



# Work Force Management

Erik Futtrup Director of Development



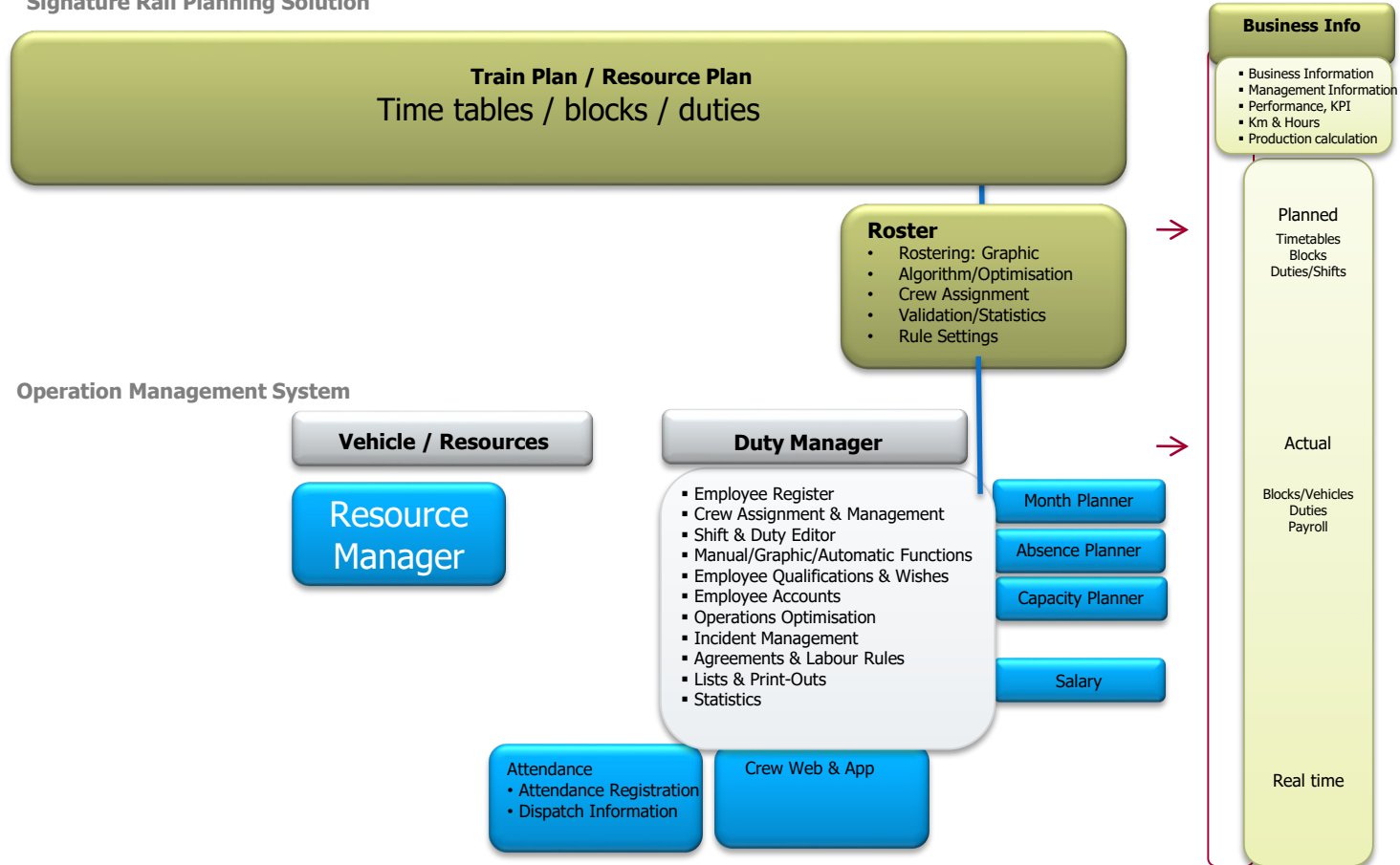
## Overview

- Duty Suite overview
- Gantt Delays
- Daily Crew optimisation
- Employee information / Employee self service
- BI
- Road map



# Signature Rail system for planning & Trapeze for Operation

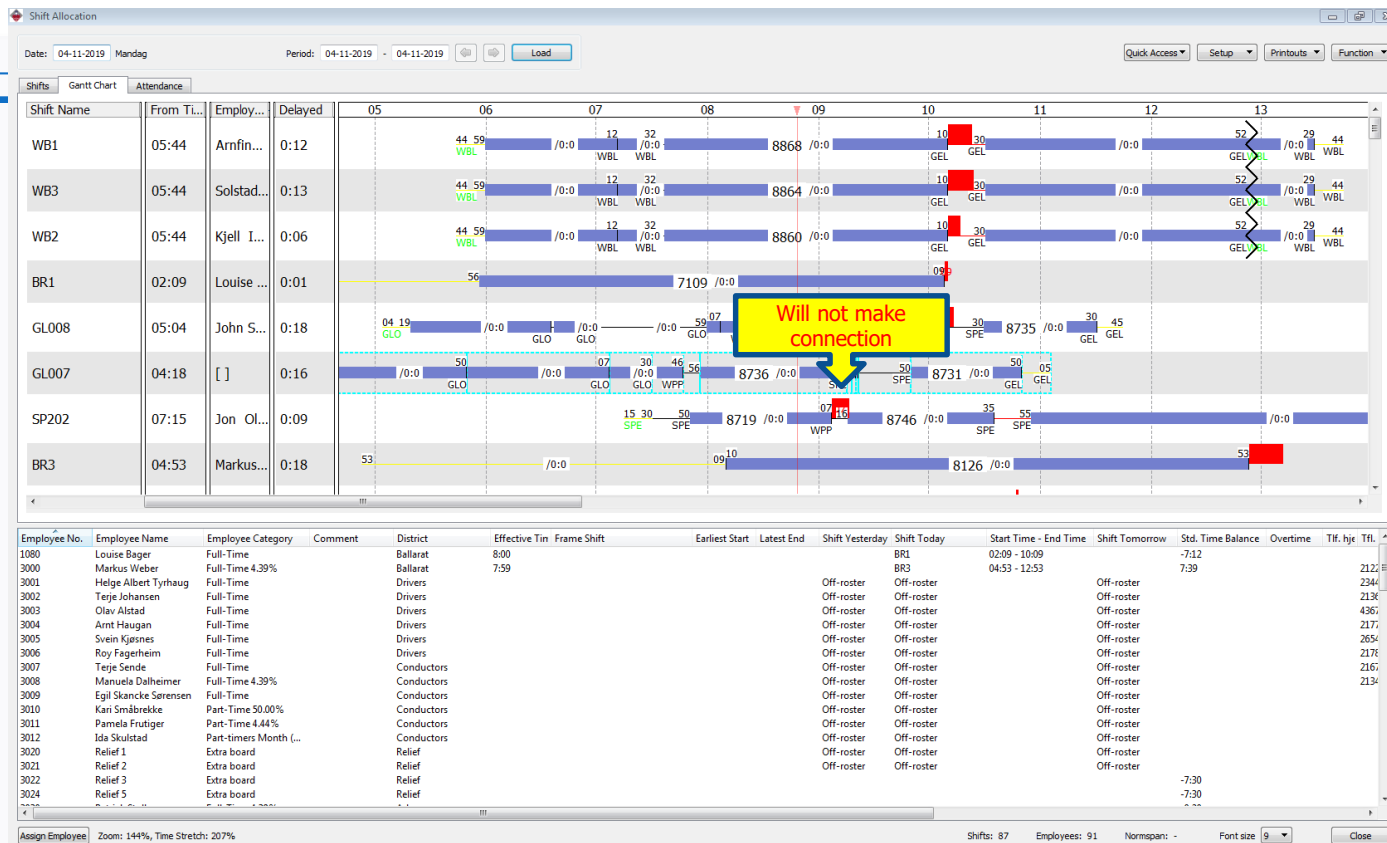
## Signature Rail Planning Solution





# Gantt delays

## Monitoring train delays





## Daily Crew Allocation

- Problems we are solving:
  - Time to allocate employees to shifts (reducing dispatching time)
  - Allocating employees to shifts in an optimal way:
    - Typically using standard time balance ('normbalance')
    - Avoiding overtime
    - Avoiding undertime



# Daily Crew Allocation (DCA)

Shift Allocation

Date: 31-10-2018 Onsdag

Period: 31-10-2018 - 31-10-2018

Load

Quick Access

Setup

Printouts

Function

Shifts

Gantt Chart

Attendance

Start Time - End	Shift Name	Shift Type	Auto. Assigned	Route/Description	Effective To	Paid time 1	Assigned Emp	Employee Name	Issued	Shift Code	Start Time	End Time
08:18 - 16:10	8128	Release shift	x	ORDERLÄSNIN...	7:52	7:52	232533	Sergio Trincado			08:18	16:10
08:33 - 16:25	8130	Roster shift		ORDERLÄSNIN...	7:52	7:52	232029	Idris Abdulla	x		08:33	16:25
05:16 - 13:09	5204	Roster shift		OMLOPP, 7504...	7:53	7:53	241000	Ivan Saric			05:16	13:09
15:57 - 23:50	8152	Roster shift		ORDERLÄSNIN...	7:53	7:53	232231	Nina Wyrde	x		15:57	23:50
14:59 - 22:53	8149	Unassigned roster shift	x	ORDERLÄSNIN...	7:54	7:54	232495	Cristina Tagel			14:59	22:53
16:10 - 24:04	8155	Unassigned roster shift	x	ORDERLÄSNIN...	7:54	7:54	232451	Nathalie Hansson			16:10	24:04
04:41 - 12:36	5203	Absence shift: Semester		OMLOPP, 7502...	7:55	7:55					04:41	12:36
06:45 - 14:40	8122	Roster shift		ORDERLÄSNIN...	7:55	7:55	232046	Olafur Danielsson	x		06:45	14:40
14:33 - 22:28	8148	Absence shift: Semester	x	ORDERLÄSNIN...	7:55	7:55	232440	Laila Choong Forsner			14:33	22:28
15:09 - 23:04	5213	Roster shift		OMLOPP, 5025...	7:55	7:55	242020	Tobias Hagedorn	x		15:09	23:04
05:47 - 13:43	8118	Unassigned roster shift	x	ORDFRI & GNIN...	7:56	7:56	232515	Rasmus L...			05:47	13:43

Employee No.	Employee Name	Employee Category	District	Effective To	Paid Time	Frame Shift	Earliest Start	Std. Time balance	Roster	Shift Yesterday	Shift Today	Shift Tomorrow
232185	Joakim Runnedal	DK 38-25 månad		8:00	8:00	DK S1 [06:00 - 21:00]	04:00	-4:32	BM F DK S1	UTBILDNING	UTBILDNING	UTBILDNING
232499	Ozgurat Akbulut	DK 38-25 månad		7:11	7:11	DK [00:00 - 32:00]		-0:21	BM F DK	8114	8109	8156
232013	Andreas Nyman	DK 38-25 månad					17:25	-0:09	BM F DK MELLAN	FRIDAG	FRIDAG	8129
232525	Sara Björnström	DK 38-25 månad		7:01	7:01	DK S1 [06:00 - 21:00]	03:00	-0:09	BM F DK S1	UTBILDNING	8139	PRAKTIK 5
232534	Jonas Holmström	DK 39:00		8:00	8:00	DK S1 [06:00 - 21:00]	03:00	-0:09	BM F DK S1	UTBILDNING	PRAKTIK 4	PRAKTIK 5
232538	Steve Hälleberg	DK 39:00		7:12	7:12	DK S1 [06:00 - 21:00]	03:00	-0:09	BM F DK S1	UTBILDNING	8120	PRAKTIK 5
232488	Björn Berglund	DK 38-25 månad		8:07	8:07	DK [00:00 - 32:00]	00:05	-0:08	BM F DK	8104	8125	8133
232443	Jenny Samuelsson	DK 38-25 månad					01:13	0:01	BM F DK	8121	FRIDAG	8152
232496	Lisa Svan	DK 38-25 månad		0:35	0:35	DK [00:00 - 32:00]	15:30	0:01	BM F DK	FRIDAG	RAST	8112
232473	Martin Einar	DK 38-25 månad		7:43	7:43	DK [00:00 - 32:00]	14:28	0:02	BM F DK	FRIDAG	8117	8135
232486	Kenneth Röstlund	DK 38-25 månad		7:50	7:50	DK [00:00 - 32:00]		0:03	BM F DK	8105	8115	FRIDAG
232521	Magnus Almqvist	DK 38-25 månad		7:48	7:48	DK S1 [06:00 - 21:00]	07:16	0:03	BM F DK S1	8137	8129	8114
232005	Jan-Erik Lindahl	DK 38-25 månad					19:25	0:06	BM F XS	FRIDAG	FRIDAG	FRIDAG
232227	Hannes Egnell	DK 38-25 månad					10:30	0:08	BM F DK IN	8151	FRIDAG	8164
232515	Rasmus Lodenius	DK 39:00		7:56	7:56	DK [00:00 - 32:00]	00:28	0:08	BM F DK	8117	8118	FRIDAG
232122	Viktor Ljungqvist	DK 38-25 månad					09:28	0:11	BM F DK	8148	FRIDAG	8120
232533	Sergio Trincado	DK 39:00		7:52	7:52	DK S1 [06:00 - 21:00]	03:25	0:11	BM F DK S1	8130	8128	8147
232184	Hockey Bergenf...	DK 38-25 månad		7:48	7:48	DK [00:00 - 32:00]	09:53	0:15	BM F DK	8149	8114	8125
232440	Laila Choong Fo...	DK 38-25 månad		7:55	7:55	DK [00:00 - 32:00]	11:16	0:15	BM F DK	8157	8148	FRIDAG
232495	Cristina Tagel	DK 38-25 månad		7:54	7:54	DK [00:00 - 32:00]	10:46	0:20	BM F DK	8153	8149	8140
232088	Noureddine Sou...	DK 39:00		7:45	7:45	DK S1 [06:00 - 21:00]	03:00	0:22	BM F DK S1	UTBILDARE	8127	8108
232451	Nathalie Hansson	DK 38-25 månad		7:54	7:54	DK IN [15:00 - 32:00]	36:00	0:29	BM F DK IN	FRIDAG	8155	8158
232087	Lise Fuchs	DK 39:00		8:00	8:00	DK S1 [06:00 - 21:00]	04:00	0:36	BM F DK S1	UTBILDNING	UTBILDNING	UTBILDNING
232107	Aaron Jacobsen	DK 39:00		8:00	8:00	DK S1 [06:00 - 21:00]	04:00	0:36	BM F DK S1	UTBILDNING	UTBILDNING	UTBILDNING
232536	Stefan Granath	DK 39:00		8:00	8:00	DK S1 [06:00 - 21:00]	04:00	0:36	BM F DK S1	UTBILDNING	UTBILDNING	UTBILDNING
232542	Samuel Rahm	DK 39:00		8:00	8:00	DK S1 [06:00 - 21:00]	04:00	0:36	BM F DK S1	UTBILDNING	UTBILDNING	UTBILDNING

Assign Employee

Shifts: 190 Employees: 26 Normspan: 10:28 Font size 8

Close



## Validation

- Qualifications (route knowledge etc.)
- Districts (depots)
- Frames
- Wishes
- Rules (rest time, earliest start)
- Filtering (which categories do we use, and which types of shifts)



Under- and  
over norm

After  
optimisation

Datum: 31-10-2018	Normtidsbalans	Kategori	Norm	Overnorm	Undernorm	Norm (abs værdi)	Norm (abs værdi)	Efter optimering	Efter optimering 2	
230013		DK 38:25 måned	-16,43	0	16,43	16,43	16,43	0,07	0	
232005		DK 38:25 måned	-5,65	0	5,65	5,65	5,65	0,23	0,1	
232013		DK 38:25 måned	-2,23	0	2,23	2,23	2,23	0,17	0,15	
232122		DK 38:25 måned	-9,08	0	9,08	9,08	9,08	0,02	0,18	
232184		DK 38:25 måned	-2,15	0	2,15	2,15	2,15	0,07	0,25	
232185		DK 38:25 måned	-7,47	0	7,47	7,47		0	0	
232227		DK 38:25 måned	-18,4	0	18,4	18,4	18,4	0,03	0,13	
232440		DK 38:25 måned	-6,5	0	6,5	6,5	6,5	0,23	0,25	
232443		DK 38:25 måned	-3,97	0	3,97	3,97	3,97	0,05	0,02	
232451		DK 38:25 måned	-9,83	0	9,83	9,83	9,83	0,4	0,48	
232473		DK 38:25 måned	-4,27	0	4,27	4,27	4,27	0,3	0,03	
232486		DK 38:25 måned	-6,55	0	6,55	6,55	6,55	0	0,05	
232488		DK 38:25 måned	-11,15	0	11,15	11,15	11,15	0,08	0,13	
232495		DK 38:25 måned	-9,82	0	9,82	9,82	9,82	0,27	0,33	
232496		DK 38:25 måned	1,18	1,18	0	1,18	1,18	0,23	0,02	
232499		DK 38:25 måned	-10,48	0	10,48	10,48	10,48	0,03	0,35	
232500		DK 38:25 måned	-8,03	0	8,03	8,03	8,03	0,03	0,03	
232508		DK 38:25 måned	-2,55	0	2,55	2,55	2,55	0,05	0,22	
232521		DK 38:25 måned	3,18	3,18	0	3,18	3,18	0,02	0,05	
232525		DK 38:25 måned	7,28	7,28	0	7,28	7,28	0,27	0,15	
232087		DK 39:00	0,6	0,6	0	0,6		0	0	
232088		DK 39:00	-0,27	0	0,27	0,27	0,27	0,18	0,37	
232107		DK 39:00	0,6	0,6	0	0,6		0	0	
232515		DK 39:00	-7,48	0	7,48	7,48	7,48	0	0,13	
232533		DK 39:00	0,63	0,63	0	0,63	0,63	0,2	0,18	
232534		DK 39:00	4,6	4,6	0	4,6	4,6	0,15	0,15	
232536		DK 39:00	0,6	0,6	0	0,6		0	0	
232538		DK 39:00	4,6	4,6	0	4,6		0	0	
232542		DK 39:00	0,6	0,6	0	0,6		0	0	
				23,87	142,31	166,18	151,71	3,08	3,75	
				27	192					
										97,97% Forbedring
										97,53% Forbedring





Driver/Shift	1	2	3	4	5	6
A	x		x		x	
B		x	x		x	x
C	x	x	x		x	x
D		x		x		
E						
F	x		x	x	x	x

Driver/Shift	1	2	3	4	5	6
A	100		-20		-40	
B		120	140		170	200
C	-100	0	50		80	-20
D		40		200		
E						
F	-10		-20	-80	-20	-90



Driver/Shift	1	2	3	4	5	6
A	100		-20		-40	
B		120	140		170	200
C	-100	0	50		80	-20
D		40		200		
E						
F	-10		-20	-80	-20	-90
	cost: 400					

Driver/Shift	1	2	3	4	5	6
A	100		-20		-40	
B		120	140		170	200
C	-100	0	50		80	-20
D		40		200		
E						
F	-10		-20	-80	-20	-90
	cost: 170					



## Employee Information

- Cool features
  - Live workplan and push notification updates
  - Absence requests
  - Entry of wishes / preferences



Shift Details

04

AU19

08:38 - 18:30

From Agerskellet / Nordskellet (Randers)

To Randers Busterminal

Auto

From Agerskellet / Nordskellet (Randers)

08:38

To Agerskellet / Nordskellet (Randers)

08:48

Content Sign-on time

From Agerskellet / Nordskellet (Randers)

08:48

To Østervold / Nørregade (Randers)

09:03

Content Block 1

From Østervold / Nørregade (Randers)

09:03

To Haslund, Hammelvej / Møllevangsvej - vendeplads (Randers)

09:29

Content Block 1

From Haslund, Hammelvej / Møllevangsvej - vendeplads (Randers)

09:32

To Østervold / Nørregade (Randers)

09:56

Content Block 1

From Østervold / Nørregade (Randers)

09:56

To Agerskellet / Nordskellet (Randers)

10:13

Content Block 1

From Agerskellet / Nordskellet (Randers)

10:13

To Agerskellet / Nordskellet (Randers)

11:03

Content Lunch break

From Agerskellet / Nordskellet (Randers)

11:03

To Østervold / Nørregade (Randers)

11:18

Content Block 5

From Østervold / Nørregade (Randers)

11:18

Request absence

Since

05

To

05

Reason

Annual Leave

Comment

Submit

Affected shifts

2019-11-05 AU124 [13:23 23:12]

Pending requests

2020-02-24 - 2020-03-01: Annual Leave

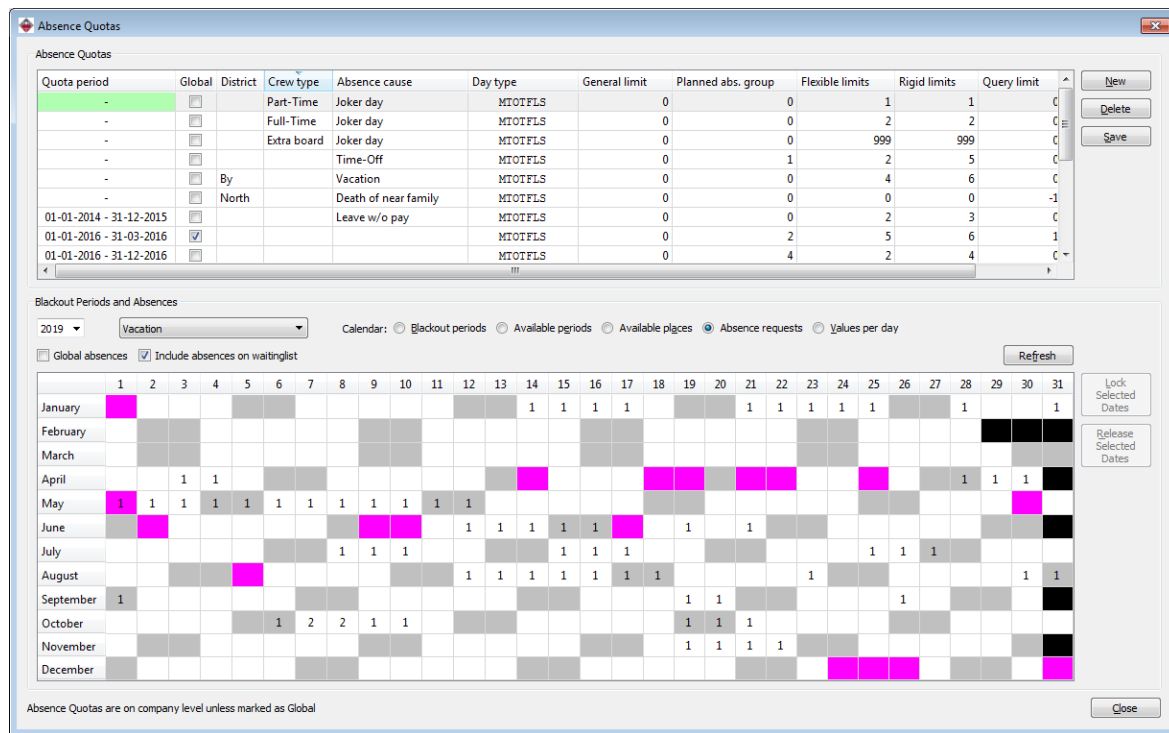
2020-03-09 - 2020-03-15: Annual Leave

2020-04-13 - 2020-04-19: Annual Leave



# Quota setup

- Limiting number of slots
- Blocking specific days/periods
- Viewing requests





# Validating work force and capacity

Capacity Planner											
Capacity Planner <span>Filter</span>											
Period: <span>15-09-2019</span> - <span>31-10-2019</span> <span>Load</span>											
	Se	Ma	Ti	On	To	Fr	Lø	Sø	Ma	Ti	On
	15	16	17	18	19	20	21	22	23	24	25
September											
Surplus/Deficit	4 / -172.0	-7 / -144.8	-6 / -128.9	-4 / -109.5	-6 / -125.0	-6 / -132.2	4 / -164.4	4 / -172.0	-6 / -146.2	-8 / -144.1	-1 / -93.8
▼ All Employees	33 / 34.8	33 / 166.2	32 / 174.6	31 / 173.7	31 / 164.6	31 / 158.9	31 / 43.3	33 / 34.8	34 / 151.5	32 / 166.7	34 / 189.1
Employees	4 / 27.3	4 / 27.3	3 / 19.9	2 / 12.4	3 / 19.8	3 / 19.8	2 / 12.4	4 / 27.4	4 / 27.3	3 / 19.8	2 / 12.4
Substitutes	28 / 0.0	28 / 131.3	27 / 139.8	26 / 138.9	26 / 129.8	26 / 124.2	26 / 8.5	28 / 0.0	29 / 116.7	27 / 131.9	29 / 154.2
Overtime	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0
On Spare Shift (No Work)	(0) / (0.0)	(0) / (0.0)	(0) / (0.0)	(0) / (0.0)	(0) / (0.0)	(0) / (0.0)	(0) / (0.0)	(0) / (0.0)	(0) / (0.0)	(0) / (0.0)	(0) / (0.0)
On Frame Shift (No Work)	1 / 7.5	1 / 7.5	2 / 14.9	3 / 22.4	2 / 15.0	2 / 15.0	3 / 22.4	1 / 7.4	1 / 7.5	2 / 15.0	3 / 22.4
Borrowed	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0
► Assigned Shifts	0 / 0.0	16 / 130.9	18 / 139.8	17 / 138.5	17 / 129.8	16 / 123.7	1 / 8.5	0 / 0.0	17 / 113.3	17 / 131.9	19 / 150.8
▼ Unassigned Shifts	0 / 0.0	11 / 75.9	10 / 74.6	8 / 51.6	10 / 74.0	10 / 74.4	0 / 0.0	0 / 0.0	10 / 91.5	11 / 82.4	7 / 46.8
Planned Shifts	0 / 0.0	11 / 75.9	10 / 74.6	8 / 51.6	10 / 74.0	10 / 74.4	0 / 0.0	0 / 0.0	9 / 84.2	11 / 82.4	7 / 46.8
Extra Shifts	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	1 / 7.3	0 / 0.0	0 / 0.0
Fixed Extra Shifts	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0
▼ Planned Days Off	29 / 199.3	13 / 96.6	10 / 74.2	10 / 70.7	10 / 70.8	11 / 78.0	26 / 176.8	29 / 199.4	13 / 85.4	12 / 81.5	9 / 62.8
Off-roster	29 / 199.3	13 / 96.6	10 / 74.2	9 / 63.1	10 / 70.8	11 / 78.0	25 / 169.2	29 / 199.4	13 / 85.4	12 / 81.5	8 / 55.2
Rest day	0 / 0.0	0 / 0.0	0 / 0.0	1 / 7.6	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	1 / 7.6
EDO	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	1 / 7.6	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0
Absences	-	-	-	-	-	-	-	-	-	-	-
Qualifications	!!!										
1	III   2030   Mar...	III   2030   Mar...	III   2030   Mar...	III   2030   Mar...	III   2030   Mar...	III   2030   Mar...	III   2030   Mar...	III   2030   Mar...	III   2030   Mar...	III   2030   Mar...	III   2030   Mar...
2			VI   1035   Ma...	UFT   2080   H...	V   1075   Pet...	V   1075   Pet...	UFT   2080   H...	UFT   2080   H...	III   1065   Jan...	UFT   2080   H...	III   2080   Hen...
3			Fre   2100   Su...	UFT   2080   H...	UFT   2080   H...	UFT   2080   H...	UFT   2080   H...	UFT   2080   H...	III   1025   Dan...	UFT   2080   H...	U   2035   Jen...
4				Fre   2100   Su...	Fre   2100   Su...	Fre   1000   An...	Fre   1000   An...	AL   2025   M...	III   1045   Max...	AL   2025   M...	UFT   2080   H...
5				AL   2025   M...	AL   2025   M...	AL   2025   M...	AL   2025   M...		III   1050   Chr...		AL   1080   Se...
6					AL   2015   Si...	AL   1080   Lo...			UFT   2080   H...		
7									UFT   2080   H...		
8									AL   2025   M...		



# Information available for algorithm and dispatching

Trapeze Month Planner - [EF: 01-11-2019 - 30-11-2019]											
File View Tools Window Help											
november											
44											
No.	Employee	District	fr	lø	sø	Time	Standard	ma	ti	on	to
			1	2	3			4	5	6	7
			30 / 11	30 / 1	28 / 1			28 / 13	29 / 11	30 / 11	
1000	Anne Jensen Vittr	By	AU15	Off-roster	Off-roster	9:51		AU128	AU128	AU117	AU1
1005	Annika Persson	By	AU124	Off-roster	Off-roster	9:14		AU131	AU18	Off-roster	Off-r
1010	Caroline Skovman	By	AU131	Off-roster	Off-roster	8:27		Off-roster	Off-roster	AU129	AU1
1015	John Lund II.	Land	Off-roster	EDO	Off-roster			AU113	AU133	AU16	AU1
1020	Lars Nielsen	Land	AU112	Off-roster	Off-roster	8:21		Off-roster	AU17	AU130	AU1
1025	Daniel Hansen-Ha	By	AU129	Off-roster	Off-roster	8:00		AU118	AU113	Off-roster	Off-r
1035	Mahmoud Sulaym	Land	AU111	Off-roster	Off-roster	8:26		AU122	AU132	AU18	AU1
1040	Heidi Madsen	North	AU119	Off-roster	Off-roster	8:00		Off-roster	AU120	Off-roster	AU1
1045	Max Jensen	North	Annual Leave	Off-roster	Off-roster			Off-roster	Off-roster	AU131	AU1
1050	Christina Thomse	North	AU128	Off-roster	Off-roster	12:26		AU110	Off-roster	Rest day	AU1
1055	Ellen Christiansen	North	AU114	Off-roster	Off-roster	11:29		AU123	AU129	Off-roster	Off-r
1060	Sebastian Svane	North	AU132	Off-roster	Off-roster	9:17		AU19	AU124	AU123	Off-r
								LT	CALL	CALL	
1065	Jamila Rashid	North	Illness	Illness	Illness	22:48		Illness	Illness	Illness	Illness
1070	Martin Birch	Train	FRAME2	FRAME3	Off-roster	15:00		Off-roster	FRAME1	FRAME2	FRA



# Preferences

CrewApp

New Preference

**Later than**  
Date: 04/11/2019  
From: 06:00  
To: 12:00 05/11/2019  
Status: Unknown

**CALL**  
Date: 05/11/2019  
From: 00:00  
To: 12:00 06/11/2019  
Status: Unknown

Preference sent successfully

Status of your preferences

CrewApp

Date:  
05/11/2019

Type:  
CALL

From: 00:00 To: 12:00

Comment:  
only after 14:00

Send

Create new preference





# Preferences via CrewWeb

My work schedules

1060 11/5/2019 9:24:19 AM

Employee No.:  
1060

Employee Name:  
Sebastian Svane

Company:  
By

District:  
North

November 2019

2019-11-01

2019-11-30

Load

2019-11-01 - 2019-11-30

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
				1 AU132 5:31 - 15:18	2 Off-roaster	3 Off-roaster
4 AU19 8:38 - 18:30	5 AU124 13:23 - 23:12	6 AU123 13:23 - 23:13	7 Off-roaster	8 Off-roaster	9 Off-roaster	10 Off-roaster
11 AU17 6:00 - 15:17	12 AU118 8:53 - 18:25	13 AU134 13:22 - 23:10	14 AU123 13:23 - 23:13	15 Off-roaster	16 Off-roaster	17 Off-roaster
18 AU132 5:31 - 15:18	19 Off-roaster	20 AU19 8:38 - 18:30	21	22	23	24
25	26	27	28	29	30	

Date

Type

Start Time

End Time

Comment

Create preference

2019-11-28

CALL

0:00

36:00

from CrewWeb

Current preferences:

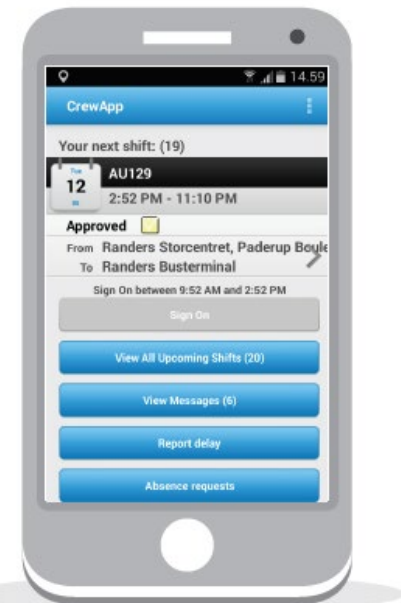
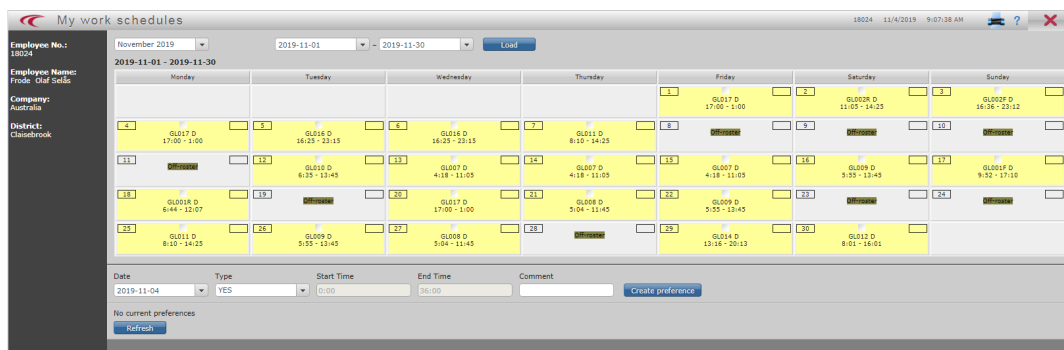
LY	6:00 - 36:00	Status: (Unknown)	
CALL	0:00 - 36:00	Status: (Unknown)	only after 14:00
CALL	0:00 - 36:00	Status: (Unknown)	from CrewWeb

Refresh



# Road Map – Duty Manager

- 2020
  - New CrewApp – current has 28.000+ daily users
  - New CrewWeb
  - Employee Swap
  - FAID



A photograph of three people in a modern office setting. A man with a beard and a woman are looking at a laptop screen, while another man stands behind them, also looking at the screen. The office has large windows and potted plants. The text "Thank You!" is overlaid on the right side of the image.

# Thank You!