

# SANDVIK MATERIALS TECHNOLOGY

## PRIMARY PRODUCTS



# SAFETY FIRST

Sandvik's objective is zero harm to our people, the environment we work in, our customers and our suppliers.



PROTECTIVE  
EQUIPMENT



FIRST AID  
KIT



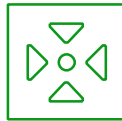
ALARM



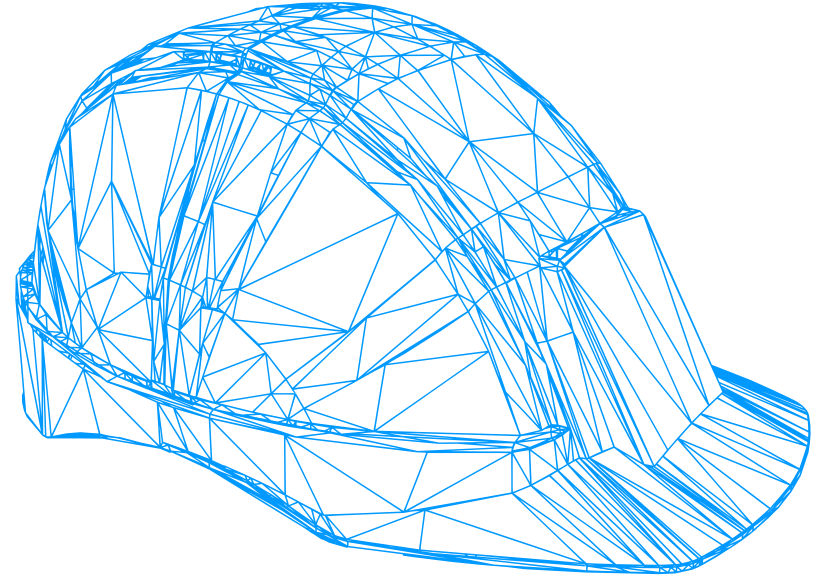
EMERGENCY  
NUMBER



EMERGENCY  
EXIT



ASSEMBLY  
POINT



# AGENDA

## SUPPLY CHAIN DEVELOPMENT PROJECT

- Sandvik Materials Technology & Primary Products
- Supply Chain and Planning Challenges
- Project Background & Objectives
- Planning Philosophy & iPlanner Set Up
- Result
- Summary Q&A

A wide-angle photograph of a large industrial factory floor. The ceiling is high with a complex network of white steel beams and numerous bright lights. In the foreground, there are several long, parallel rows of industrial machinery, likely part of a manufacturing line. The machinery is primarily white and grey, with some yellow accents. In the middle ground, a group of about six people, including men and women, are standing and talking. They are wearing hard hats and work clothes. The background shows more machinery and a large yellow overhead crane. The overall atmosphere is one of a busy, modern industrial environment.

# SANDVIK MATERIALS TECHNOLOGY

- Part of Sandvik Group
- Steel industry
- 4 product areas: Tube (Primary), Kanthal, Powder and Strip
- 6 500 employees
- Primary Products runs iPlanner
  - Sales and Operations Planning (2013)
  - Master Planning (2015)

# PRIMARY PRODUCTS

## WORLD-LEADING PRIMARY SYSTEM

### ROLE AND CAPABILITIES

- Mission to secure **EFFICIENT SUPPLY** of stainless billets for seamless tube, bar and precision strip
- Profitable Growth and **SECURE SCALE**
- **HIGHLY INTEGRATED PRODUCTION** from melt to finished products with **CLOSE COOPERATION WITH R&D**
- **LEADING METALLURGY** for our type of materials
- Production based on **RECYCLED STAINLESS STEEL**
- **STRONG COST** position



### FACTS

- Products: rock drill steel, bars, blooms and billets
- 580 employees



NICHE PLAYER

ADDRESSING 0.02% OF WORLD STEEL MARKET

STEEL  
PRODUCTION

1500  
Mtons

STAINLESS  
STEEL

50  
Mtons

INSTALLED  
CAPACITY IN  
SMT MELTSHOP

0.3  
Mtons

# PRIMARY PRODUCTS PRODUCTION PROCESS

## STEEL MILL AND CONTINUOUS CASTING

From raw materials to bars and coils in our own steel mill



## HOT ROLLING AND FORGING

Processes include blooming mill, forging press, bar mill, steckel mill, annealing and quench annealing



## FINISHING MILL

Peel turning and finishing in the Finishing Mill expanded in 2013 with:

- Two peel turning lathes
- Four finishing lines
- One end cutting line



## ROCK DRILL STEEL

Production of rock drill steel is a process from billets to the finished product.



# PRIMARY PRODUCTS

## PRODUCT RANGE

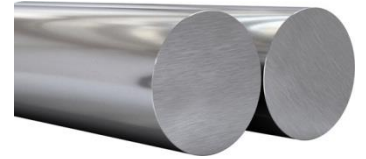


### BAR STEEL

for compressor valves  
and shafts

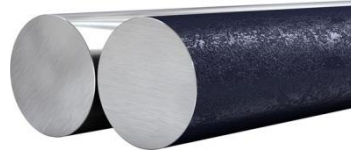
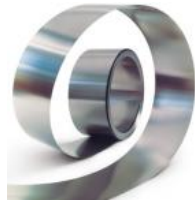
### BAR FOR EXTRUSION

for a wide range of applications  
within for example the oil and  
gas industry



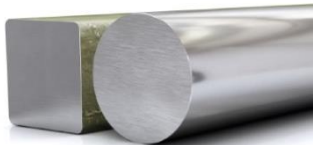
### HOT ROLLED COIL

for razorblades and  
compressors



### ROLLED & FORGED BILLETS

for flanges



### CONTINUOUS CAST BLOOMS & BILLETS

for rerolling to bar and wire

### ROCK DRILL STEEL

for the mining industry

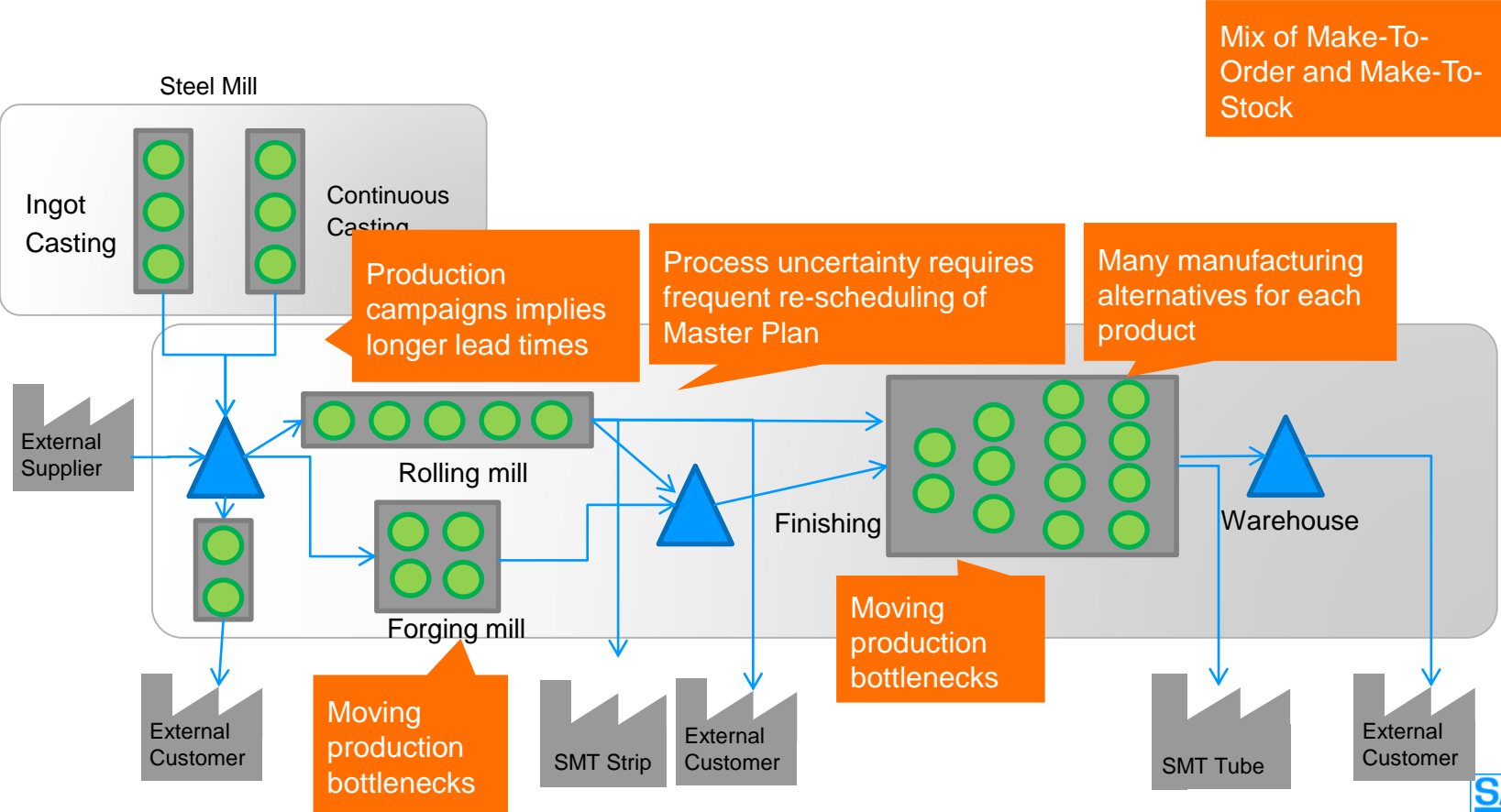


# AGENDA

- Sandvik Materials Technology & Primary Products
- **Supply Chain and Planning Challenges**
- Project Background & Objectives
- Planning Philosophy & iPlanner Set Up
- Result
- Summary Q&A



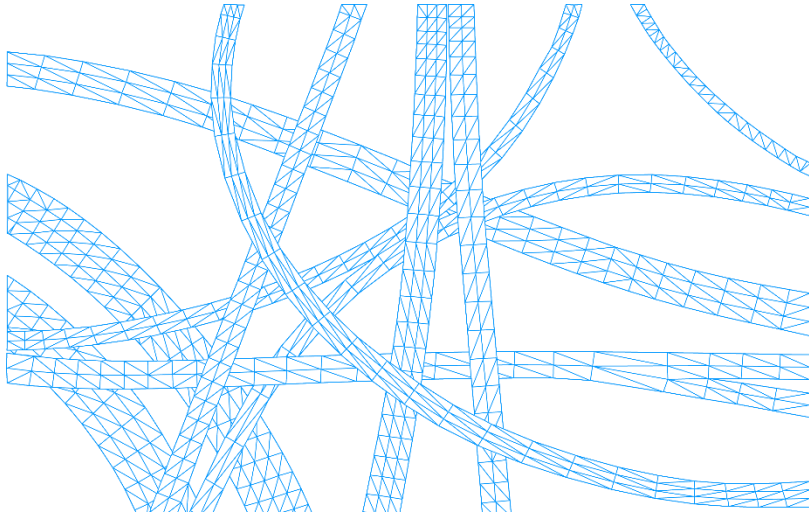
# PRIMARY SUPPLY CHAIN



# PLANNING CHALLENGES AND POSSIBILITIES

## UNCERTAINTY

- Long Value Chains
- Unreliable and aggregated forecast



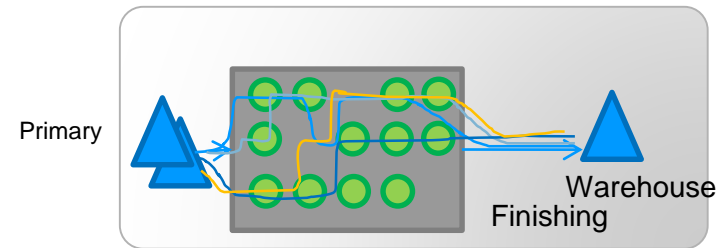
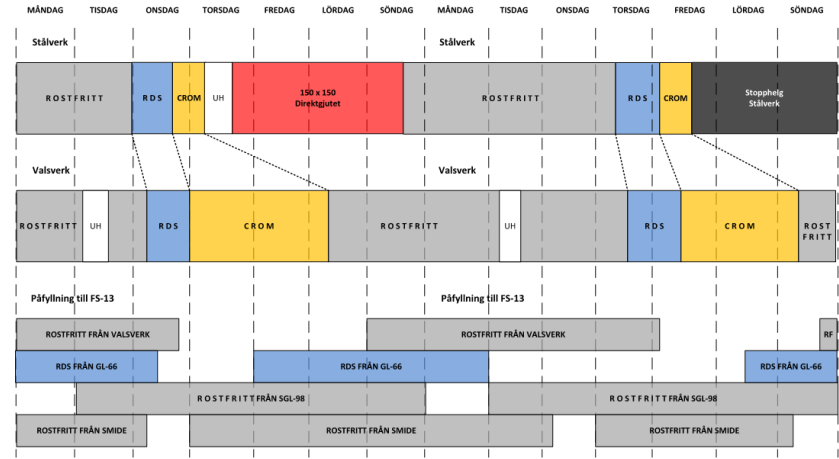
## COMPLEXITY

- Complex products with up to six variables
- Product mix have high impact on capacity/utilization
- Capacity set in tons per week, but one ton is not the same as another ton
- Scrap and yield due to high quality standards – continues development of new materials/product

# PLANNING CHALLENGES

- Steel Mill: Campaign due to metallurgy reason
  - Weekly frequency, 2 week freeze period
- Rolling Mill: Campaign planning due to
  - Bar & Strip
  - Bar: Temperatures & Dimension
- Finishing Mill: Complex flows with different production routings
- High fixed cost requires high utilization
- Product Mix: approx. 10 000 p/n
- Number of customer orders approx. 25 000

Principiell 2 veckors produktionscykel  
Stålverk / Valsverk / FS13



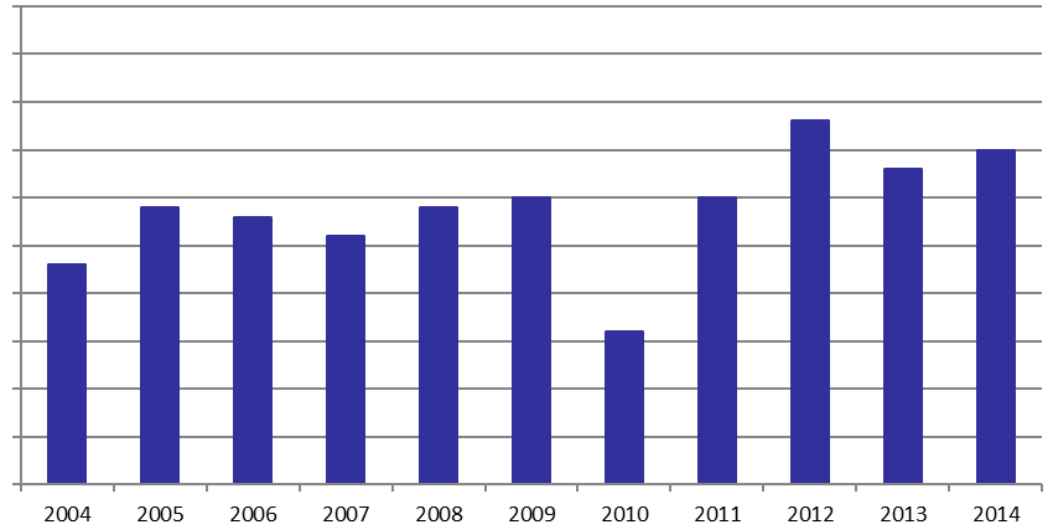
# AGENDA

- Sandvik Materials Technology & Primary Products
- Supply Chain and Planning Challenges
- **Project Background & Objectives**
- Planning Philosophy & iPlanner Set Up
- Result
- Summary Q&A

# WE NEEDED CHANGE

- Perceived as unreliable supplier
- Long lead-times
- Disconnected planning between the Mills
- High Inventory
- Poor Delivery Precision

Delivery Precision



# PROJECT OBJECTIVES

- Sales and Operations Planning (3-15 Months)
  - Collect sales forecast
  - Balance demand and supply
- Master Planning (1-12 Weeks)
  - Estimate customer order delivery date
  - Capacity in hours instead of tons
  - Calculate steel mill start date
  - Reschedule all manufacturing orders
  - Generate new manufacturing order proposals for Make-to-Stock flow



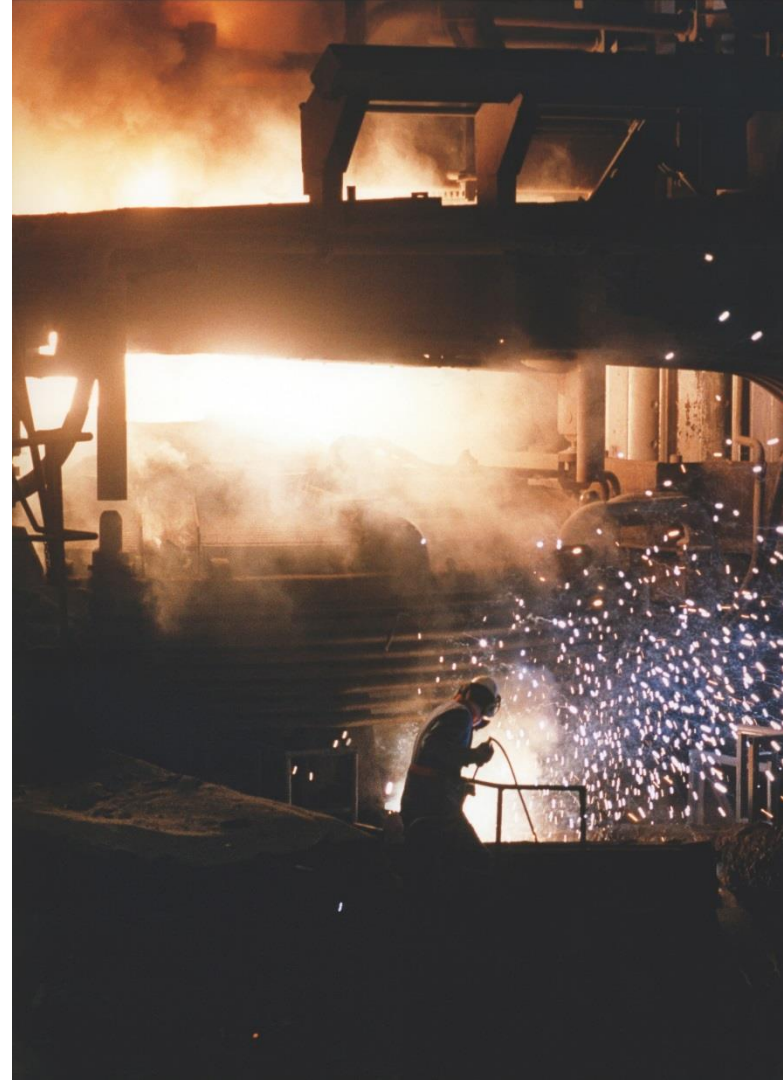
# AGENDA

- Sandvik Materials Technology & Primary Products
- Supply Chain and Planning Challenges
- Project Background & Objectives
- Planning Philosophy & iPlanner Set Up
- Result
- Summary Q&A

# PLANNING PHILOSOPHY

## BALANCING OF PRIMARY SYSTEM

- High fixed cost – high utilization of production capacity
- Lost time in up stream bottleneck can not be regained in down stream machines
- Finite order intake in bottlenecks
- Campaigns in steel mill & rolling mill to balance productivity, quality and delivery precision
- Open up production down stream, secure no constraints in finishing mill





# PLANNING PROCESSES WITH IPLANNER

## SALES AND OPERATIONS PLANNING

- Run scenarios with different forecasts or adjusted capacity
- Re-prioritize sub-contracting manufacturing alternatives
- Identify opportunities to increase sales

## MASTER PLANNING

- Automated process
- Adjust capacity
- Lock operations
- Que times and lead times
- Adjust parallel restrictions e.g. limit product group volumes per week, or machine group volumes per week
- Safety stocks and inventory targets



# BOTTLENECK OVERVIEW

Site	Plan	Capacity(Sum)	UnConstrained	Load(Sum)	Type											
Utilization(Su...	StartingWip(...	Throughput(...	Data			PlanCalendar										
Utilization(Sum)																
CapacityType	Resource	ResourceName	2018-w33	2018-w34	2018-w35	2018-w36	2018-w37	2018-w38	2018-w39	2018-w40	2018-w41	2018-w42	2018-w43	2018-w44	2018-w45	2...
Finite	110-00	GÖTVALSVERK VÄ...	26 %	11 %	42 %	61 %	43 %	60 %	34 %	46 %	18 %	46 %	38 %	11 %	19 %	
	116-00	VALSNING STÄNG...	52 %	73 %	91 %	87 %	58 %	29 %	21 %	29 %	15 %	23 %	17 %	21 %	14 %	
	118-00	VALSNING BAND ...	31 %	27 %	96 %	100 %	100 %	0 %	4 %	0 %	0 %	0 %	14 %	6 %	3 %	
	191-00	GLÖDGNING-66 ...	45 %	23 %	62 %	98 %	59 %	32 %	19 %	22 %	19 %	7 %	1 %	2 %	1 %	
	238-00	SLIPMASKIN 11-12...	100 %	69 %	91 %	73 %	76 %	92 %	35 %	56 %	33 %	58 %	59 %	42 %	31 %	
	265-00	Pressrikt	95 %	98 %	36 %	57 %	73 %	63 %	65 %	61 %	75 %	75 %	70 %	51 %	22 %	
	274-00	FÄRDIGSTÄLLNING...	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	
	275-00	FÄRDIGSTÄLLNING...	100 %	98 %	82 %	24 %	54 %	80 %	76 %	70 %	100 %	100 %	99 %	100 %	82 %	
	280 279-S...	Sum 280 279	100 %	100 %	89 %	92 %	96 %	61 %	25 %	15 %	10 %	1 %	4 %	3 %	0 %	
	281-00	FÄRDIGSTÄLLNING...	99 %	100 %	100 %	97 %	100 %	36 %	76 %	48 %	57 %	0 %	9 %	27 %	14 %	
	282-00	BANDSÄG	99 %	99 %	96 %	99 %	99 %	100 %	100 %	100 %	99 %	99 %	99 %	97 %	58 %	
	404-Sum	SUM 404-00 01 02...	53 %	63 %	33 %	67 %	72 %	62 %	90 %	73 %	67 %	35 %	79 %	56 %	28 %	
	405-00	SMIDESPRESS KAL...	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	405-01	SMIDESPRESS SML...	26 %	46 %	24 %	79 %	67 %	80 %	38 %	79 %	50 %	35 %	59 %	41 %	16 %	
	406-00	SLÄCKGLÖDGNIN...	66 %	72 %	86 %	62 %	56 %	98 %	100 %	80 %	70 %	40 %	31 %	38 %	40 %	
	408-00	SMIDE VÄRMNIN...	35 %	22 %	56 %	100 %	78 %	57 %	12 %	33 %	5 %	14 %	17 %	10 %	5 %	
	411-00	SMÅLTVERK-64 H...	100 %	98 %	98 %	100 %	100 %	100 %	99 %	15 %	0 %	8 %	16 %	0 %	0 %	
	411-02	SMÅLTVERK-64 H...	0 %	0 %	0 %	12 %	0 %	0 %	37 %	0 %	27 %	85 %	97 %	64 %	0 %	
	542-00	UGN 42	0 %	0 %	0 %	0 %	35 %	21 %	23 %	27 %	23 %	17 %	19 %	17 %	14 %	
	981-00	SCANA VBT KARLS...	0 %	0 %	0 %	0 %	2 %	2 %	1 %	0 %	0 %	0 %	0 %	0 %	0 %	
SUM-SVA...	Svarvar totalt	100 %	100 %	80 %	81 %	96 %	59 %	45 %	38 %	35 %	47 %	22 %	28 %	16 %		
Infinite	005-00	KORRIGERING AO...	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	010-00	LAGERHANTERING...	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	010-01	SKEPPN.MÄRKKN. ...	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	010-02	INVÄGNING FRÅN...	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	011-00	TRANSPORT LEGO...	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	109-00	GÖTVALSVERK VÄ...	46 %	58 %	95 %	82 %	60 %	25 %	13 %	29 %	9 %	20 %	15 %	17 %	11 %	
	110-01	GÖTVALSVERK GL...	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	110-06	GÖTVALSVERK ET...	0 %	0 %	8 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	110-09	GÖTVALSVERK VA...	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	111-00	GÖTVALSVERK VÄ...	52 %	61 %	107 %	100 %	71 %	39 %	24 %	39 %	13 %	35 %	24 %	19 %	16 %	
	111-01	GÖTVALSVERK KÄ...	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	111-02	GÖTVALSVERK SV...	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	111-09	GÖTVALSVERK KÄ...	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	
	112-00	MÅLJÄNNVÄRMNIN...	1 024 %	1 060 %	1 037 %	1 022 %	1 026 %	418 %	205 %	440 %	142 %	374 %	237 %	242 %	185 %	



# WORK CENTER BOTTLENECK

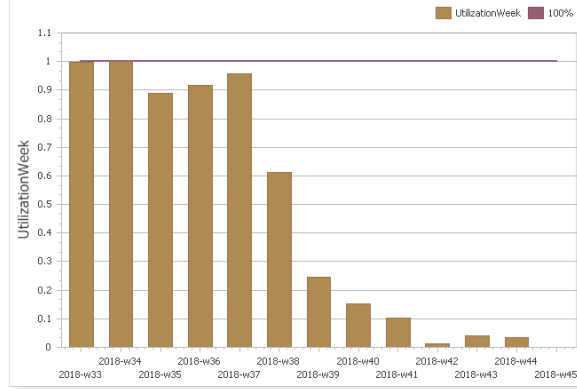
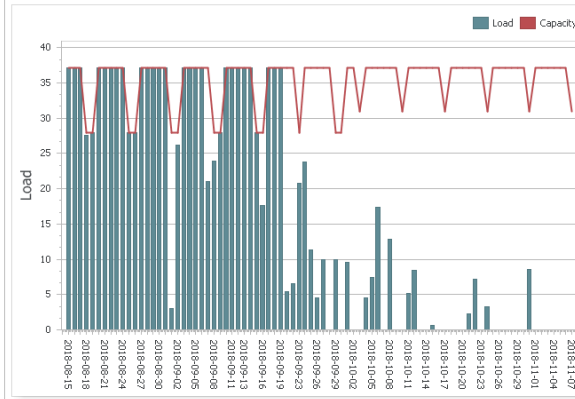
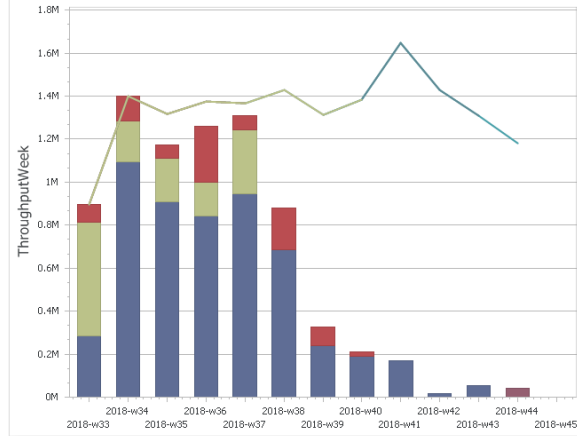
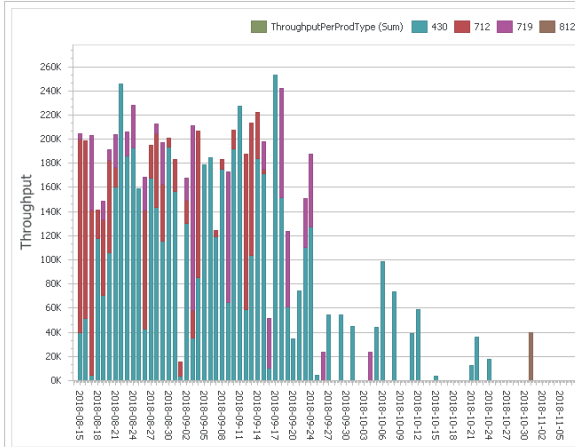
Current Plan not Set for a

## Plan Analysis

- Operations And Load
- Load VS Capacity Need
- Loads and Throughput**
- Customer Demand
- Bottleneck Finite Week
- Bottleneck Finite Month
- Bottleneck Infinite Week
- Bottleneck Infinite Month
- Capacity
- Demand Orders
- Make Orders
- Operations
- Supply Demand

## Plan Analysis

- Settings PROD MP
- APS Inbox
- APS Outbox
- ERP Inbox
- ERP Outbox
- LocalData Plan Input
- LocalData Supply Chain Data



- ColorType
- OnTimeStatus
- OrderType
- ProdType**
- SteelGrade

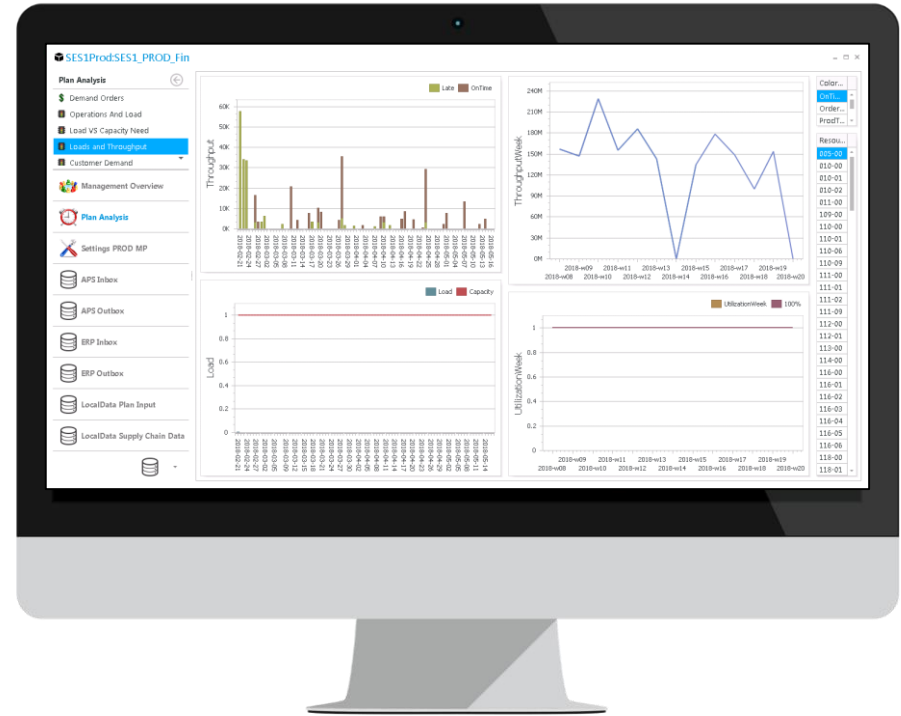
## Resource

- 005-00
- 010-00
- 010-01
- 010-02
- 011-00
- 099-00
- 110-00
- 110-01
- 110-06
- 110-09
- 111-00
- 111-01
- 111-02
- 111-09
- 112-00
- 112-01
- 113-00
- 114-00
- 116-00
- 116-01
- 116-02
- 116-03
- 116-04
- 116-05
- 116-06
- 118-00
- 118-01
- 118-03
- 118-04
- 118-05
- 118-06
- 118-07
- 118-08
- 191-00
- 200-00
- 200-01
- 200-02
- 226-228



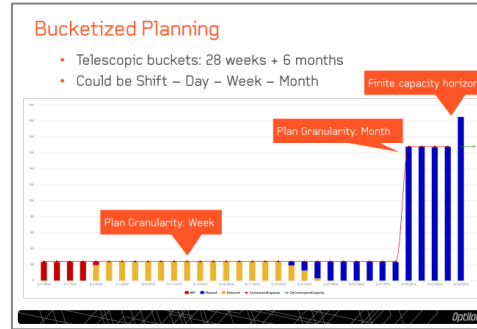
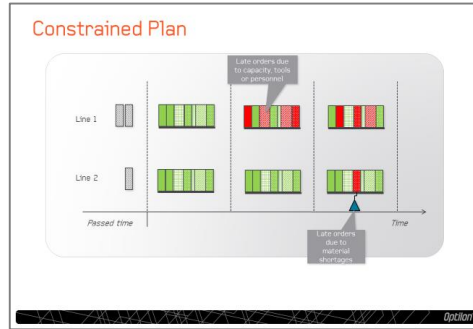
# IPLANNER MODEL

- 150 Work Centers (Machines)
- 2 000 active customer orders on average
- 10 000 p/n
- 100 000 production operation routing
- 65 000 forecast records (S&OP)
- Time for creating a new plan:  
40 minutes (MP) & 4-5 Hours (S&CP)



# IPLANNER CONFIGURATION - SANDVIK

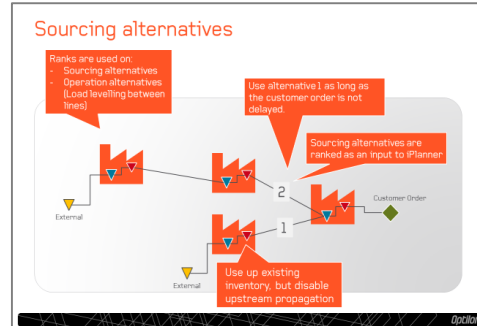
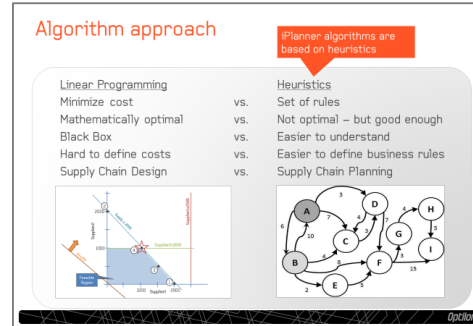
10-15% of resources are set to finite. Steel Mill-program frozen 2 week.



MP:  
365 Daily Buckets

S&OP:  
60 Weekly Buckets

Confirmed orders planned before new orders. Customer Orders are planned before Forecast in MP.



Different manufacturing alternatives.

# AGENDA

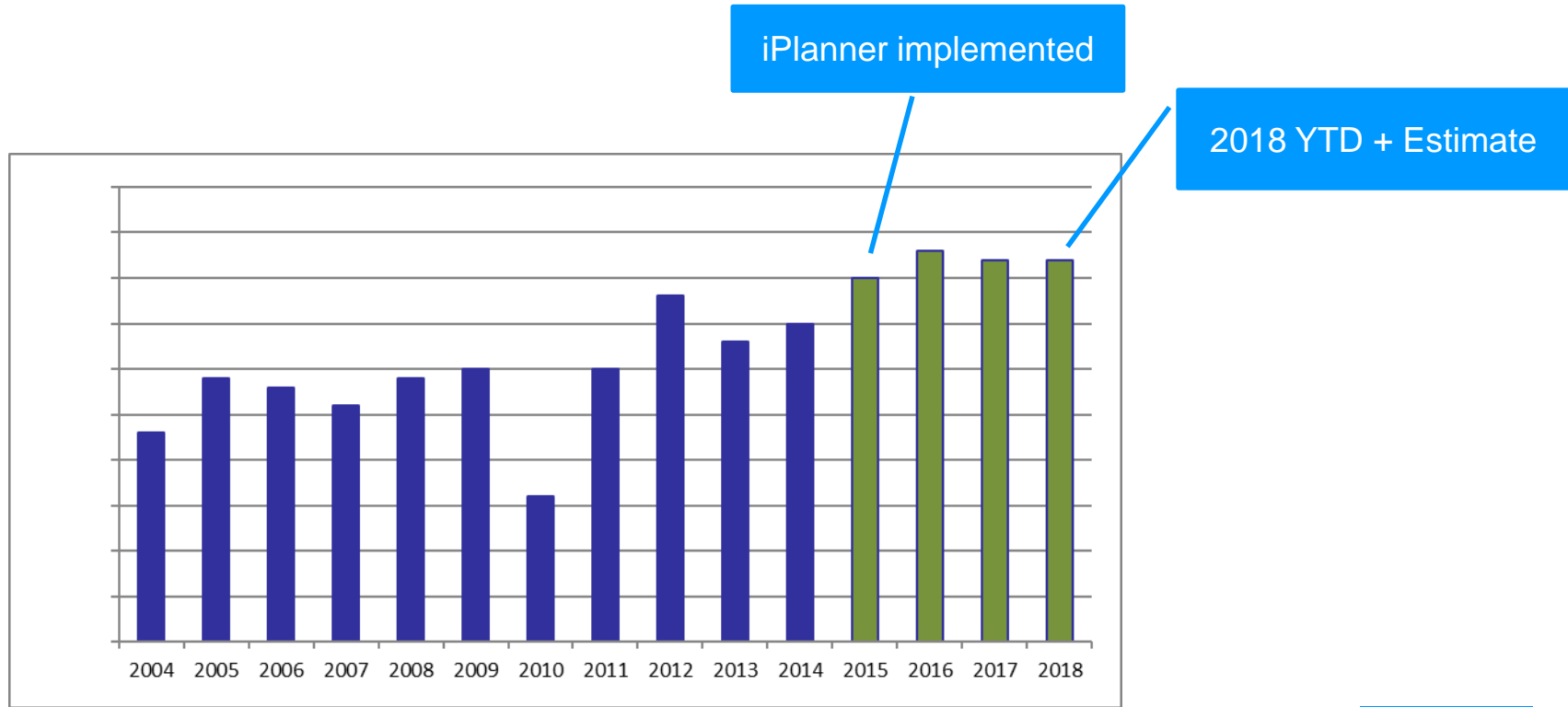
- Sandvik Materials Technology & Primary Products
- Supply Chain and Planning Challenges
- Project Background & Objectives
- Planning Philosophy & iPlanner Set Up
- **Result**
- Summary Q&A

# RESULTS & CONCLUSIONS FOR PRIMARY

- Better proactive planning, when we miss a delivery we can give the customer earlier “heads up”
- Better common understanding of own capacity between planning and production (from tons to hours)
- Integrated planning between our mills
- Visual description of bottlenecks and understanding in the organization where is the bottleneck “today”
- Built trust for the planning team which has made decision making clearer
- Delivery precision to customer increased with about 7-10 percent

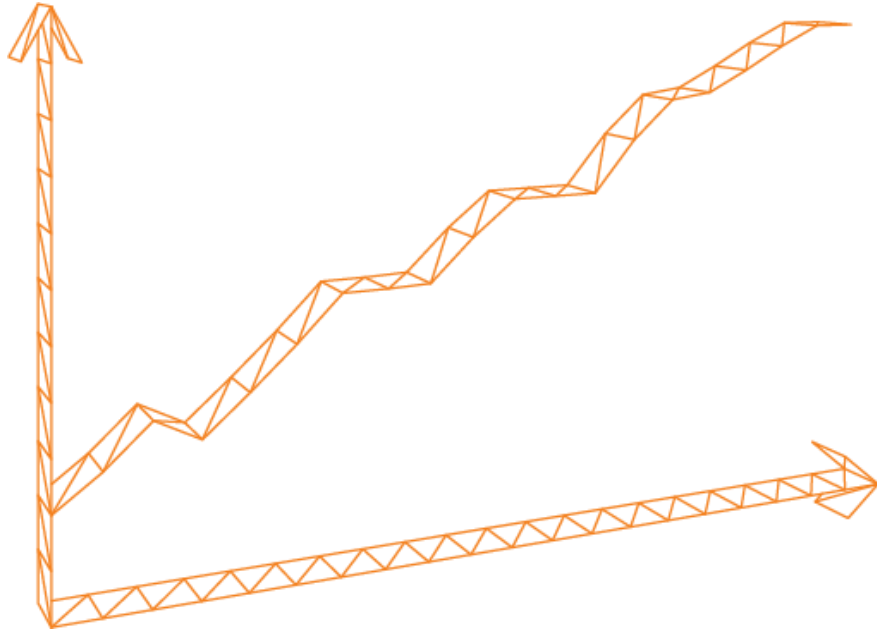


# DELIVERY PRECISION





# NEXT STEP @ PRIMARY SUPPLY CHAIN



## NWC Improvement

Culture change and Courage,  
“dare to start order later”

## Detail planning in Rolling/Forging

Still weekly bucket in Rolling Mill Plan,  
not direct connect with finishing mill

# AGENDA

- Sandvik Materials Technology & Primary Products
- Supply Chain and Planning Challenges
- Project Background & Objectives
- Planning Philosophy & iPlanner Set Up
- Result
- Summary Q&A