

## FEATURES

---

- The lowest coefficient of friction
- Superior wear resistance in dry running conditions

Superior features vs. all other plastic materials used as conveyor chains and belts in the beverage industry

## BENEFITS

---

- Minimization / elimination of lubrication in the different sections of the line, according to needs
  - Improved container handling, thanks to reduction of debris and lubricant build up
  - Reduction of motor power requirement
  - Longer center to center distances
- Chain life increase up to 3 times vs. other plastic material solutions
- Lower operating and maintenance costs vs. other plastic material solutions

# DK on the field installation

		GLASS	PLASTIC	METAL CAN	ALUMINIUM CAN	PAPER
FOOD	BABY FOOD					
	PET FOOD					
	SAUCE					
CONTAINER MFG	CONTAINER MFG					
BOTTLING	BEER					
	WINE & SPIRITS					
	SOFT DRINKS					
	WATER					
	JUICE & ENERGY DRINKS					
DAIRY	MILK					
OTHER	OTHER					

## Regina products benchmarking

1. Competitors cross references

2. Stainless Steel chains

3. Plastic chains and belts

1. DK: an outstanding successful story

2. **DK<sup>2</sup>™** : a promising future

3. **DK<sup>2</sup>™** : Applicative case studies

MARKET TREND



- Development of lines with higher productivity
- Increased number of PET lines



DI<sup>2</sup>™

## Regina products benchmarking

1. Competitors cross references
2. Stainless Steel chains
3. Plastic chains and belts
  1. DK: an outstanding successful story
  2. **DK<sup>2</sup>™** : a promising future
  3. **DK<sup>2</sup>™** : **Applicative case studies**

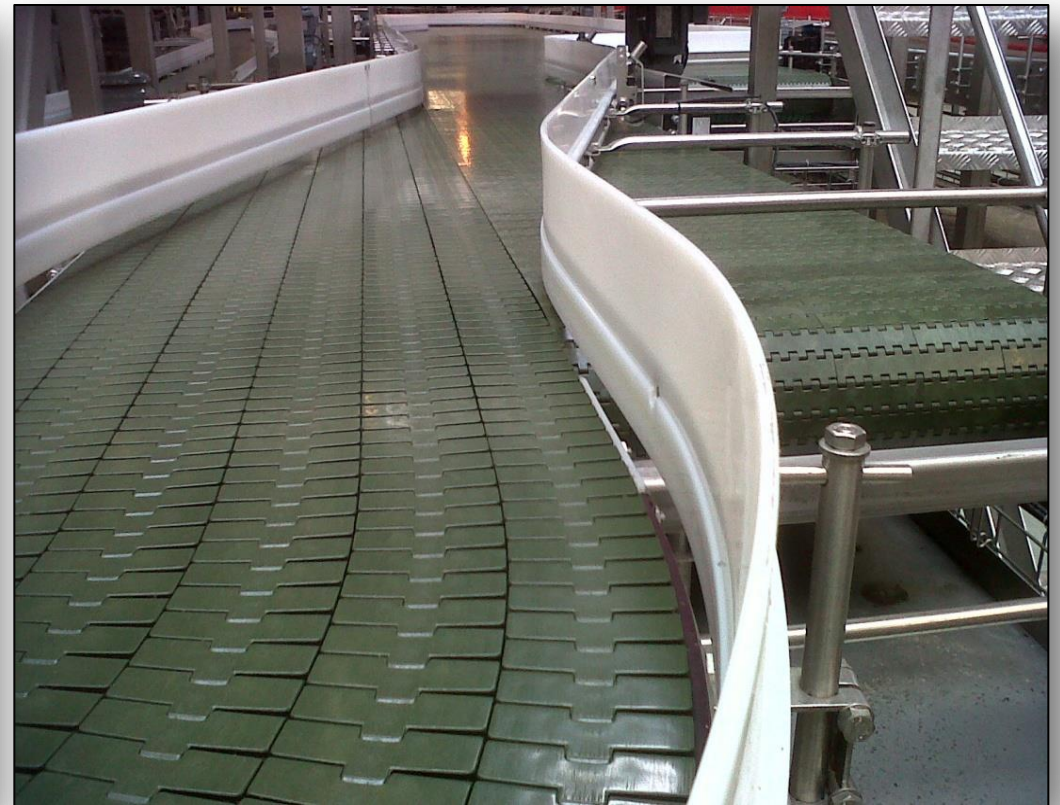


LINE N°	LINE MANUF.	INSTALL DATE	DAILY WORKING HOURS	ESTIMATED TOTAL WORKING HOURS	REGINA PRODUCT	TYPE OF CONTAINER	OUTPUT [bph]
1	KRONES	December, 2011	24	28.500	1600 D2K Belts D2K 783M Chains D2K 828 Chains	1,5 liter, PET petaloid bottle	36.000
						2 liter, PET petaloid bottle	33.000
2	KRONES	December, 2010	24	35.000	1600 D2K Belts D2K 783M Chains D2K 828 Chains D2K 880M RG Chains	1,5 liter, PET petaloid bottle	36.000
						2 liter, PET petaloid bottle	33.000
3	KRONES	April,2010	24	37.300	1600 D2K Belts D2K 783M Chains D2K 880M RG Chains	1,5 liter, PET petaloid bottle	30.000

LINE N°	LINE MANUF.	INSTALL DATE	DAILY WORKING HOURS	ESTIMATED TOTAL WORKING HOURS	REGINA PRODUCT	TYPE OF CONTAINER	OUTPUT [bph]
1	KRONES	December, 2011	24	28.500	1600 D2K Belts D2K 783M Chains D2K 828 Chains	1,5 liter, PET petaloid bottle	36.000
						2 liter, PET petaloid bottle	33.000



LINE N°	LINE MANUF.	INSTALL DATE	DAILY WORKING HOURS	ESTIMATED TOTAL WORKING HOURS	REGINA PRODUCT	TYPE OF CONTAINER	OUTPUT [bph]
2	KRONES	December, 2010	24	35.000	1600 D2K Belts D2K 783M Chains D2K 828 Chains D2K 880M RG Chains	1,5 liter, PET petaloid bottle 2 liter, PET petaloid bottle	36.000 33.000



LINE Nr	LINE MANUF.	INSTALL DATE	DAILY WORKING HOURS	ESTIMATED TOTAL WORKING HOURS	REGINA PRODUCT	TYPE OF CONTAINER	OUTPUT [bph]
3	KRONES	April,2010	24	37.300	1600 D2K Belts D2K 783M Chains D2K 880M RG Chains	1,5 liter, PET petaloid bottle	30.000

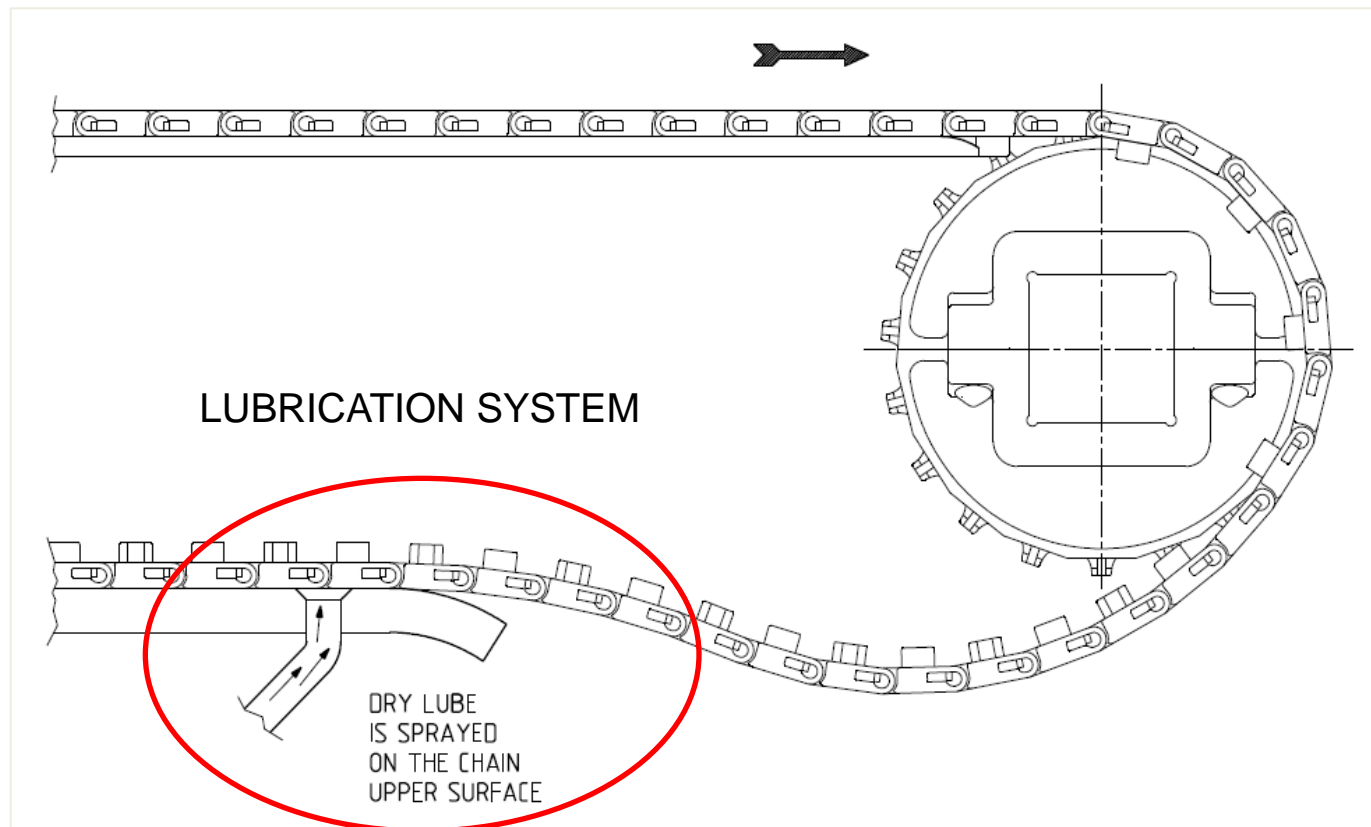


## ■ Lubrication

- Dry Lube
- Av. Consumption: 2,5l /line/wk

## ■ Sanitation and Cleaning

- Automatic
- Frequency: Weekly (1 hour/line/wk)



- **Upper Section**
  - Standard UHMWPE Wear Strip
- **Return Section**
  - Rollers with rubber rings

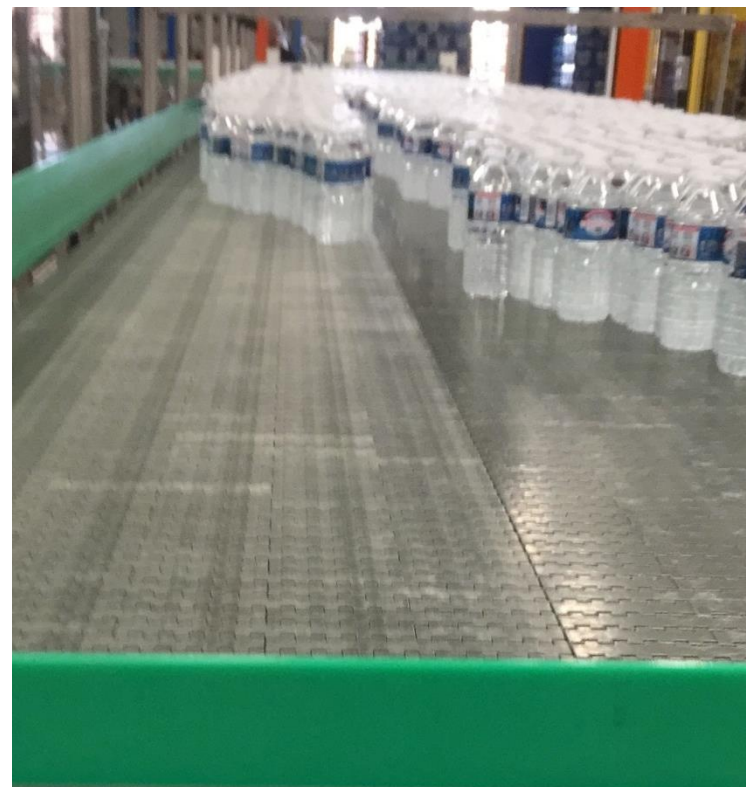
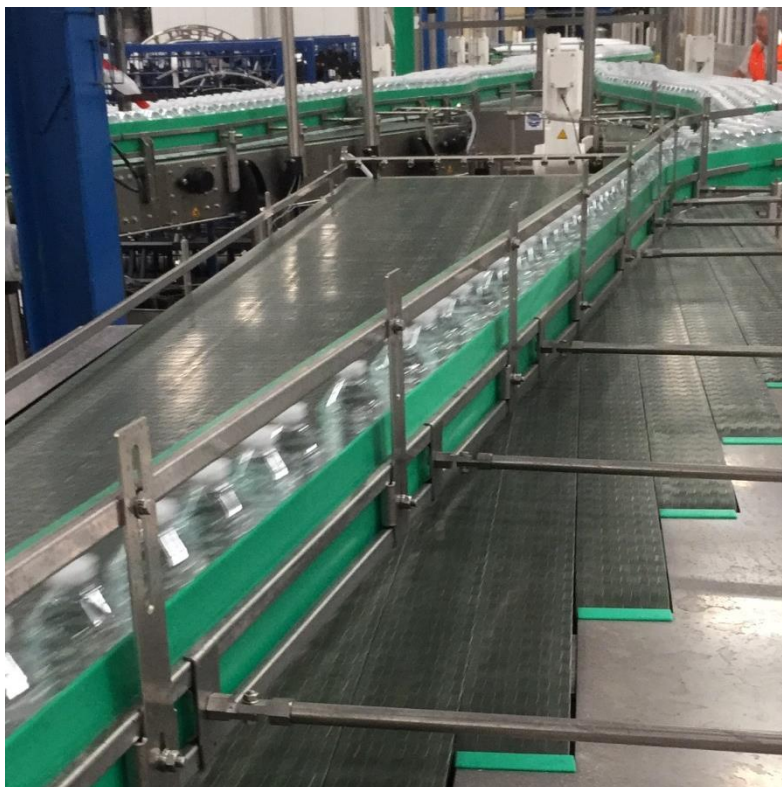


LINE N°	PRODUCT	ESTIMATED TOTAL WORKING HOURS	LINE SECTION	THICKNESS REDUCTION		ELONGATION	
				[mm]	[%]	[mm/pitch]	[%]
3	1600AGD2K0085	37.300	Single lane	-0,32	-3,68	0,553	2,18
3	1600BG1D2K0680	37.300	Mass Conveyor	-0,30	-3,45	0,359	1,41
3	D2K783MKRA/000	37.300	Mass Conveyor	-0,33	-3,79	0,424	1,67
2	1600AGD2K0085	35.000	Single lane	-0,32	-3,68	0,500	1,97
2	1600BG1D2K0680	35.000	Mass Conveyor	-0,28	-3,22	0,348	1,37
2	D2K783MKRA/000	35.000	Mass Conveyor	-0,30	-3,45	0,405	1,59
1	1600AGD2K0085	28.500	Single lane	-0,24	-2,76	0,399	1,57
1	1600AGD2K0085	28.500	Single lane	-0,18	-2,07	0,399	1,57
1	D2K783MKRA/000	28.500	Single lane	-0,30	-3,45	0,462	1,82

Confidential

## LINE OVERVIEW

LINE MANUF.	CHAIN INSTALL DATE	LUBRICATION CONDITIONS	REGINA PRODUCT	TYPE OF CONTAINER	OUTPUT [bph]
LEGENDRE	2018	4 sec. ON – 13 h OFF (inliner single line) 4 sec. ON – 16 h OFF (mass conveyor)	1600 D2K Belts D2K 783M Chains	0.5, 1.75, 2 liter PET bottles (flat bottom)	64.000 b/h (0.5l bottle) 35.000 b/h (1.5l /2l bottle)



## RESULTS OF USING Def<sup>2</sup>™

- Perfect Handling of Products
- Minimal lubrication usage



## APPLICATION DETAILS

- New glass bottles
- Productivity: 400 bpm (0,75l / 1l bottle)

## FACTS OF USING STAINLESS STEEL CHAINS (NOT USING DIF<sup>2</sup>™)

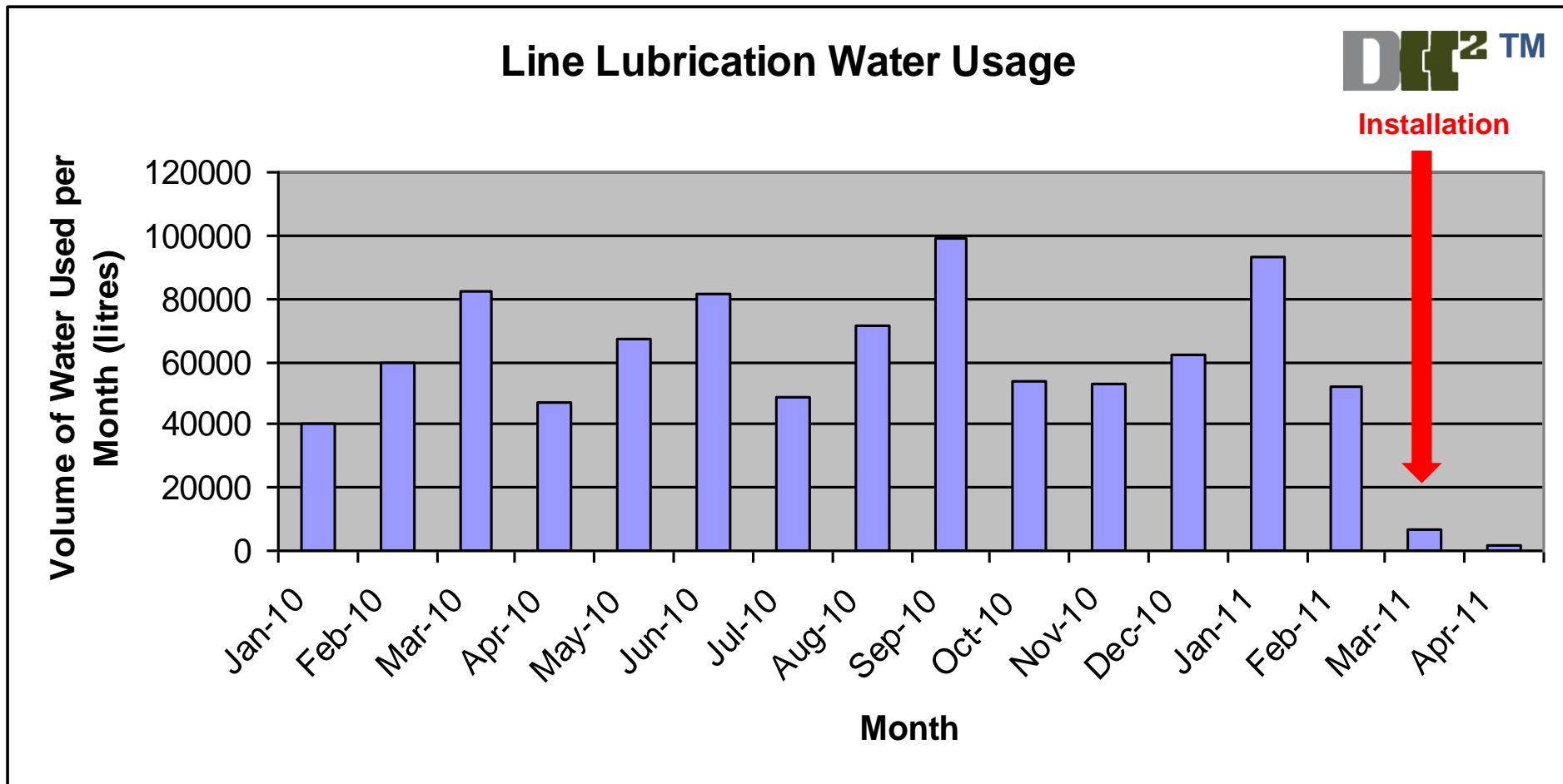
1. Lines were lubricated with Water & Soap
2. Customer set a target of reducing their energy consumption\* (per 9 litre case) by 1%, and a target of reducing their water consumption\* (per 9 litre case) by 2%

## RESULTS OF USING Diff<sup>2</sup>™

- Both of these targets were achieved.
  - Regina Diff<sup>2</sup>™ Conveyor chain contributed significantly to achieving these results
  - In FY10 they used 10,683,874 KWH energy\*
  - In FY11 they reduced this to 9,874,436 KWH\*
  - **Saving of 231 tonnes of CO2**
  - In FY10 they used 7.16 million litres of water\*
  - In FY11 they reduced this to 5.51 million litres\*
  - **Saving of 1.65 million litres of water equivalent**

## RESULTS OF USING DIF2™

- Line run dry (few water in the most critical areas only)



## RESULTS OF USING Def<sup>2</sup>™

- Starting situation: water used for line lubrication was on average **65,000 litres per month**
- Situation after conversion to Def<sup>2</sup>™ chains: approximately **4,500 litres per month**
  - **93% consumption reduction**

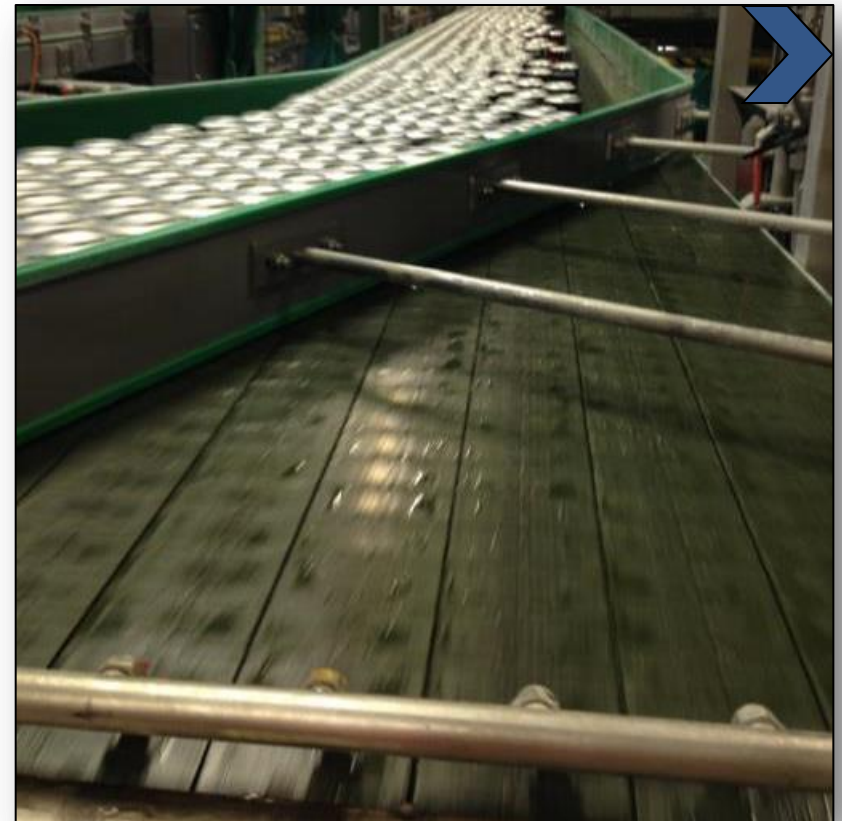
## LINES WITH REGINA PRODUCTS

LINE N°	CHAINS INSTALL DATE	OUTPUT [cph]	DAILY WORKING HOURS	ESTIMATED TOTAL WORKING HOURS	REGINA PRODUCT	LINE SECTION
1	Beginning of 2010	90.000	24	31.600	D2K 820 Chains D2K 880M RG Chains	From filler outfeed to packaging machine
2	Beginning of 2010	90.000	24	31.600	D2K 820 Chains D2K 880M RG Chains	From filler outfeed to packaging machine
3	February, 2015	120.000	24	2.100	D2K 820 Chains D2K 880M RG Chains	From can twister to packaging machine
4	Beginning of 2014	120.000	24	6.400	D2K 820 Chains D2K 880M RG Chains	From section after the filler to the packaging machine

- **Upper wear strips**
  - Standard UHMWPE
- **Return wear strips**
  - Rollers with and without rubber rings
  
- **Sanitation and Cleaning**
  - Manually with pressure washer and cleanser
  - Frequency: 2 times per week (midweek and weekend)



LINE N.	CHAINS INSTALL DATE	OUTPUT [cph]	PRODUCT	LINE SECTION	LUBRICATION CONDITIONS	REMARKS
1 & 2	Beginning of 2010	90.000	D2K 820 D2K 880M RG	From filler outfeed to can twister	Dry lube temporized: 60 sec ON 300 sec OFF	Replacement Rexnord HP chains lubricated water & dry lube
				From filler outfeed to packaging machine	Dry lube temporized: 6 sec ON 240 min OFF	Replacement Rexnord HP chains lubricated water & soap.



LINE N.	INSTALL DATE	OUTPUT [cph]	PRODUCT	LINE SECTION	LUBRICATION CONDITIONS	REMARKS
3	February, 2015	120.000	D2K 820 D2K 880M RG	From can twister to packaging machine	Dry lube temporized: 6 sec ON 480 min OFF	Replacement Rexnord HP chains lubricated water & soap.



# DIT<sup>2</sup>™ Case Study #4 – Overview Line N.4



LINE N.	INSTALL DATE	OUTPUT [cph]	PRODUCT	LINE SECTION	LUBRICATION CONDITIONS	REMARKS
4	February, 2015	120.000	D2K 820 D2K 880M RG	From section after the filler to the packaging machine	Dry lube temporized: 6 sec ON 360 min OFF	Replacement Rexnord HP chains lubricated water & soap.



Confidential

RESULTS OF USING DK<sup>2</sup>™

- **Enhanced efficiency:** optimum cans stability during side transfer with significant cut of the downed cans
- **Lubricant saving:** very limited lubrication consumption using DK<sup>2</sup> material compared to the standard acetal
- **Low replacement frequency:** chain life greater than 5 years in Lines N.1 and N.2

## APPLICATION DETAILS

- PET bottles
- Maximum productivity: 235 bpm (1.5l bottle)

## FACTS OF USING STD ACETAL CHAINS (NOT USING



1. Lines were lubricated with Dry lube
2. Temporized automatic lubrication system with brushes installed on all the conveyors
3. Estimated average lube consumption: 10 litres per month

RESULTS OF USING Df<sup>2</sup>™

- **Dry running:** oil-based lubricant applied manually once per week in just 3 points of the line
- **High chain life:** no thickness reduction and very limited elongation
- **Lubricant saving:** lube usage cut to 1 liter per month (starting situation: 10 liter per month)
  - **90% consumption reduction**
- **Enhanced efficiency:** decrease in average duration of lines stops due to downed bottle jams
  - **1% increase for OPI (Operational Performance Indicator of the line)**

LINE MANUF.	CHAIN INSTALL DATE	DAILY WORKING HOURS	ESTIMATED TOTAL WORKING HOURS	REGINA PRODUCT	TYPE OF CONTAINER	OUTPUT [bph]
KHS	March, 2014	24	11.000	1600 D2K Belts D2K 783M Chains	1,5 liter, PET petaloid bottle  2 liter, PET petaloid bottle	14.000  11.000



PRODUCT	ESTIMATED TOTAL WORKING HOURS	LINE SECTION	COF	THICKNESS REDUCTION		ELONGATION	
				[mm]	[%]	[mm/pitch]	[%]
1600 D2K	11.000	Outfeed filler	0,13	-0,1	-1,15	0,102	0,4
D2K 783M	11.000	Before sleever	0,13	-0,1	-1,15	0,000	-
D2K 783M	11.000	Outfeed sleever	0,13	-0,1	-1,15	0,051	0,2

### ■ Cleaning procedure

- 1 time per shift: automatic internal cleaning system
- 1 time per week: foaming
- 1 time per month: take out the chain and clean manually with cleaning agent & brush