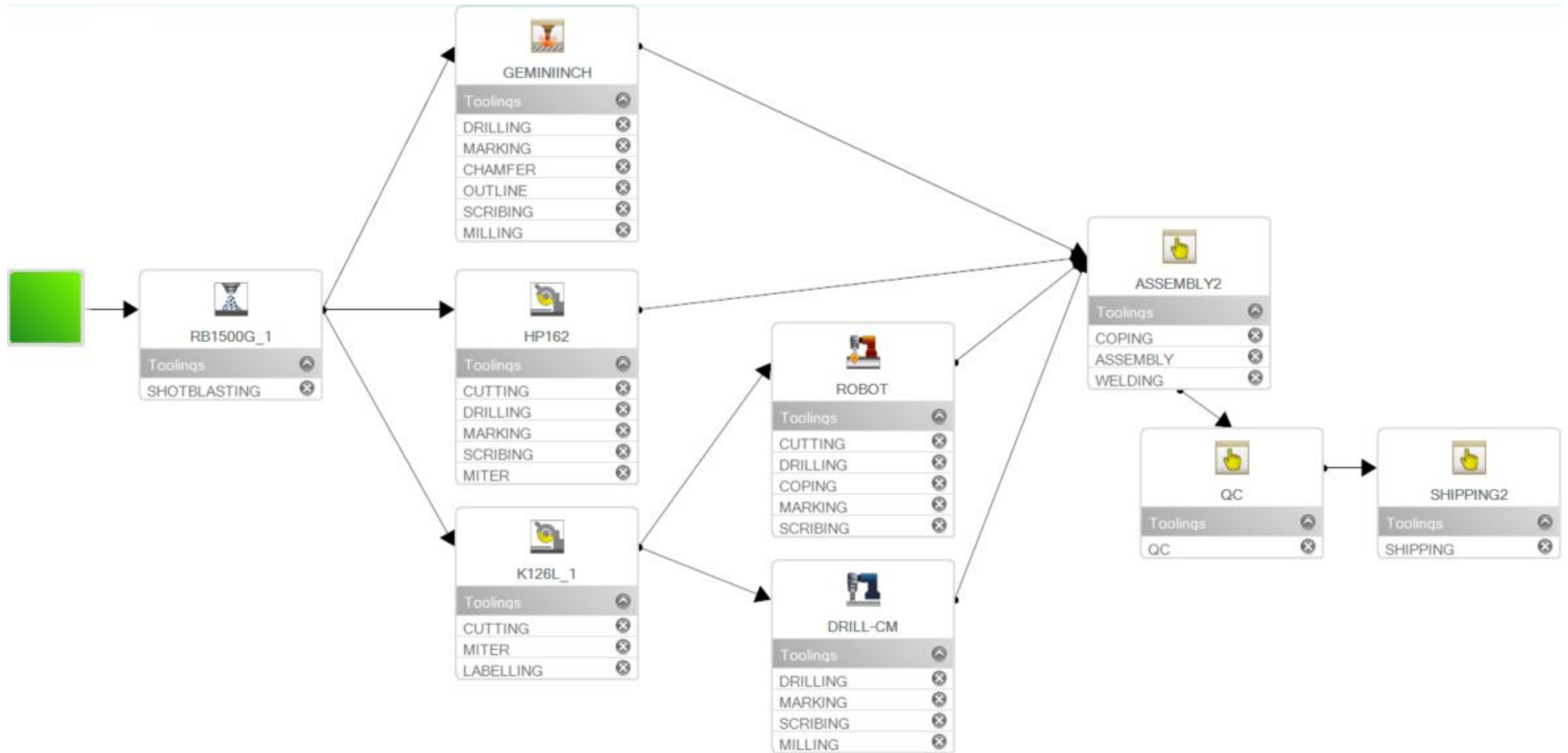
- Weld cells
- Welding data

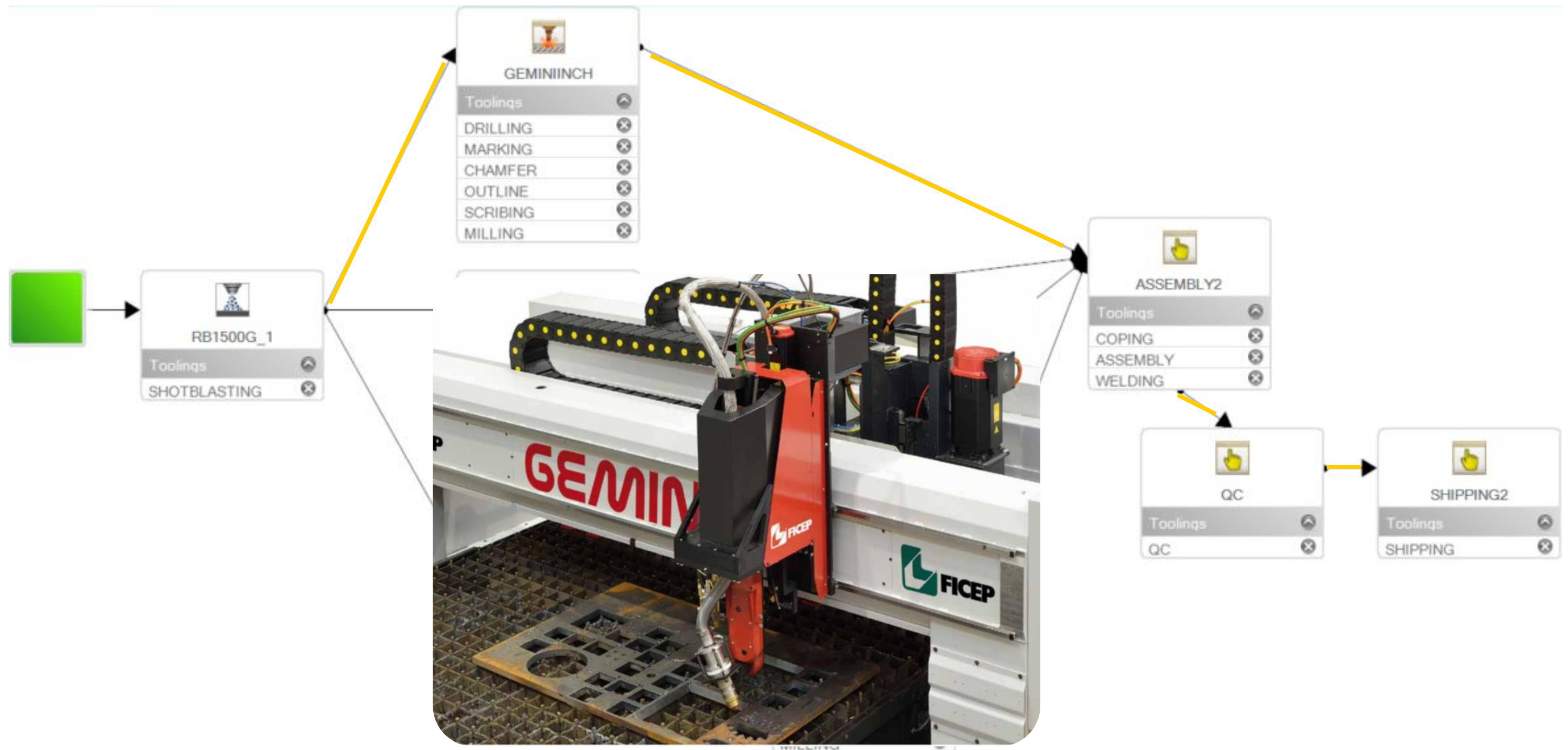


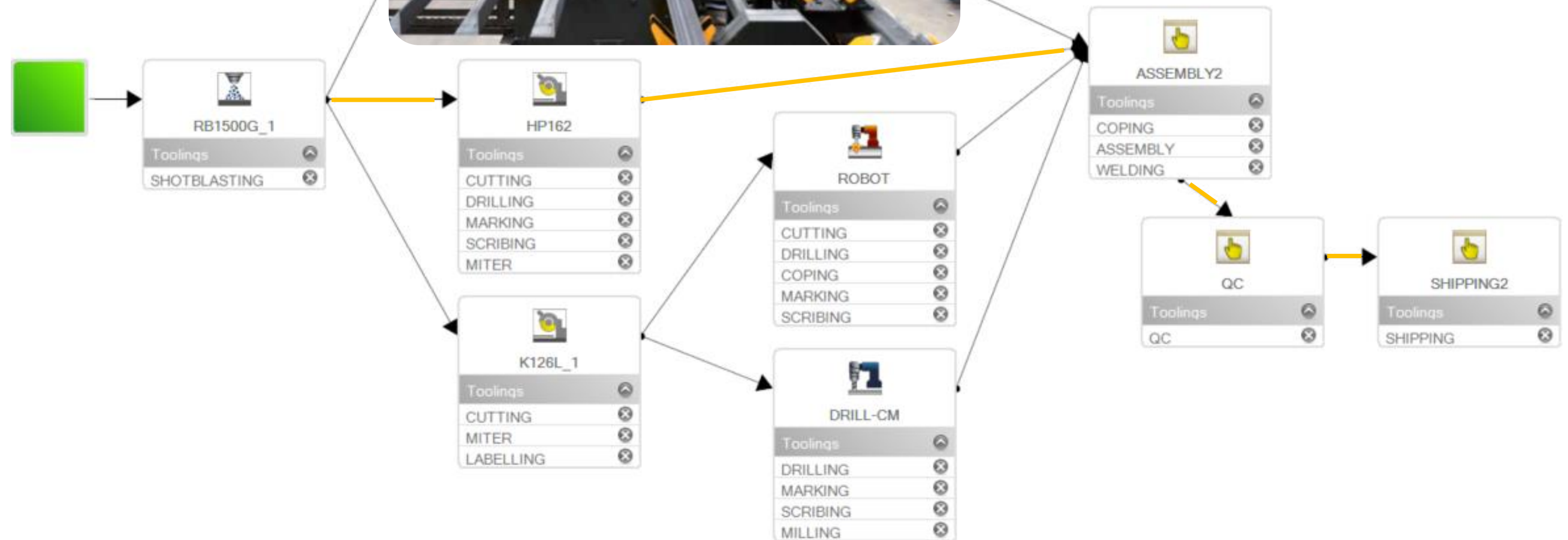
- Layout marking
- Inspection

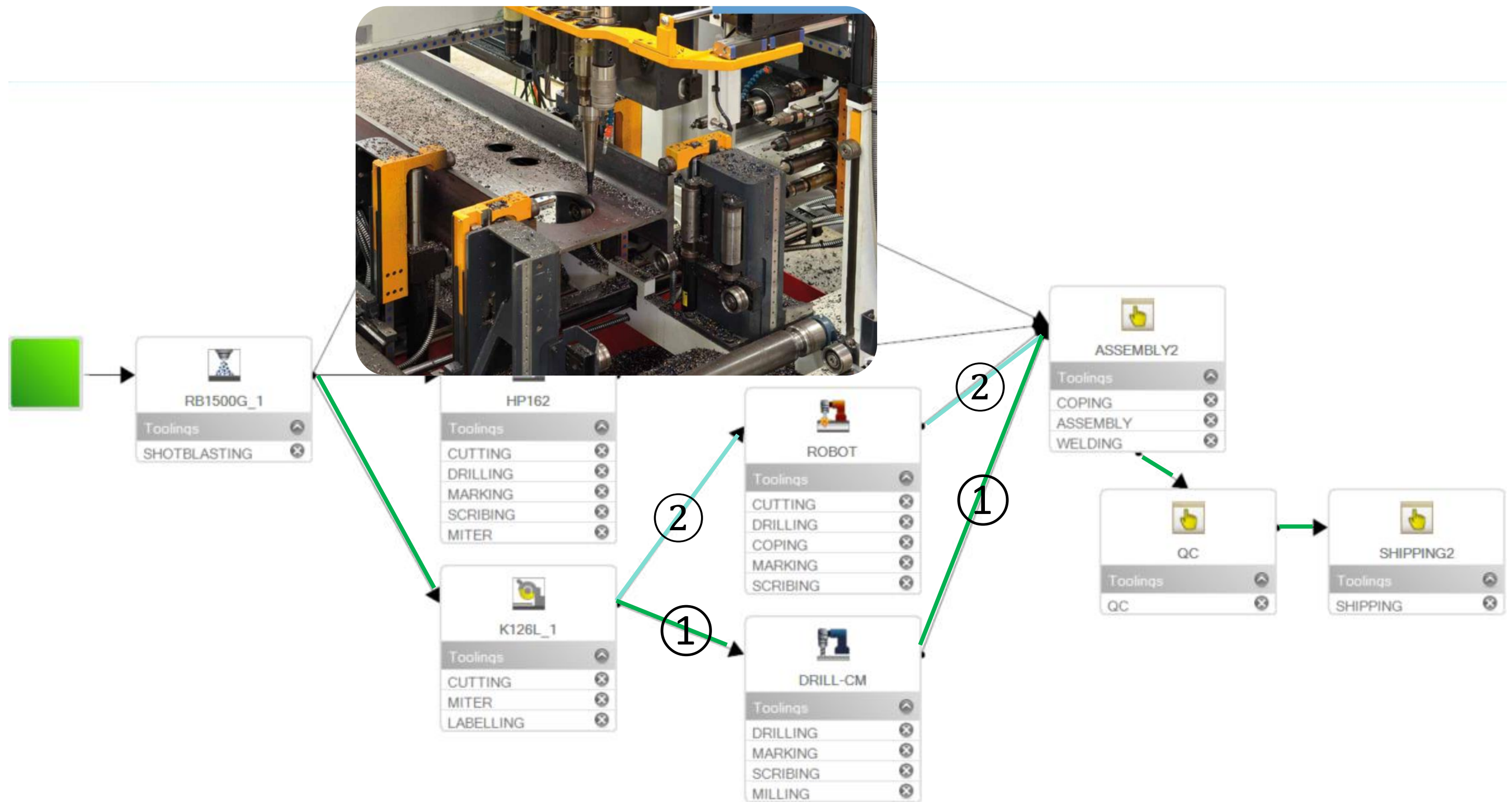


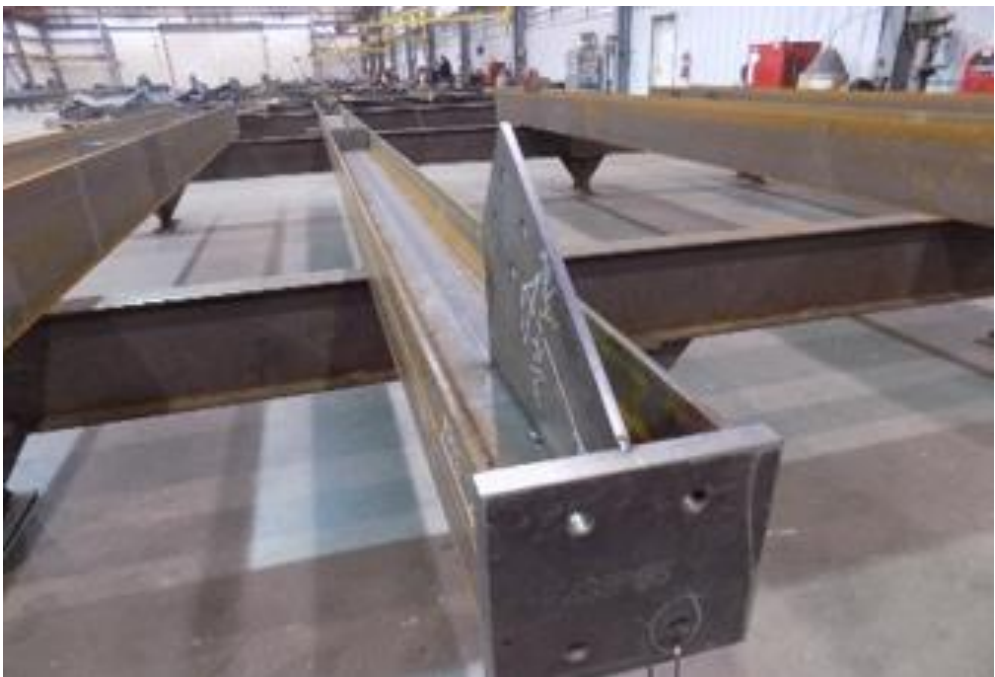
- CNC machines
- Other processing



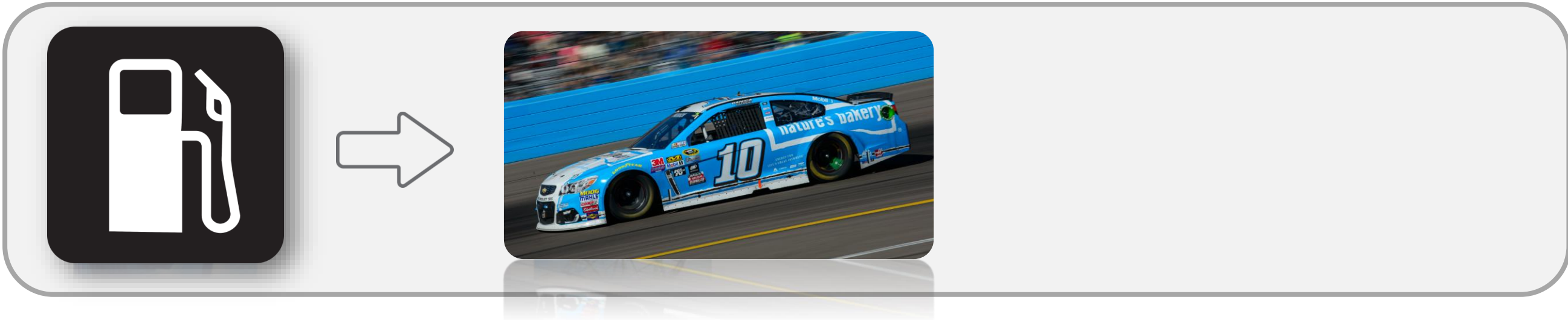




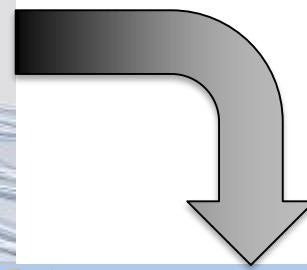




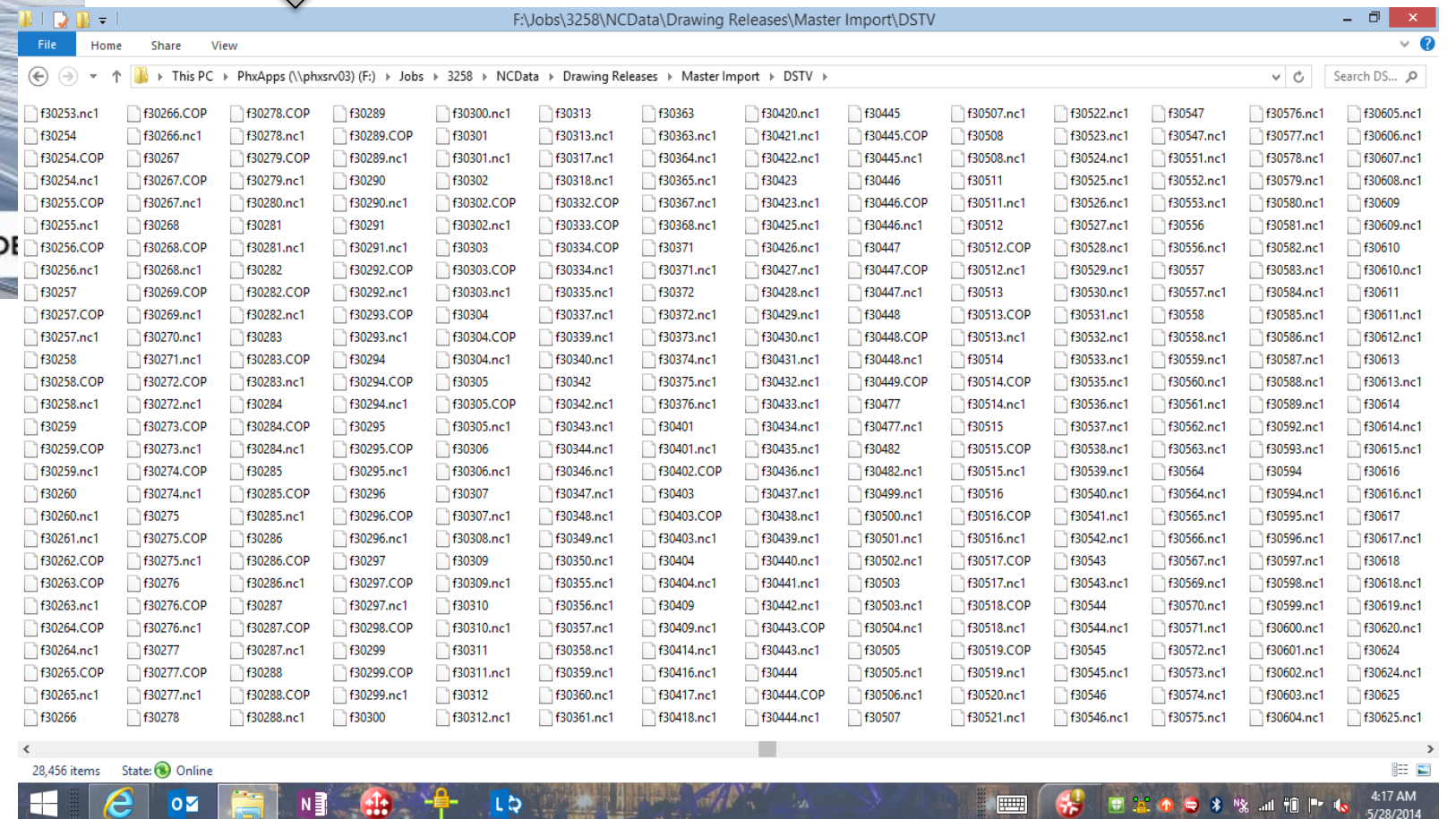
The Model Based Steel Fabrication Process



1. Build a Digital Workshop
2. **Import Knowledge – and Check Imported Data**

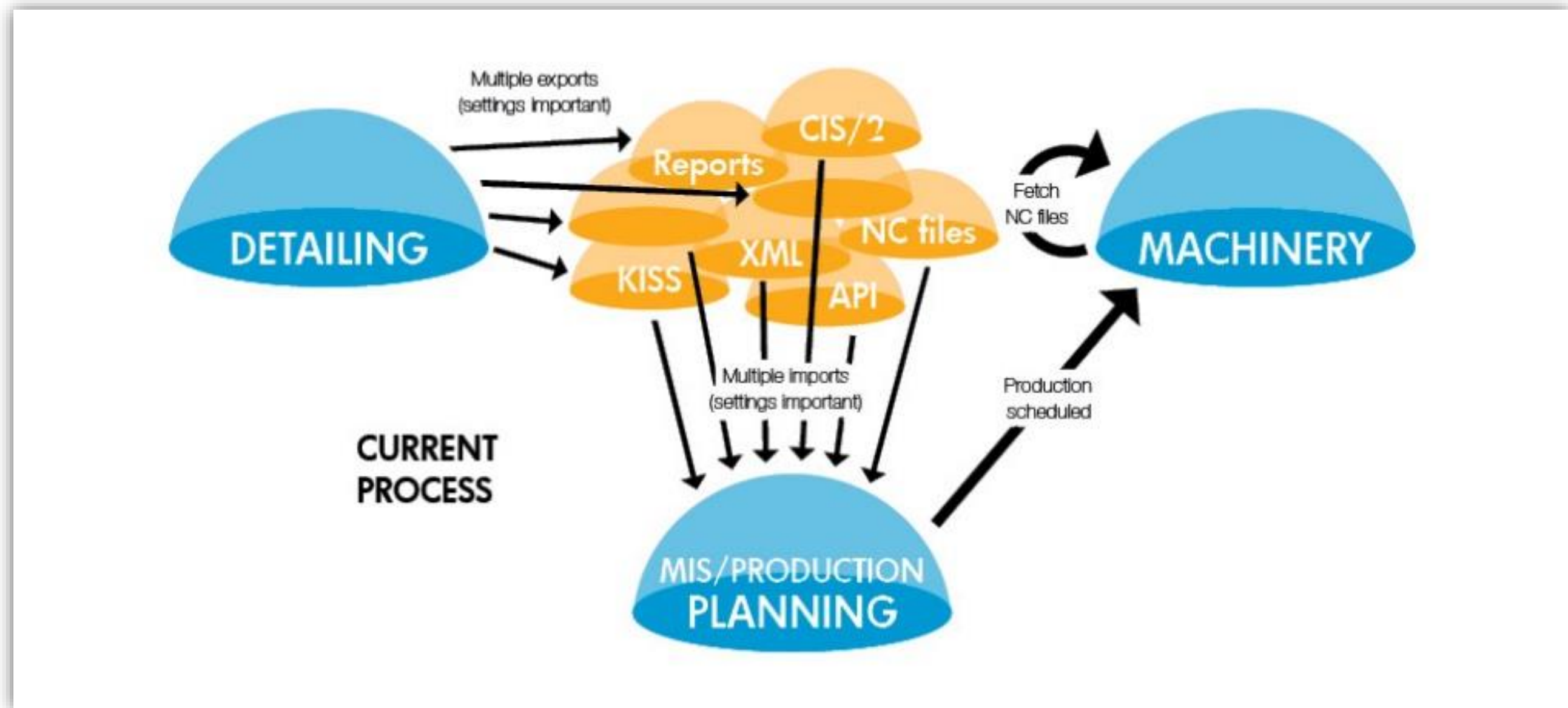


Hundreds/thousands of DSTV files



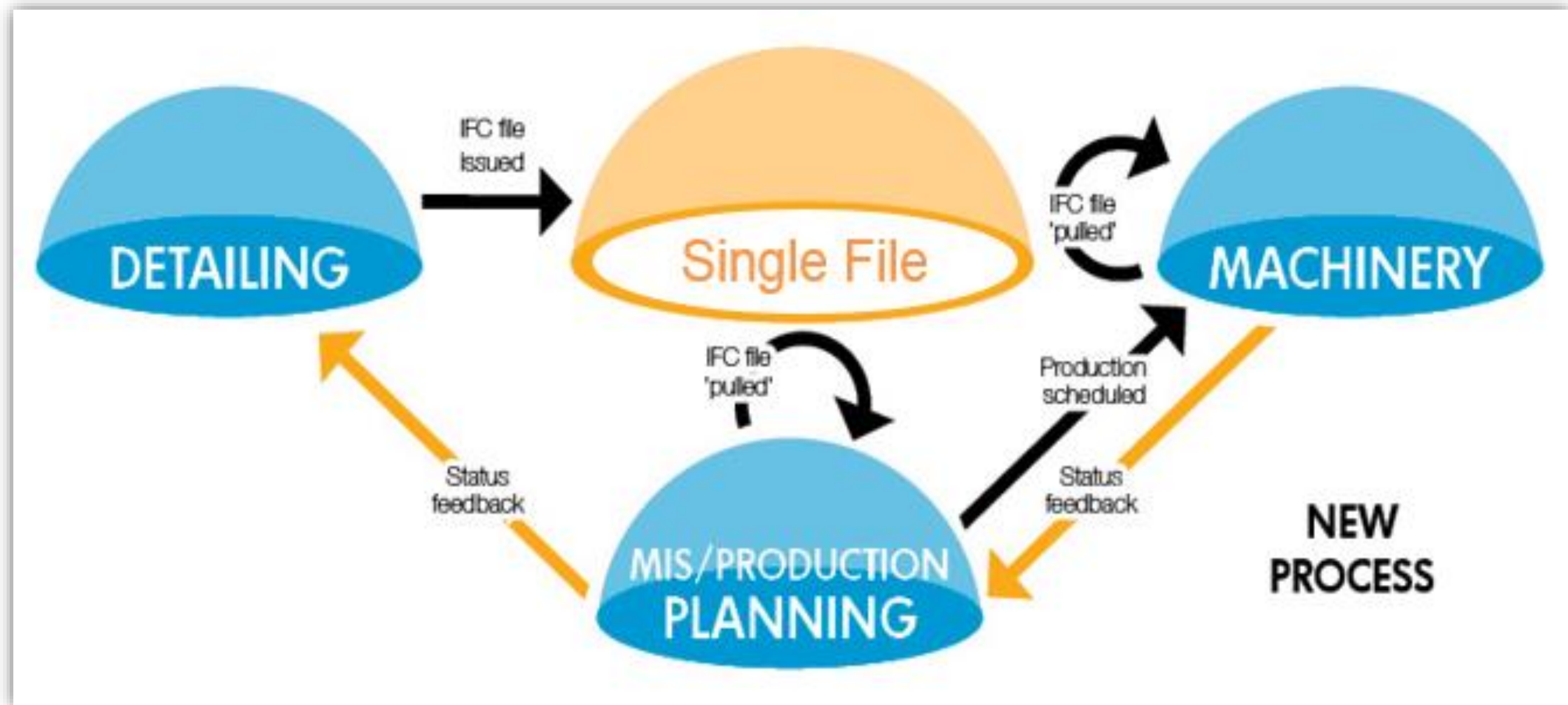
From a Model to a Thousand Files

Images courtesy of American Institute of Steel Construction

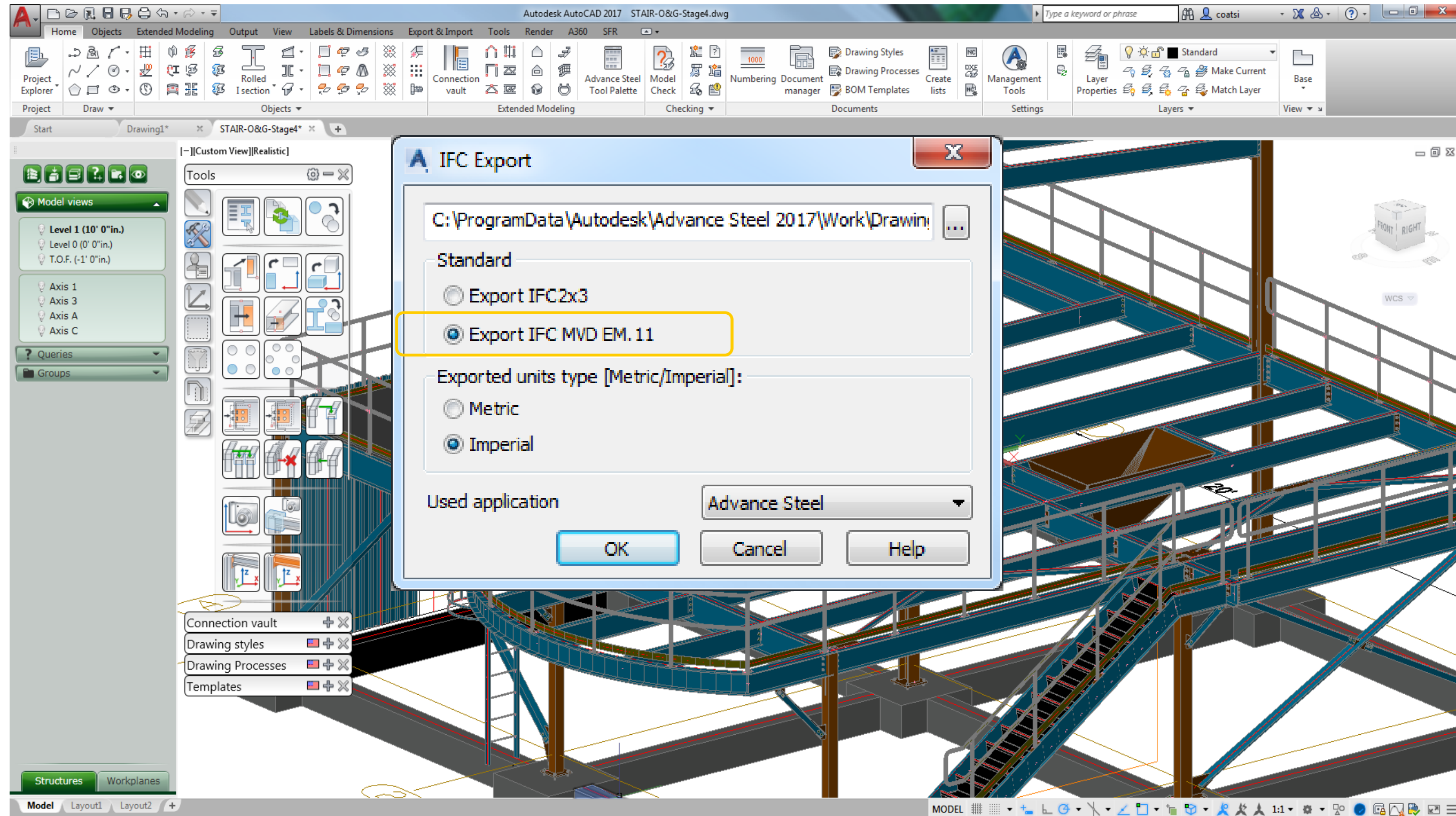


From a Model to a Single File

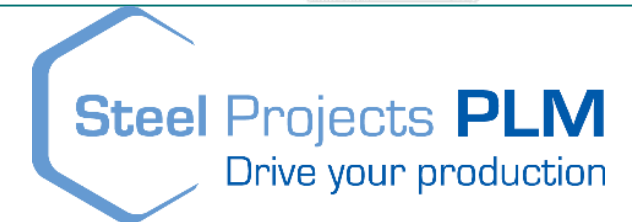
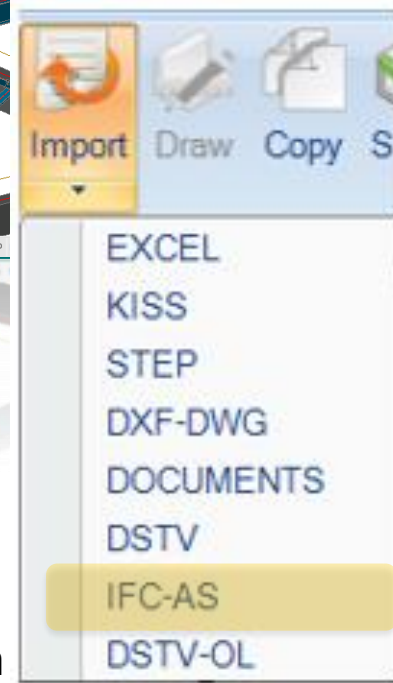
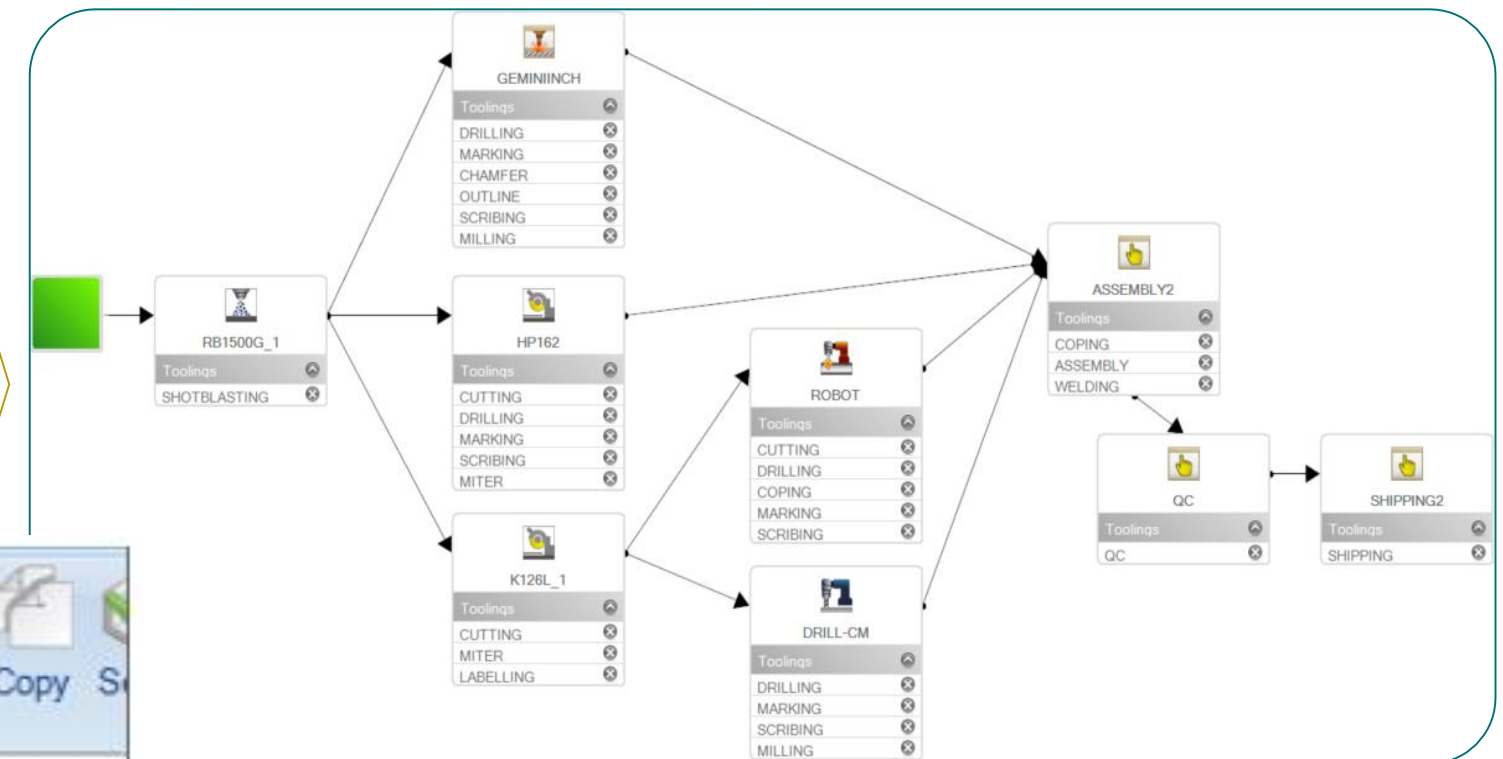
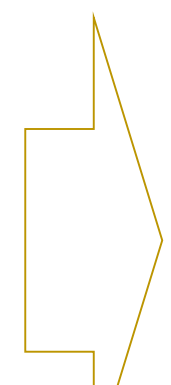
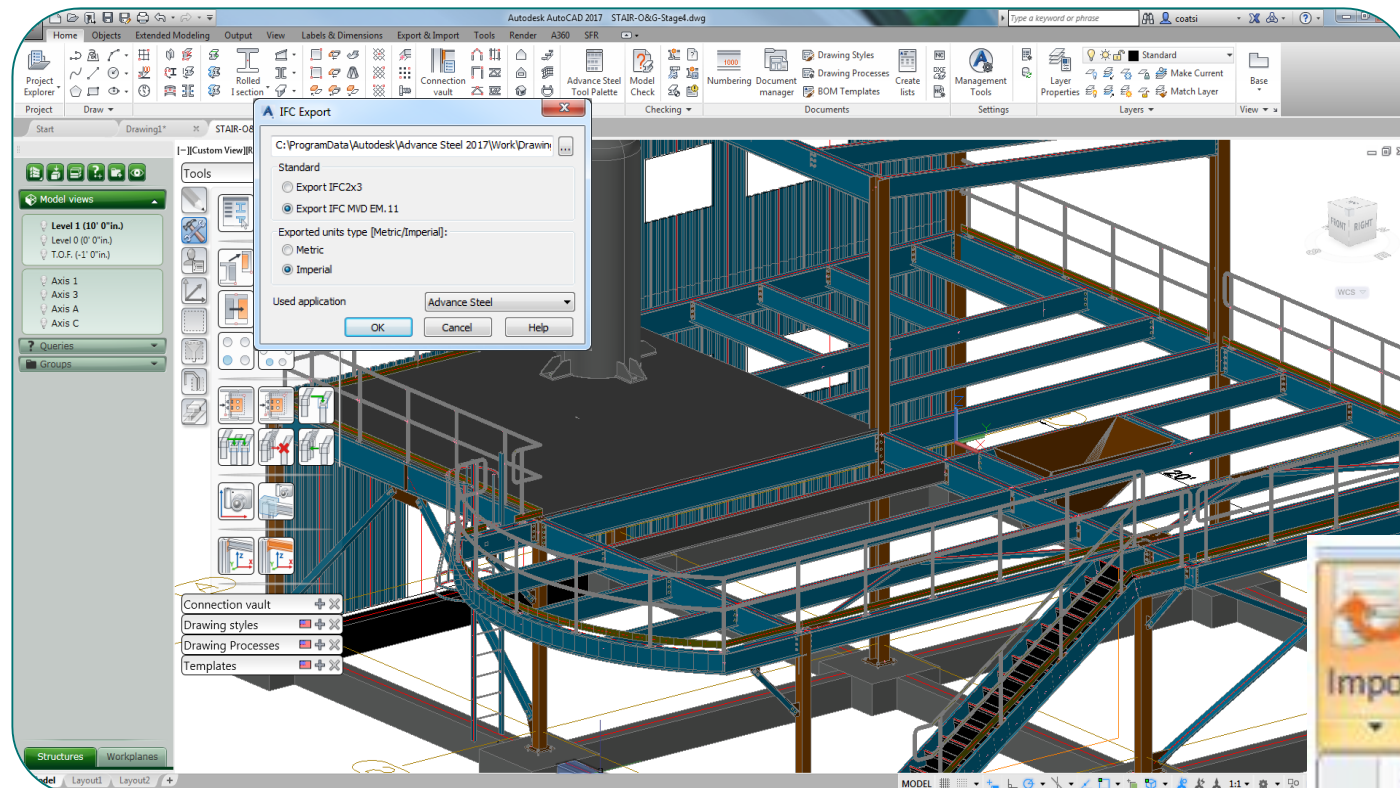
Images courtesy of American Institute of Steel Construction



From a Model to a Single File to the Shop



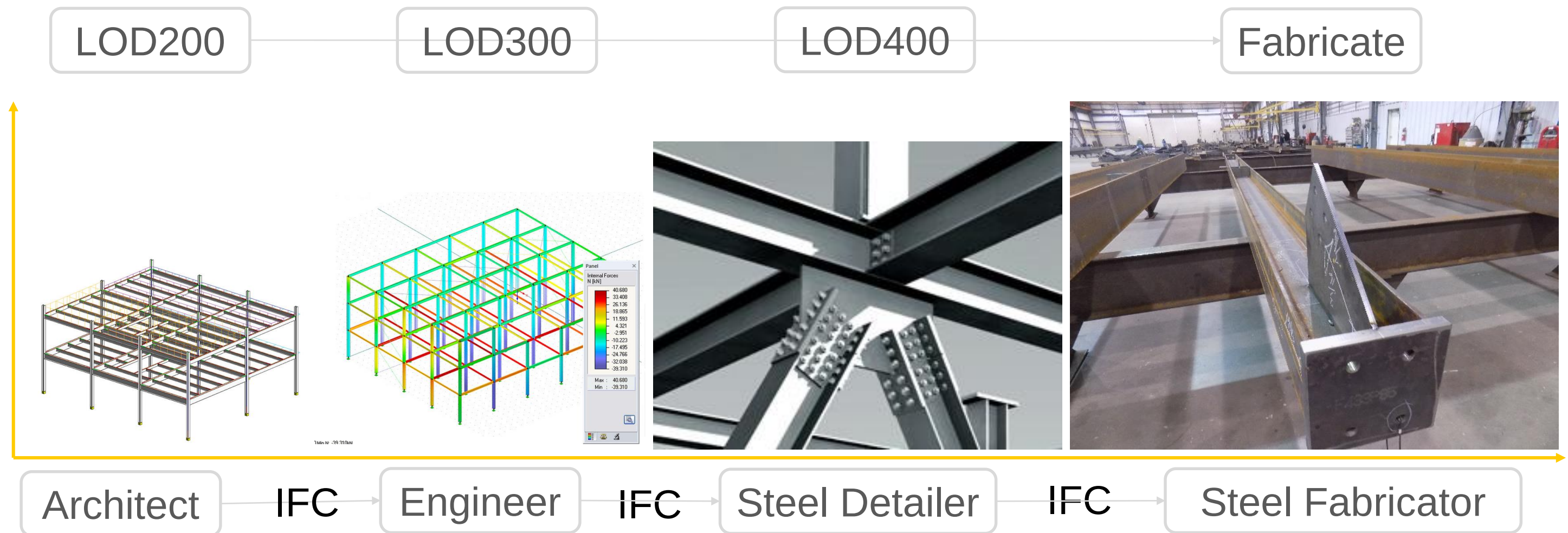
From a Model to a Single File to the Shop



IFC for Steel Fabrication

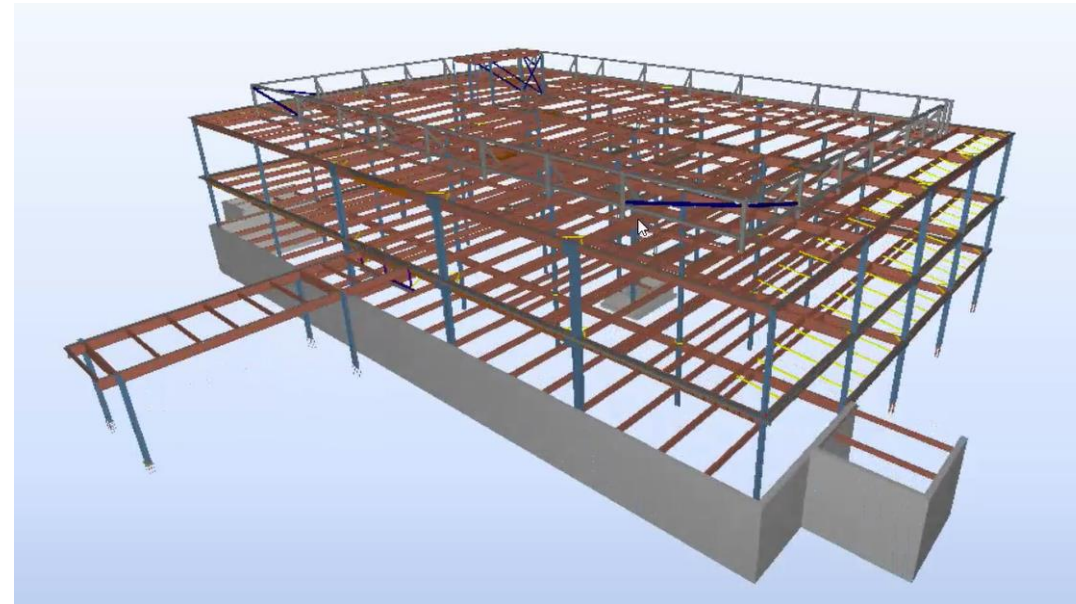
AISC/Georgia Tech Specification

- *Maximizes Knowledge Transfer from Detailed Model to Steel Fabricator*
- *IFC* is now available to take data from a detailed model to be used by fabricators to create CNC data and process, organize and fabricate steel



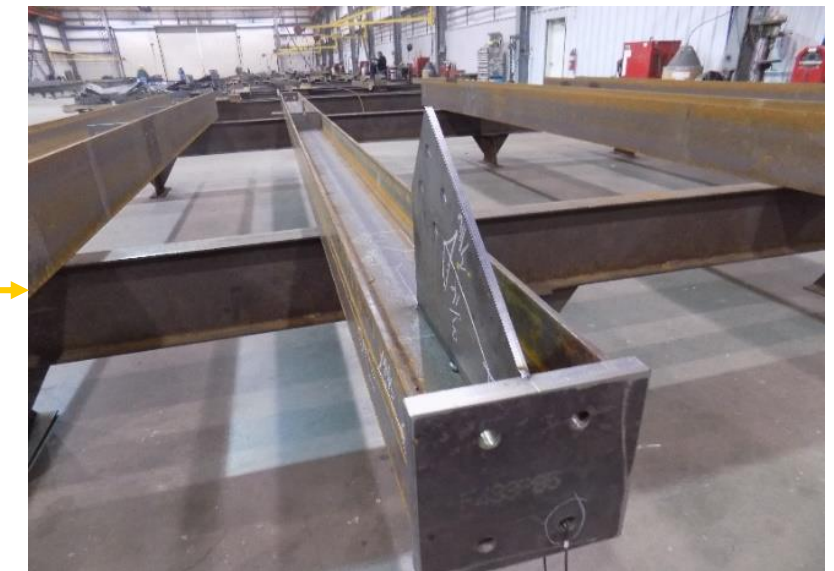
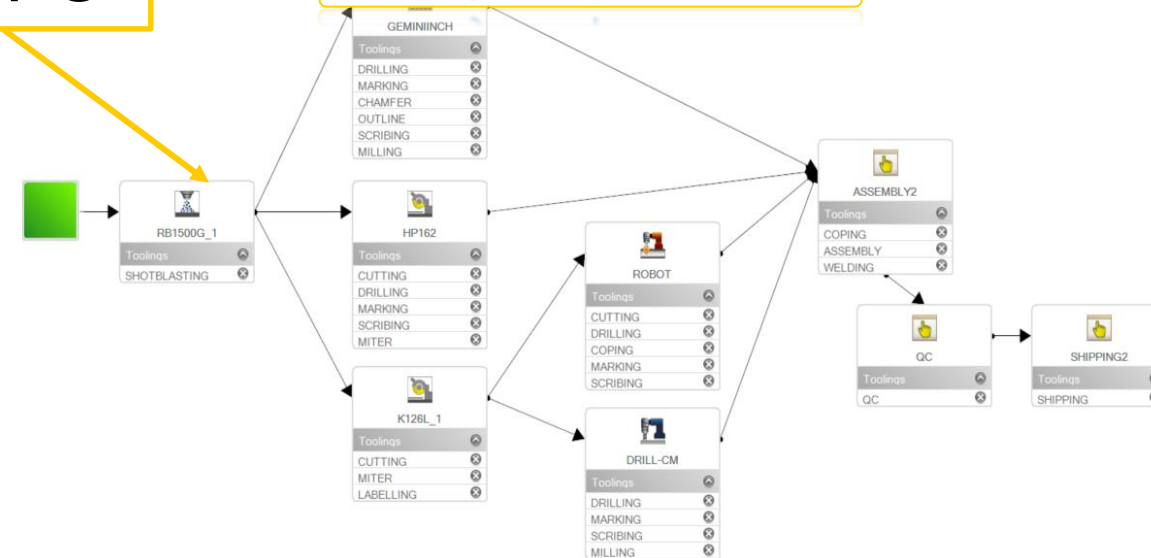
LOD400

Fabricate



IFC

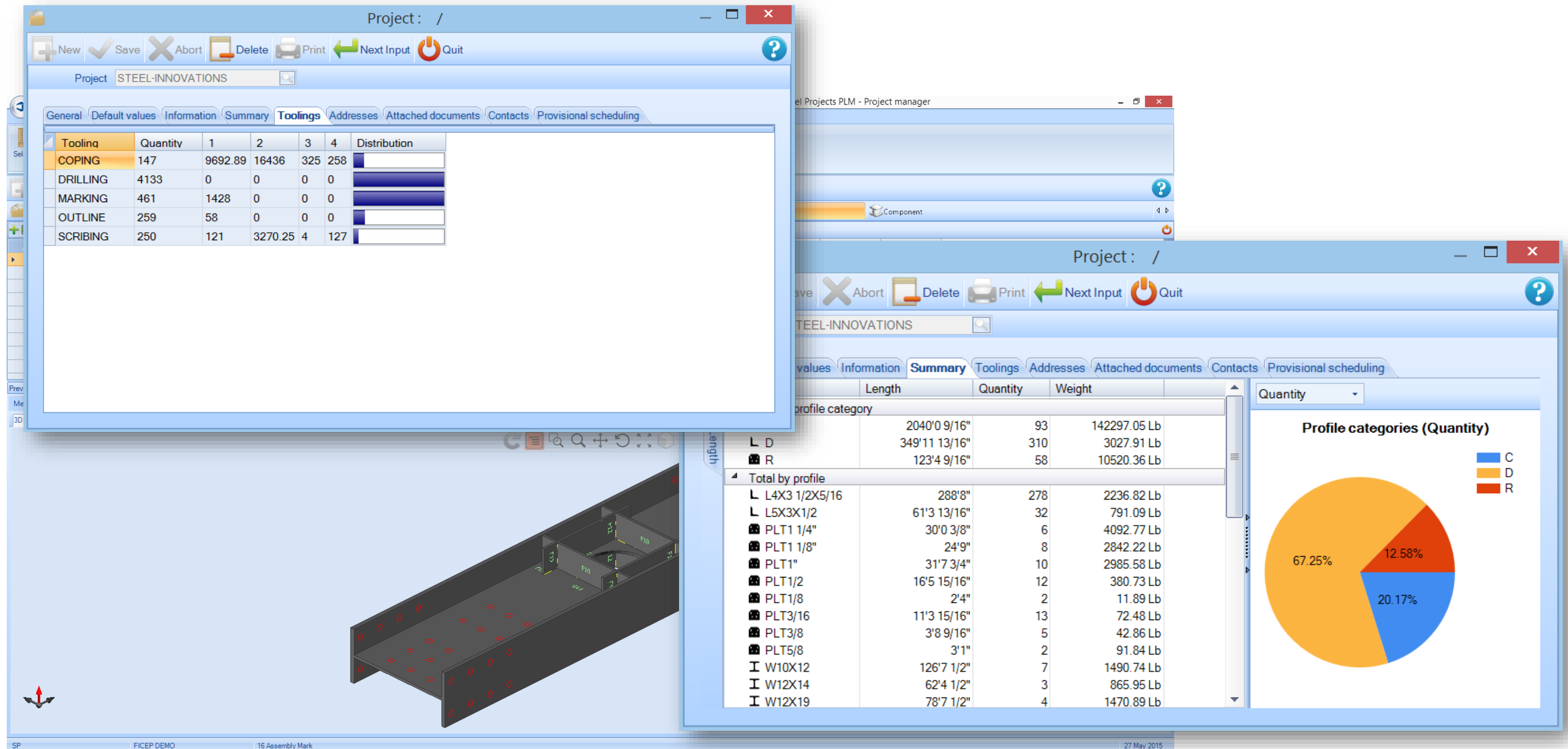
Drive your production

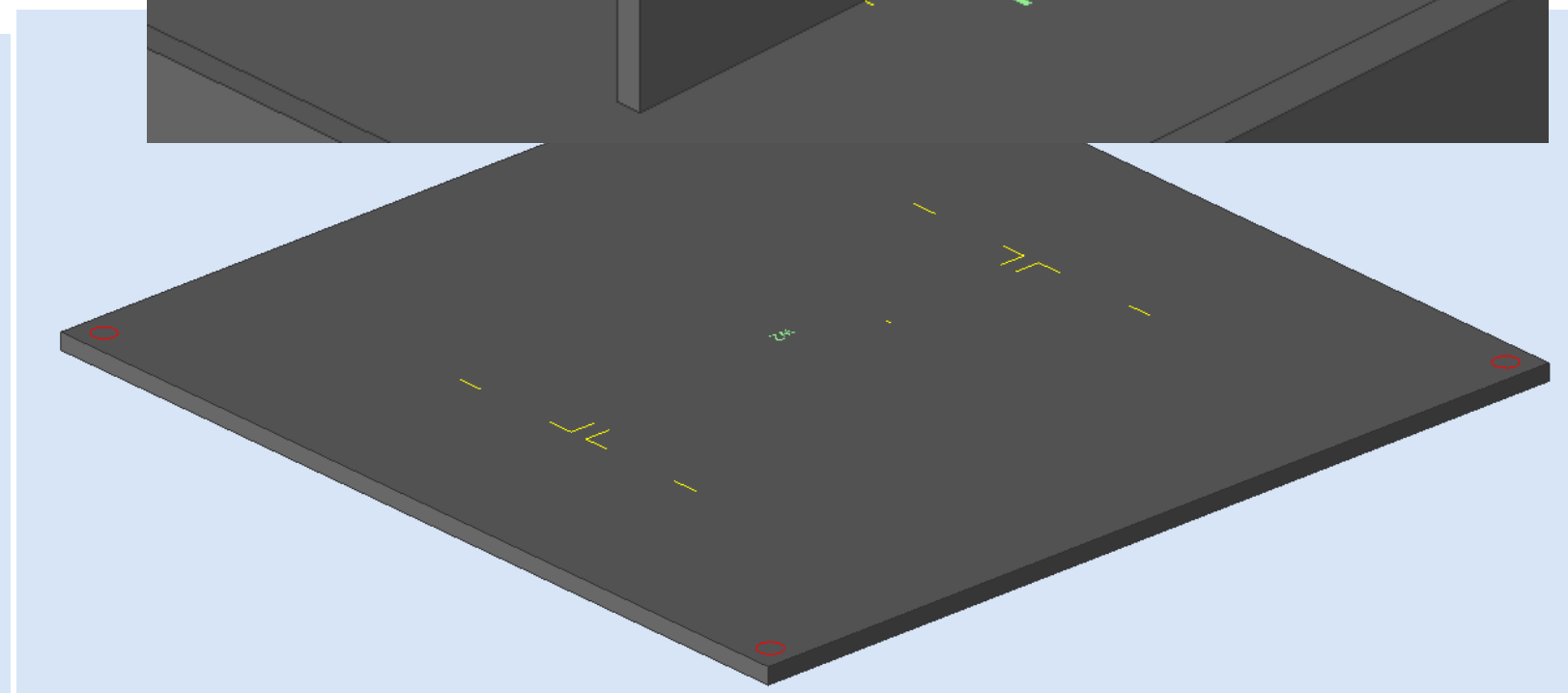
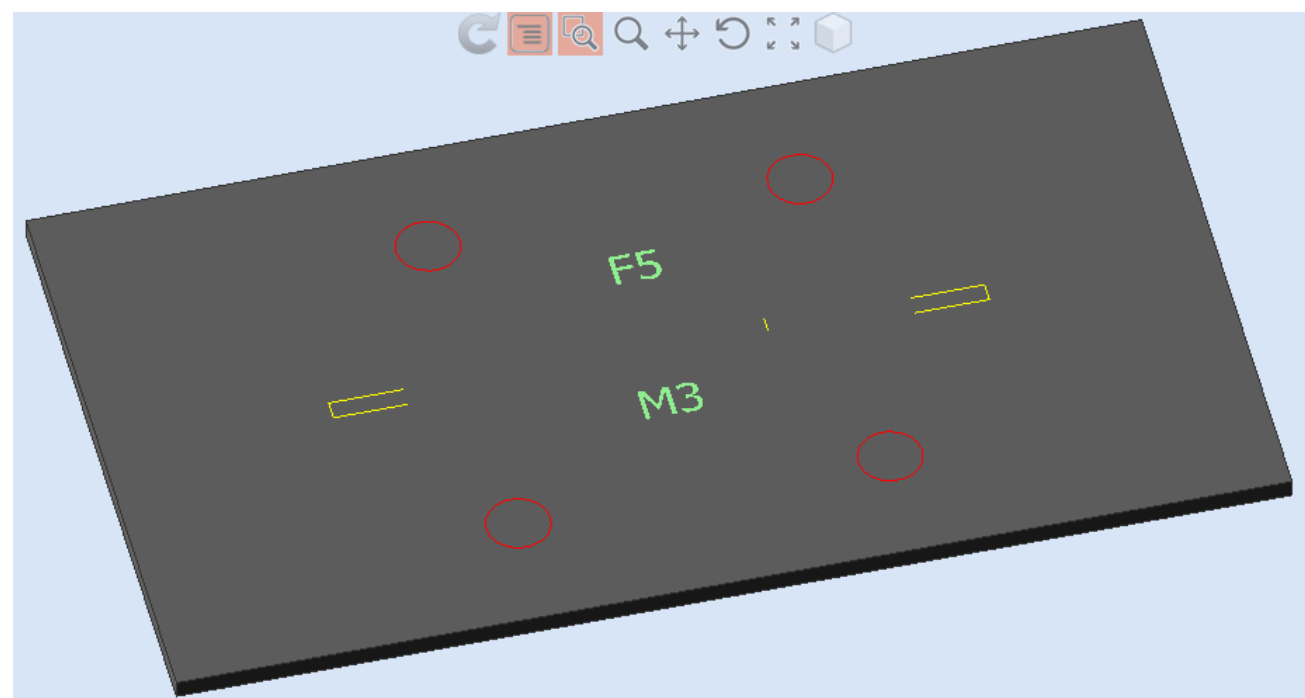
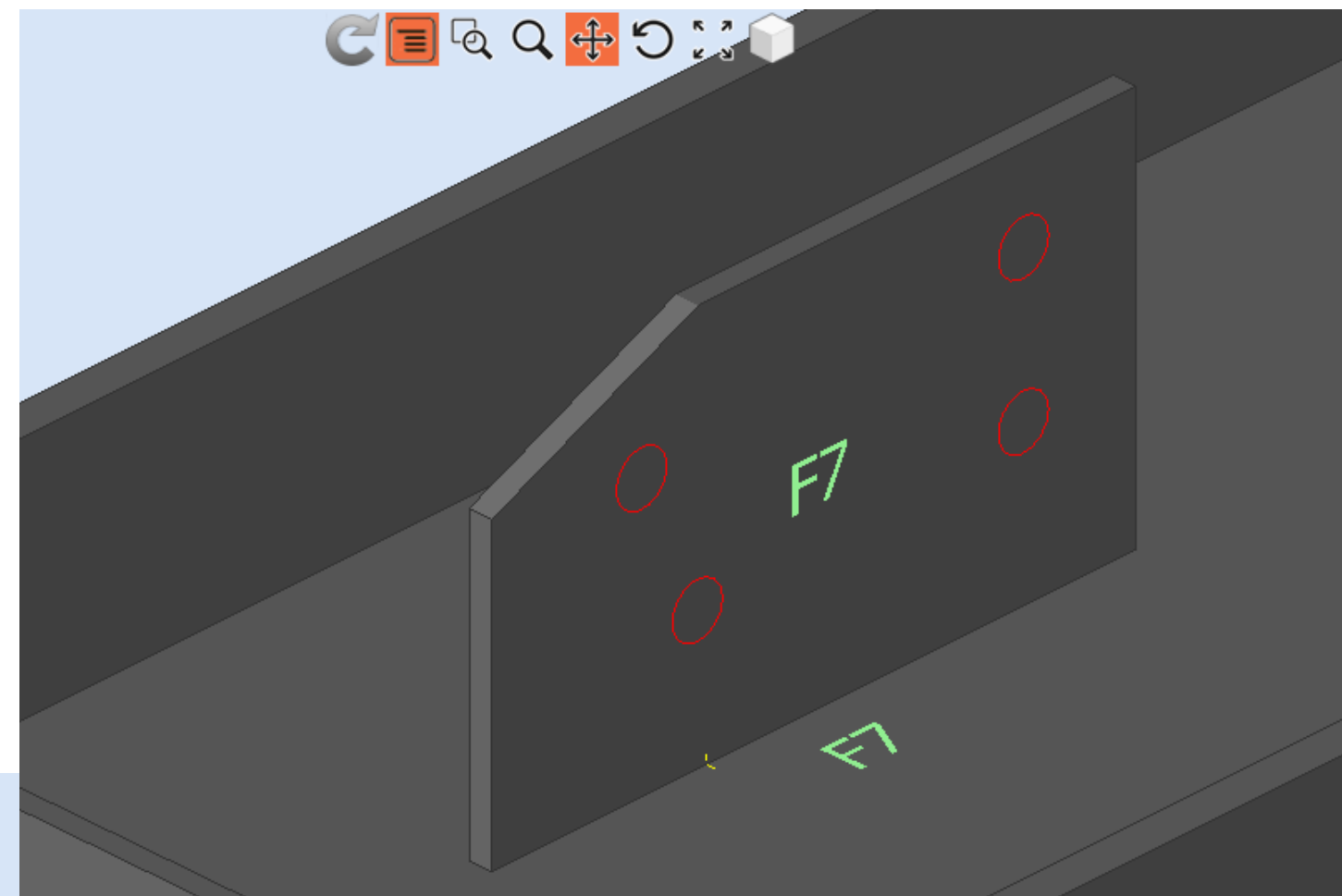
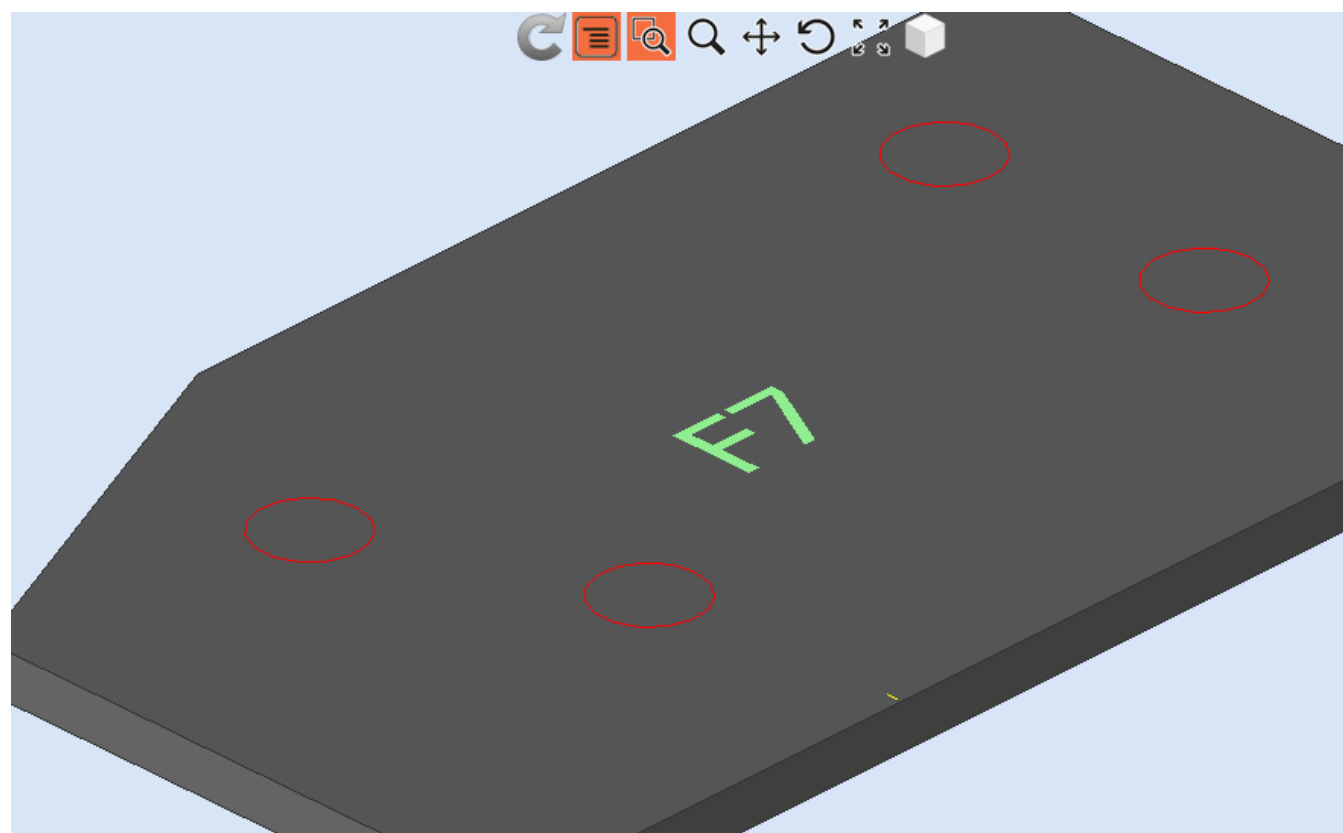


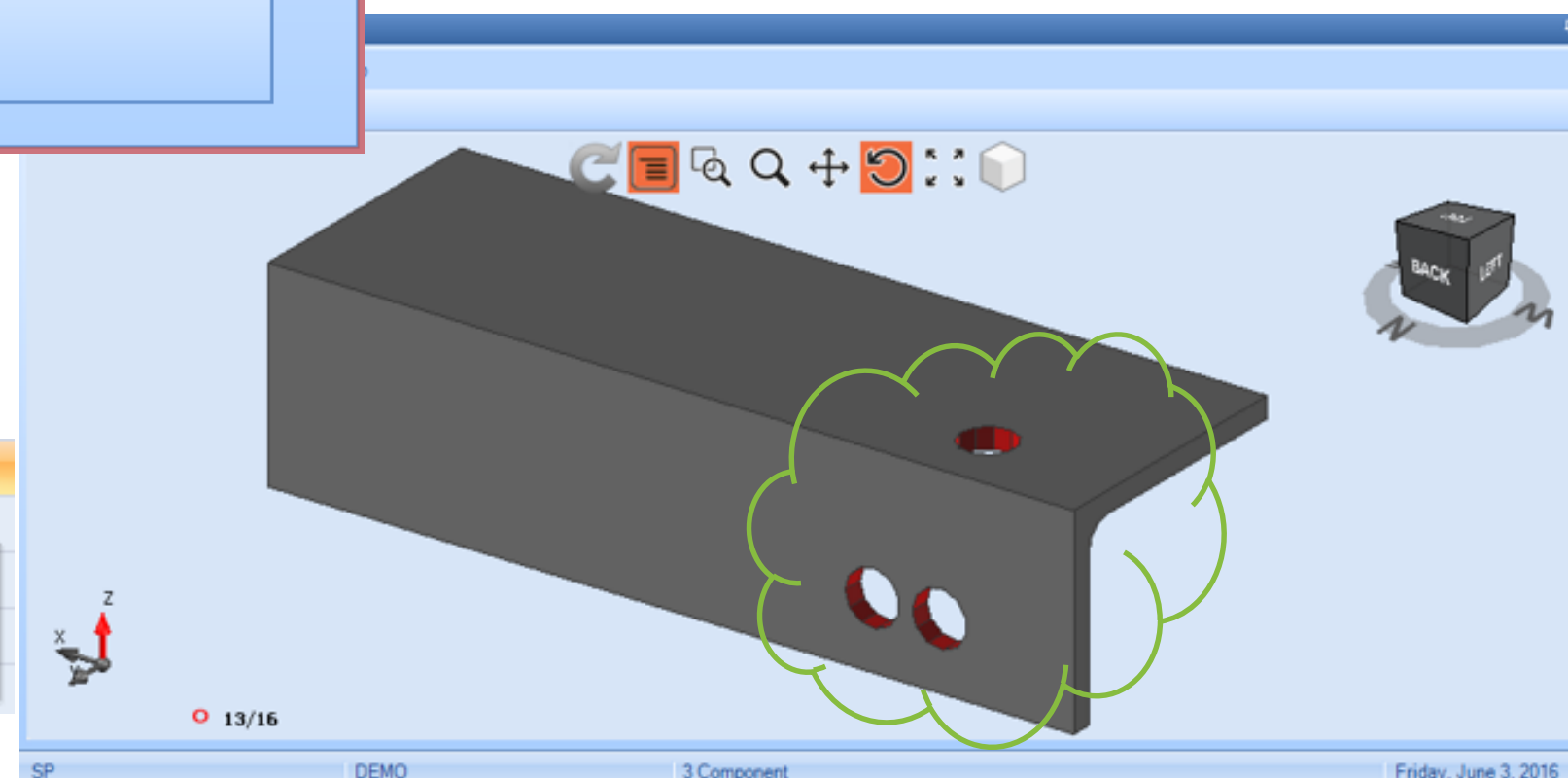
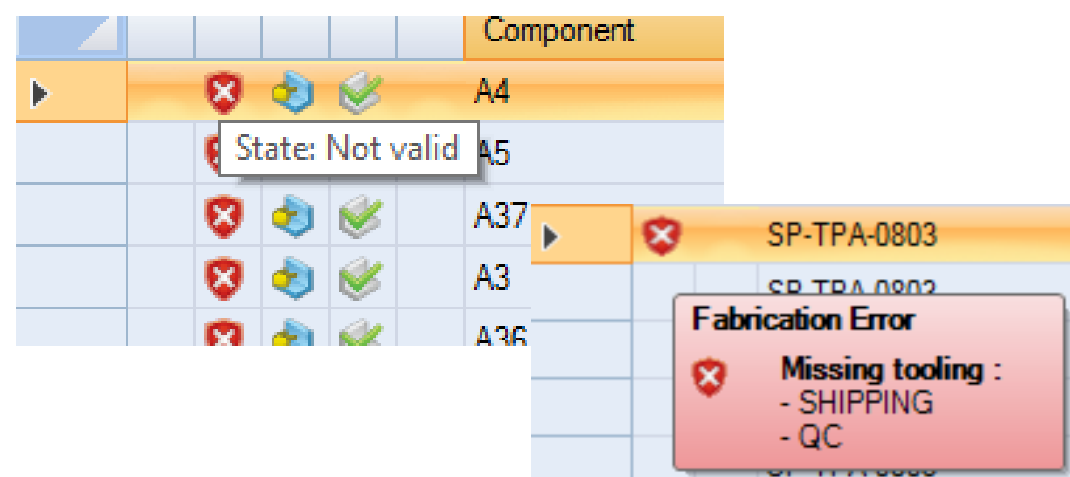
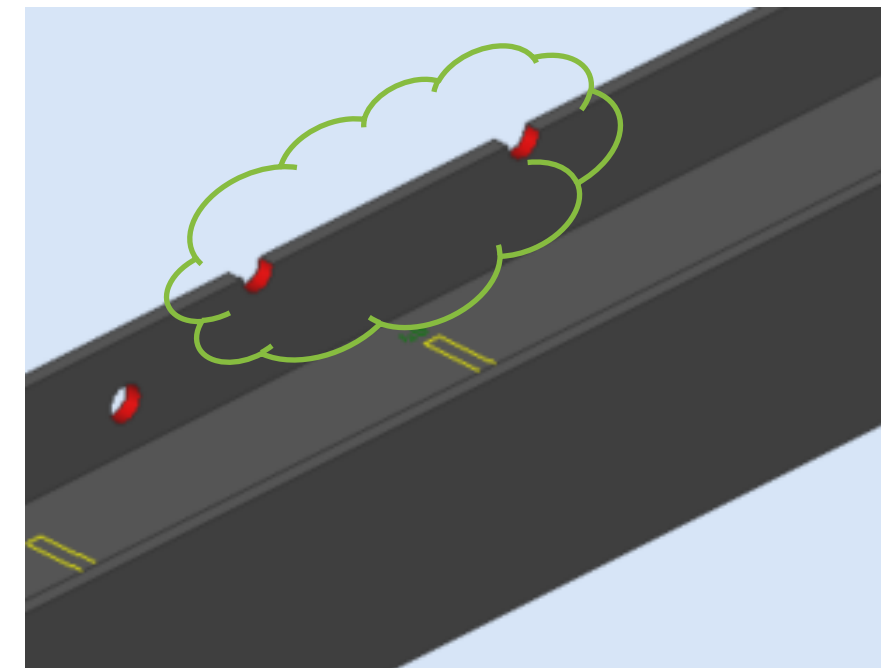
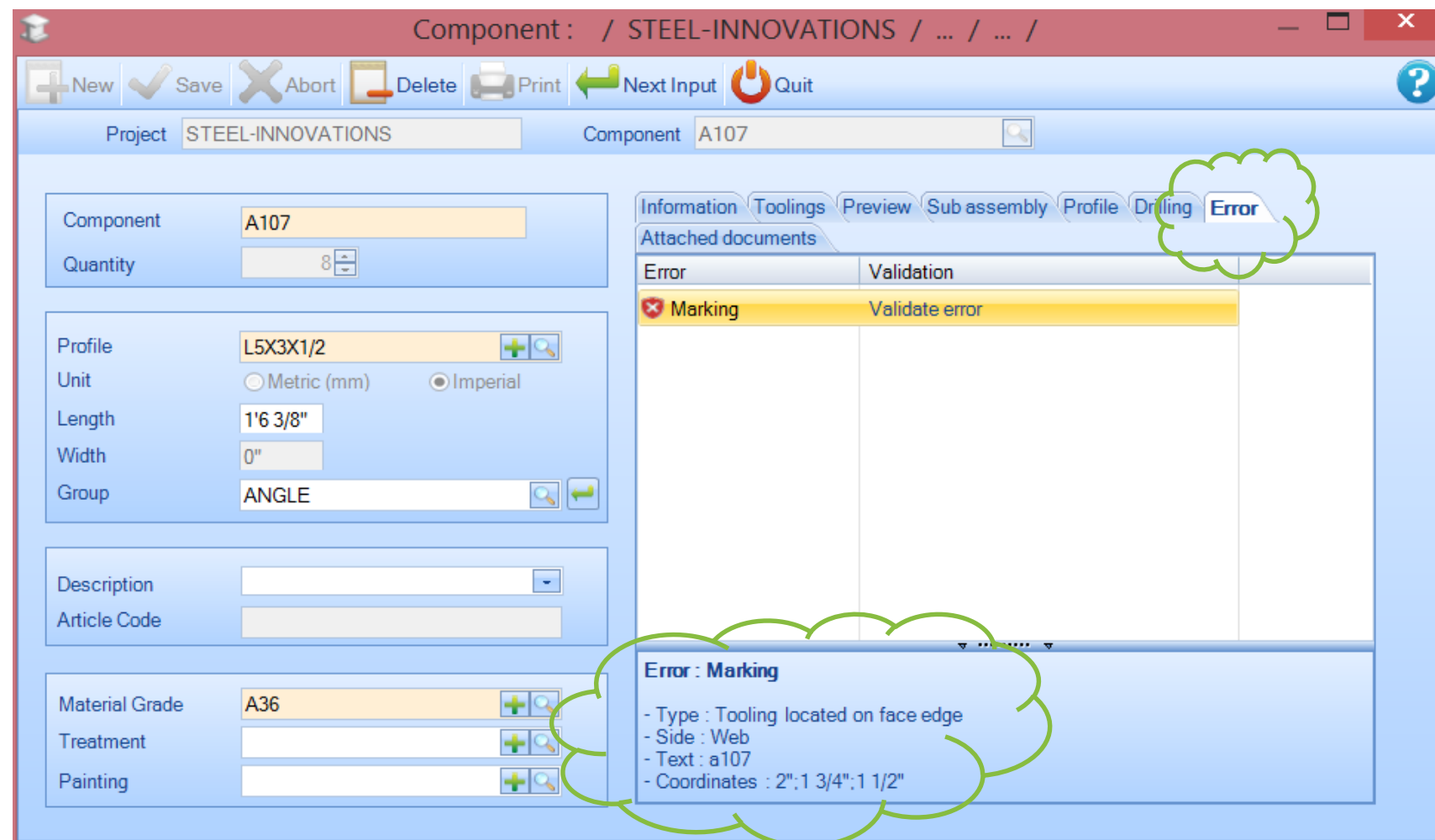
Steel Detailer

Steel Fabricator

Dealing with Data in a Better Way



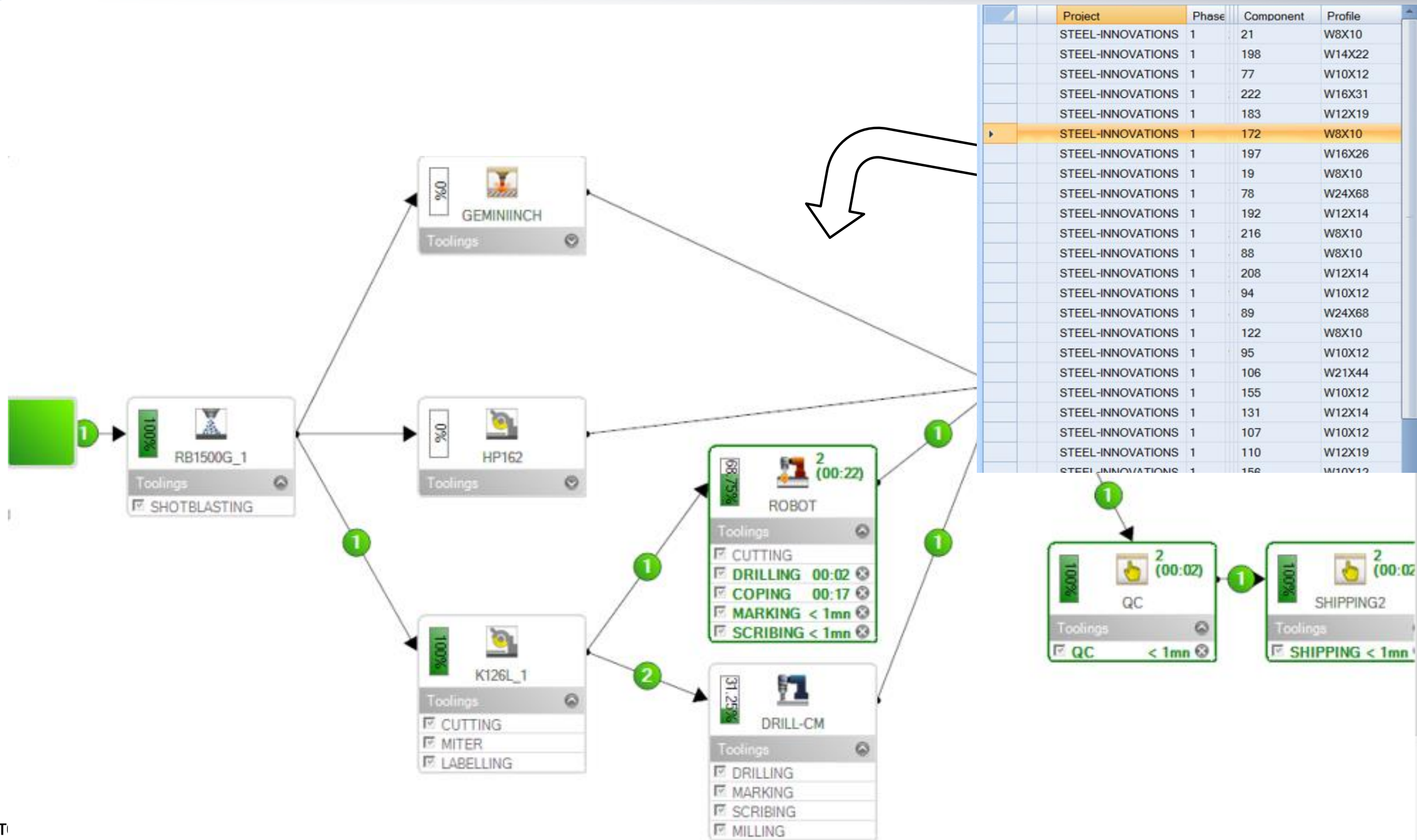


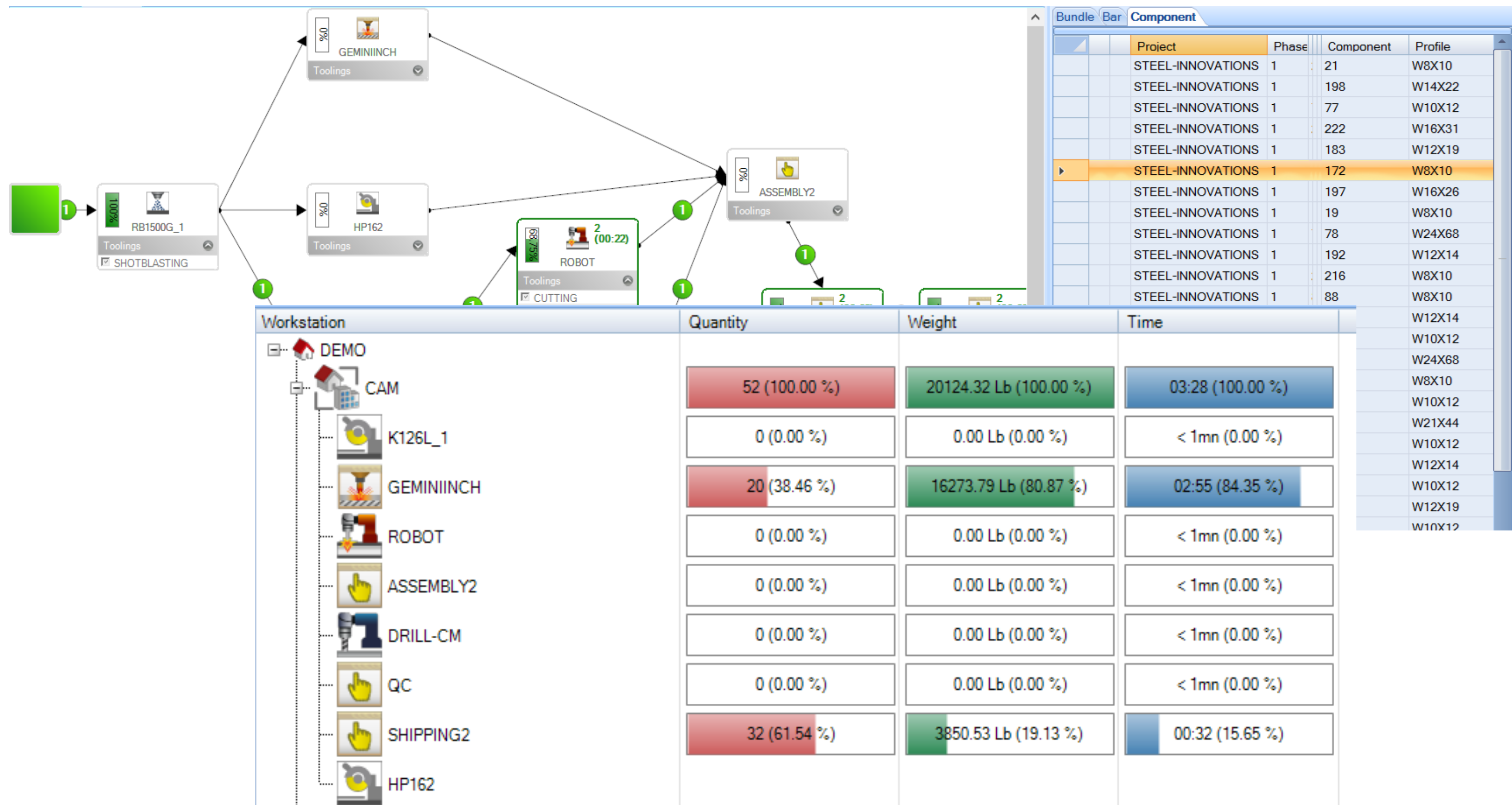


The Model Based Steel Fabrication Process



1. Build a Digital Workshop
2. Import Knowledge
3. **Organize, Batch, Route and Forecast**





The Model Based Steel Fabrication Process



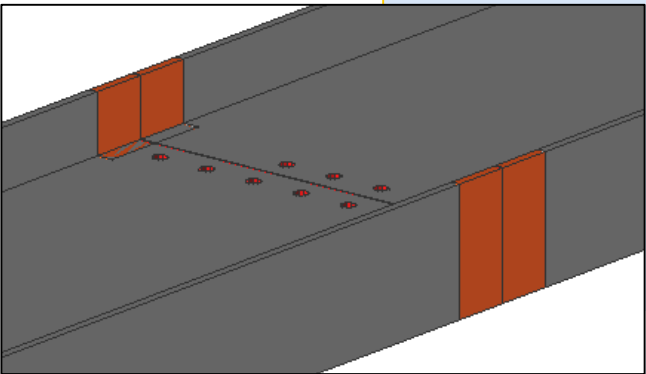
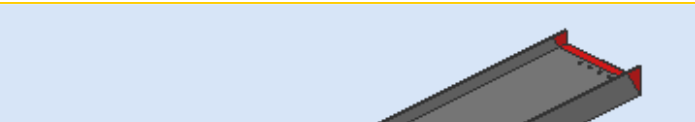
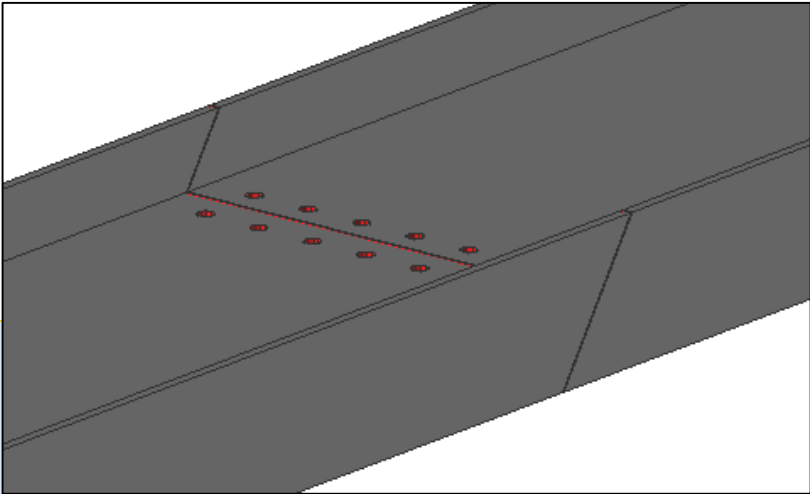
1. Build a Digital Workshop
2. Import Knowledge
3. Organize, Batch, Route and Forecast
4. **Optimize Material**



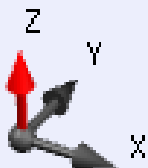
- Miter cuts with common cuts

Bar nesting

- Rotate parts for efficiency



- Angle Notching





Tools

Project Data Project Manager Data Nesting data Fabrication Job data Feedback data Configuration Utilities Production manager Send to production [SELECT25216] Plate nesting

Preview Workstations Nester Pathfinder DocViewer Scrap import Reports Automatic Import Filter

New Save Abort Delete Print Next Input Quit

Fabrication Job SELECT25216 Cutting Sheet 200

Component Stock Optimize Cutting

Bar N°	Profile	Material Grade	Treatment	Workstation	Quantity	Length	Width	Used length
1	TOLE10	S355J2		GEMINI36	1	3000.00	2000.00	2877.11

Preview

Menu Viewports Commands Help

Image

Optimize Cutting

Outils

Drilling	Diameter=18
Drilling	Diameter=26
Drilling	Diameter=38

Composition

General

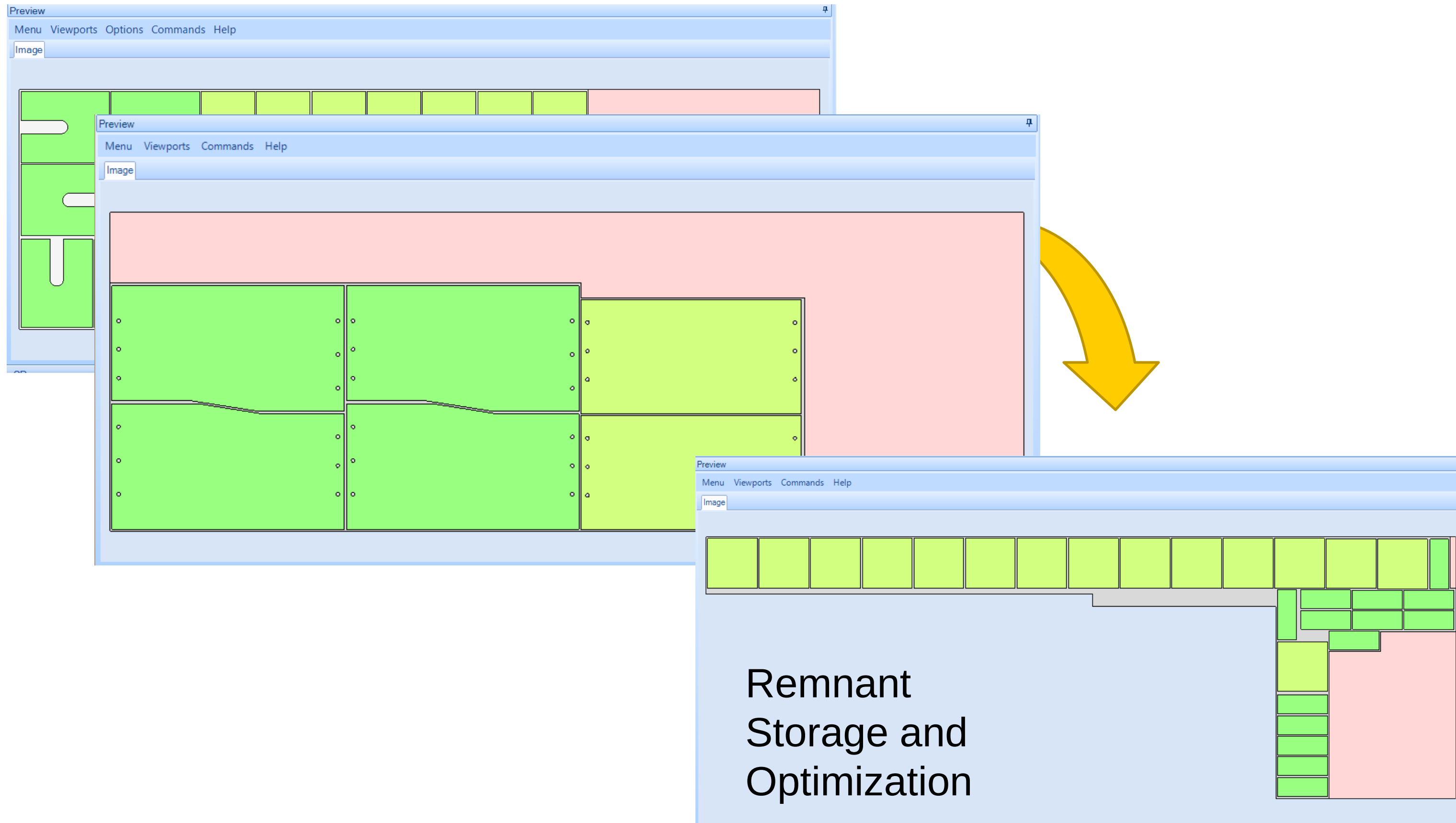
Suivi production

Outils

General Optimize Cutting

Brouchud Nicolas SP Component : 102/102 - Optimize Cutting : 1 Monday 3 March 2014

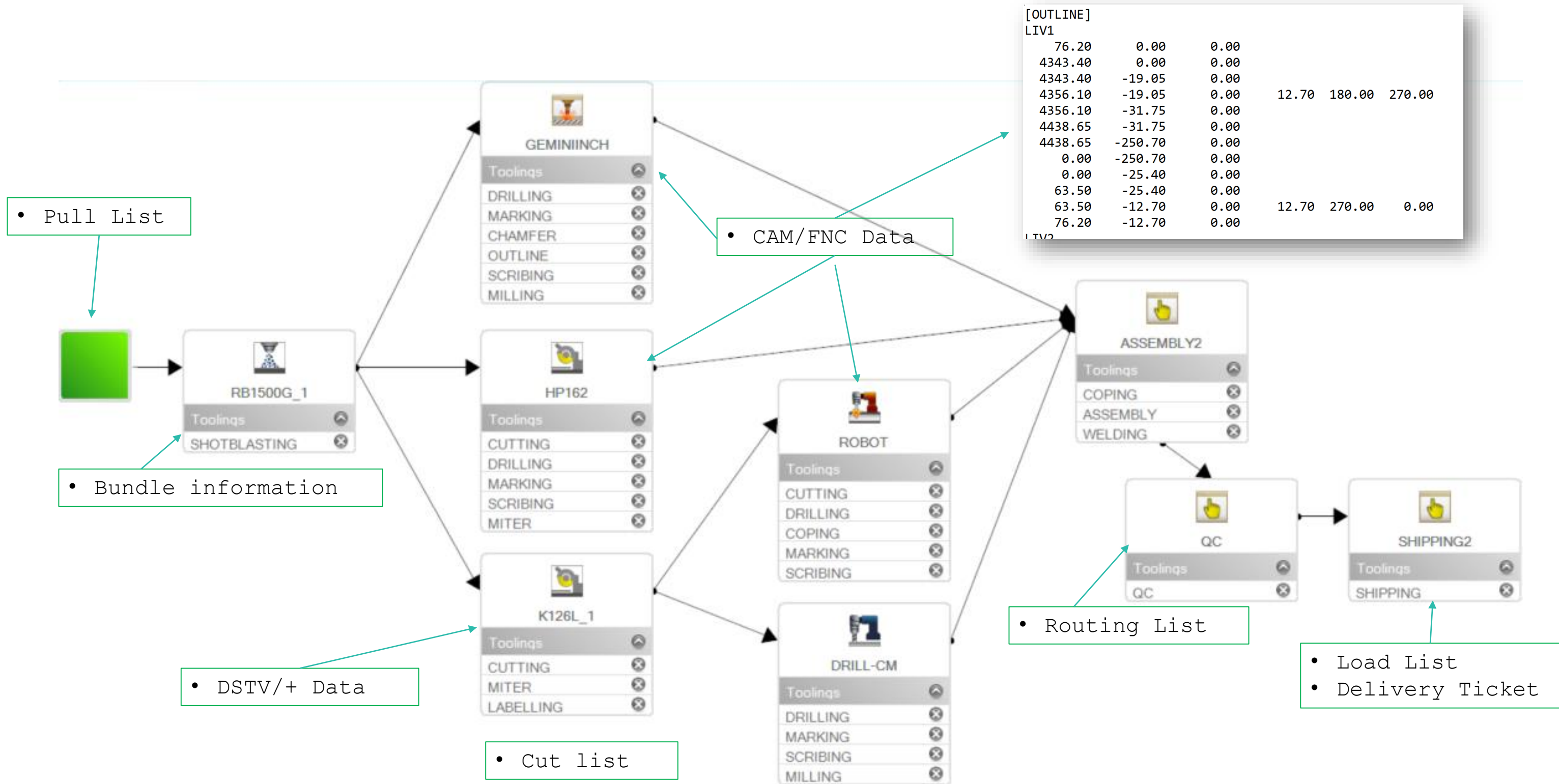
Plate nesting



The Model Based Steel Fabrication Process



1. Build a Digital Workshop
2. Import Knowledge
3. Organize, Batch, Route and Forecast
4. Optimize Material
5. **Produce Workshop Data and Reports**



Section Nesting Results

*MB00310

K126L 1

310

BMS2

Profile	Casting	Material	Grade
Project	Phase	Assembly	Co
1 W18X35			A
Time	00:02:43		
1 STEEL-INNOVAT1	B_40	B_	
2 W18X35			A
Time	00:02:43		
1 STEEL-INNOVAT1	B_40	B_	
3 W21X44			A
Time	00:04:26		
1 STEEL-INNOVAT1	B_483	B_	
2 STEEL-INNOVAT1	B_482	B_	
4 W21X68			A
Time	00:04:04		
1 STEEL-INNOVAT1	B_90	B_	

BAR LOADING SEQUENCE

Cutting Sheet

310

Fabrication Job

BMS2

Profile	Casting	M
Project	Phase	Assen
1 W18X35		
Time	00:02:43	
1 STEEL-INNOVAT1	B_40	
2 W18X35		
Time	00:02:43	
1 STEEL-INNOVAT1	B_40	
3 W21X44		
Time	00:04:26	
1 STEEL-INNOVAT1	B_483	
2 STEEL-INNOVAT1	B_482	
4 W21X68		
Time	00:04:04	
1 STEEL-INNOVAT1	B_90	

Roadmap

Fabrication Job

BMS2

Production date

MEF8505

Project	Phase	Assembly	Part	Quantity	Time
Machine	Tooling				
STEEL-INNOVATION 1		B_307	B_307	1	00:36:29
1	RB1500G_1				*WKS13*
	SHOTBLASTING			1	00:00:00
2	K126L_1				*WKS14*
	CUTTING			1	00:02:33
3	ROBOT				*WKS27*
	COPING			1	00:02:19
	DRILLING			28	00:13:05
	MARKING			1	00:00:16
4	QC				*WKS52*
	QC			1	00:00:00
5	SHIPPING2				*WKS53*
	SHIPPING			1	00:00:00

Project

STEEL-INNOVATIONS

Part

B_324

Profile

W24X55

Material Grade

A992

Length

5' 8-1/8"

Weight

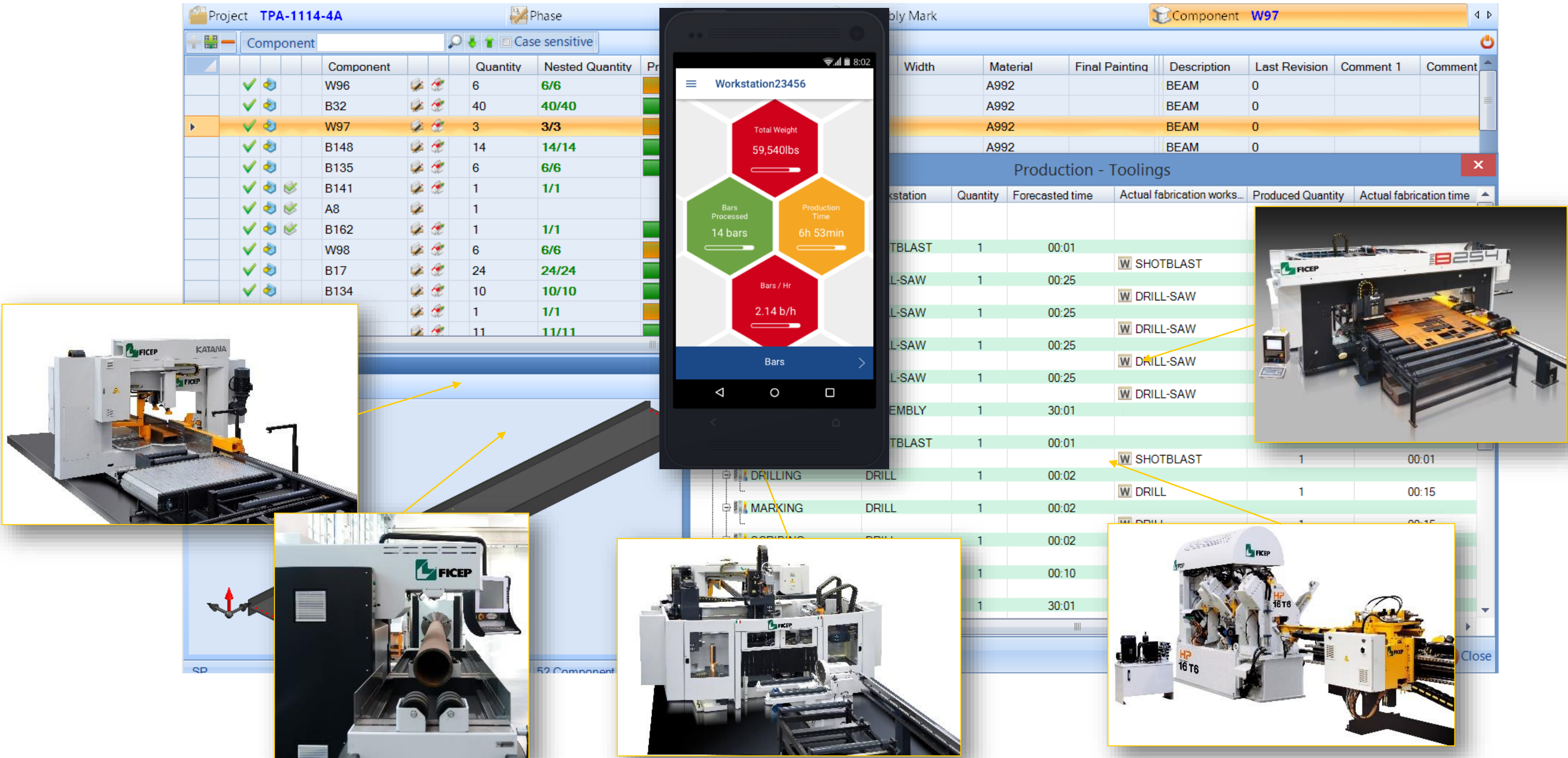
308.9 lb

The Model Based Steel Fabrication Process



1. Build a Digital Workshop
2. Import Knowledge
3. Organize, Batch, Route and Forecast
4. Optimize Material
5. Produce Workshop Data and Reports
6. **Track, Monitor and Share Production Progress**

Capturing Data – from CNC Machines



BMS1	Stock	Project booked stock
Quantity (27)	92.59 %	7.41 %

Optimize Cutting = 19
Nested : 19 (100%)

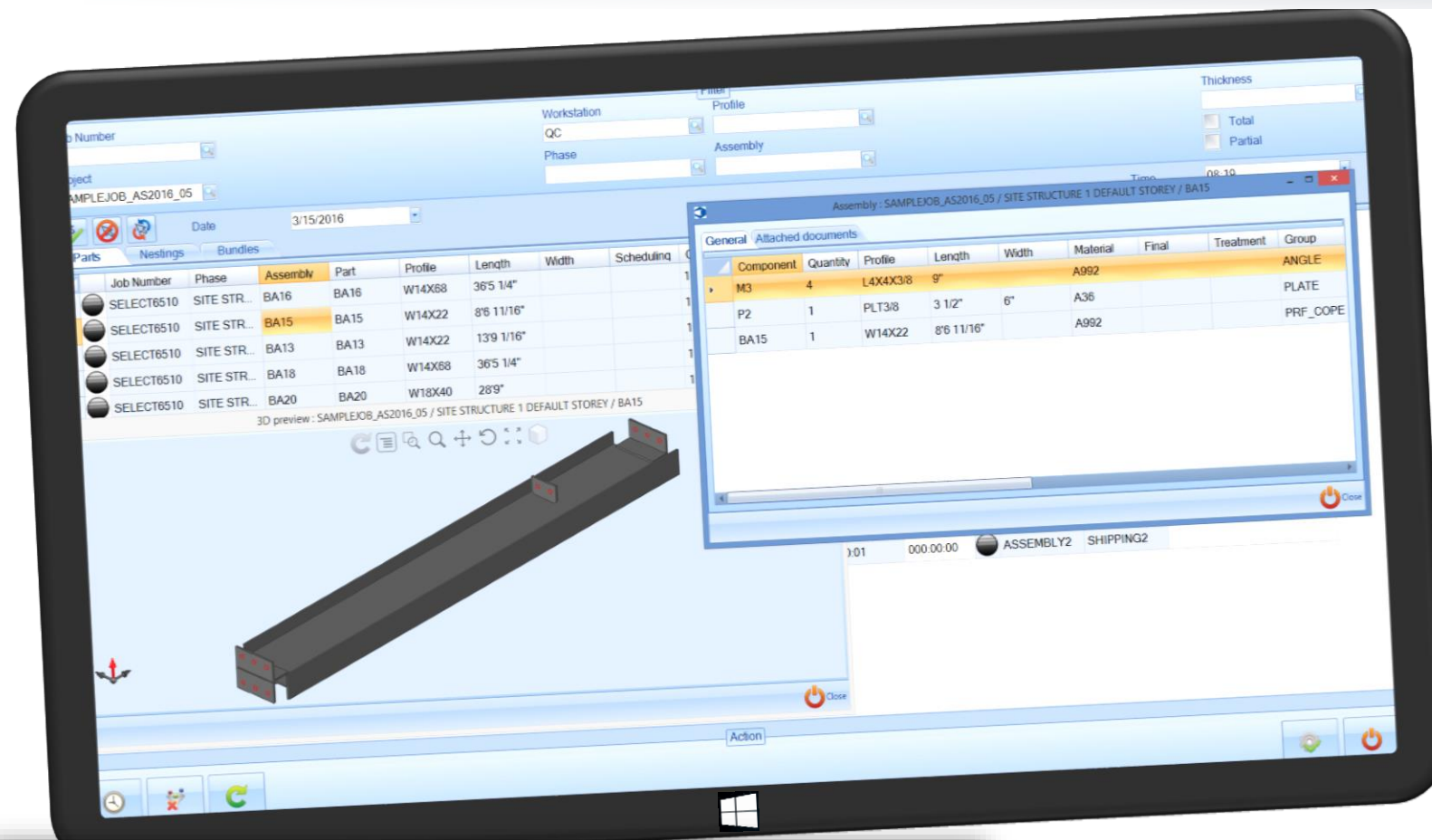
		BMS1				STEEL-INNOVATIONS	309	Beams Seq. 1	09:59
		COLS1				STEEL-INNOVATIONS		Columns Seq 1	< 1mn
		BMS2				STEEL-INNOVATIONS	310	Beams Seq. 2	06:07
		BMS3				STEEL-INNOVATIONS		Beams Seq. 3	< 1mn
		PLT1/2				STEEL-INNOVATIONS	307		00:37
		PLT1				STEEL-INNOVATIONS			02:03
		PLT3/4				STEEL-INNOVATIONS			00:33
		SELECT7580				STEEL-INNOVATIONS	311		00:05
		SELECT7581				STEEL-INNOVATIONS	312		00:08
		PLT1-1/4				STEEL-INNOVATIONS	316		02:58

BMS2	SEND	TOOLING	CHECKED	SHIPPING
Quantity (19)	100.00 %	26.32 %	0.00 %	0.00 %
Weight (27893.78 Lb)	100.00 %	19.02 %	0.00 %	0.00 %

Production Forecast Time

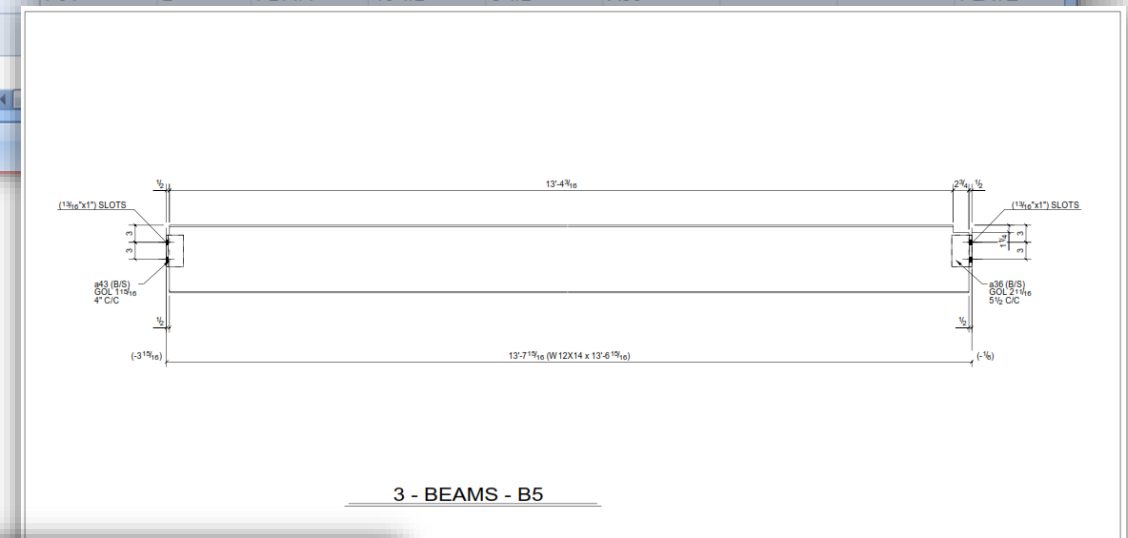
Capturing Data – from Manual Workstations





Assembly : TPA-1114-4A / 1 / C42

Component	Quantity	Profile	Length	Width	Material	Final	Treatment	Group
P35	4	PLT3/8	1'3"	3 1/2"	A36			PLATE
BP1	1	PLT3/4	3'3"	3'3"	A36			PLATE
P36	2	PLT3/8	1'3"	9 9/16"	A36			PLATE
P54	4	PLT3/8	1'10 9/16"	6 1/16"	A36			PLATE
P9	1	PLT3/4	1'9"	8 1/2"	A36			PLATE
P74	4	PLT5/8	1'9"	3"	A36			PLATE
P75	2	PLT5/8	1'9"	8 1/2"	A36			PLATE
P64	2	PLT1/4	10 1/2"	8 1/2"	A36			PLATE



REV	DESCRIPTION	DATE
001	FAST BUILT STEEL	
002	123 IRON DR	
003	STEELVILLE, GA	
004	DESCRIPTION	BEAM
005	PROJECT NAME	PROJECT VIEWER TRAINING
006	DRAWN BY	
007	DATE DRAWN	06/05/2015
008	JOB No.	P15-001
009	DRG No.	B5

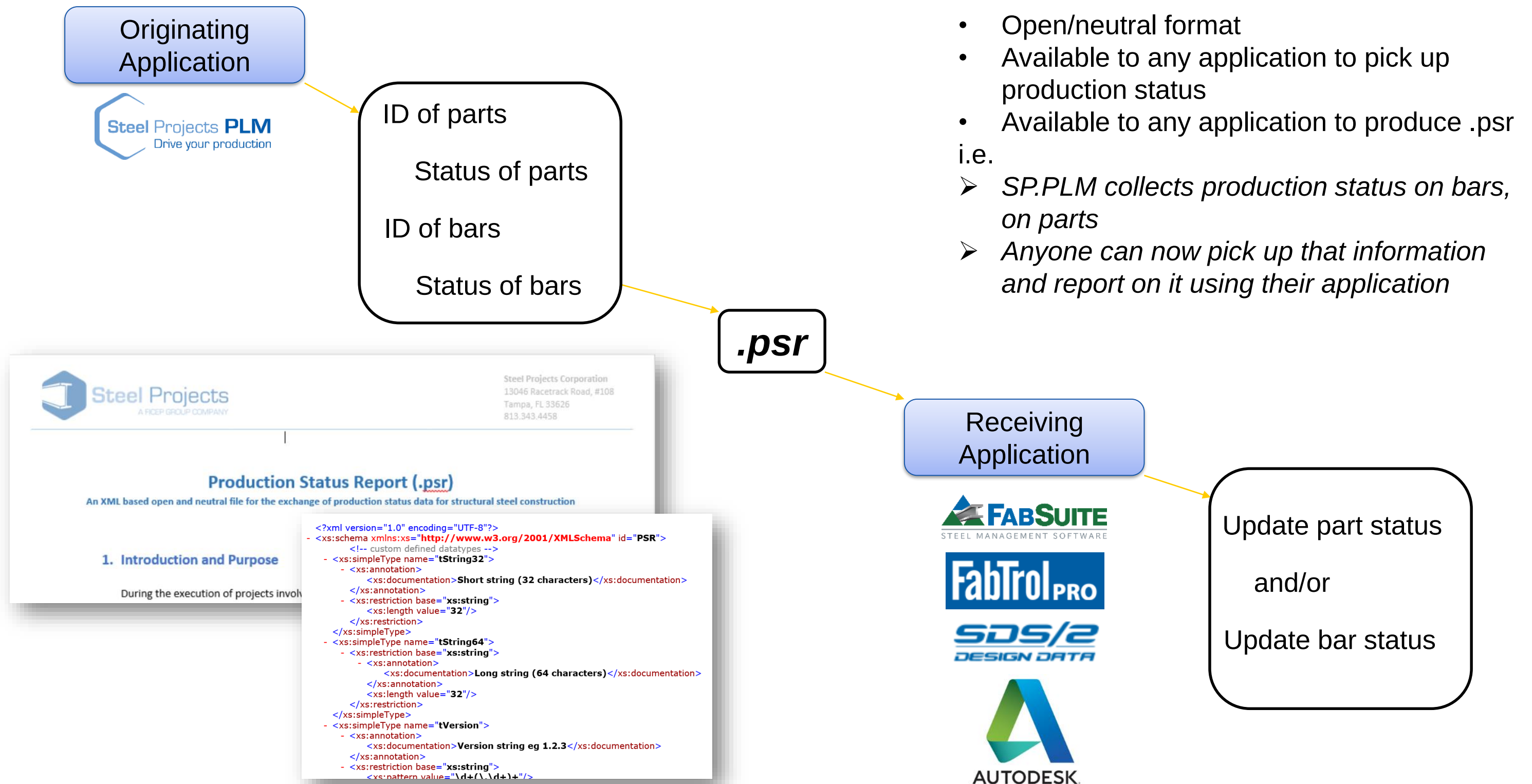
Record Production Time

View Piece 'Route'

Live Feedback to Office

Touch, type, or barcode

Sharing Data – with *any other system*



- Open/neutral format
- Available to any application to pick up production status
- Available to any application to produce .psr i.e.
 - SP.PLM collects production status on bars, on parts
 - Anyone can now pick up that information and report on it using their application

The Model Based Steel Fabrication Process



1. **Build a Digital Workshop**
2. **Import Knowledge**
3. **Organize, Batch, Route and Forecast**
4. **Optimize Material**
5. **Produce Workshop Data and Reports**
6. **Track, Monitor and Share Production Progress**



Steel Projects

A FICEP GROUP COMPANY

STEEL ADVANCING...

Steel Projects **PLM**

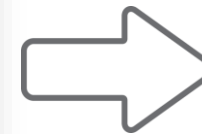
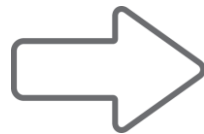
Drive your production

Using Intelligent Data for Managing Steel Fabrication

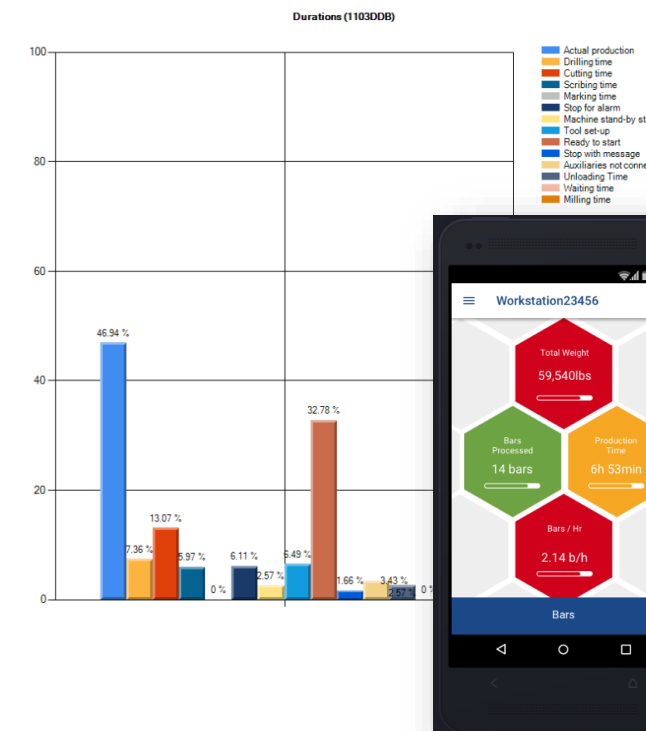
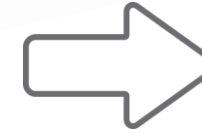
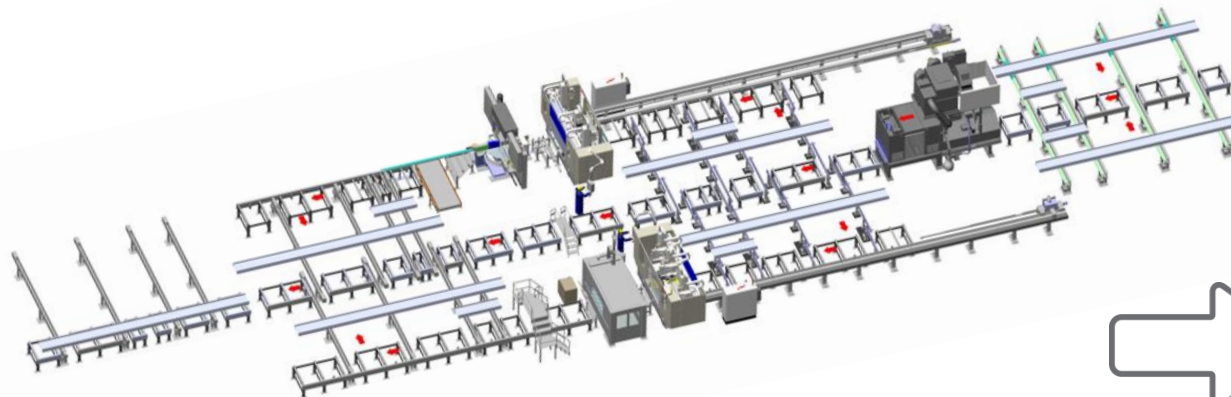
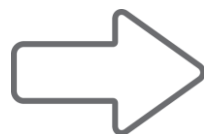
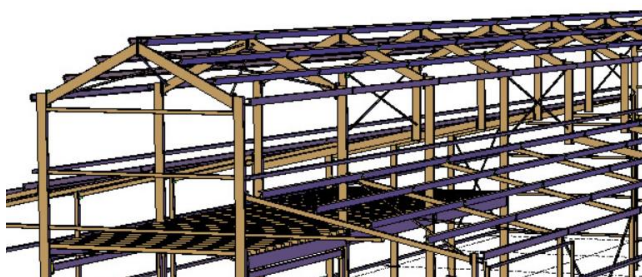
Importing from Autodesk Advance Steel into Steel Projects PLM using IFC for Steel Fabrication (AISC standard)

Chris Moor, VP Steel Projects Corporation

chrismoor@steelprojects.com



Drive your production



The most
dangerous phrase
in the language is "we've
always done it this way."

Rear Admiral Grace Hopper



Chris Moor
Vice President North American Operations

chrismoor@steelprojects.com
813.480.7017

How did I do?

- Your class feedback is critical. Fill out a **class survey** now.
- Use the AU mobile app or fill out a class survey online.
- Give feedback after each session.
- AU speakers will get feedback in real-time.
- **Your feedback results in better classes and a better AU experience.**



