MillMax®

THE INNOVATIVE TECHNOLOGY IN CANE EXTRACTION BY FIVES CAIL

Design for low maintenance and energy efficiency

MillMax presentation

Context – Objectives and existing technologies

MillMax description

- Principle of Millmax
- Main components
- Possible Settings
- Range

Energy consumption study and comparison with conventionnal technologies

Review of MillMax Questionnaire

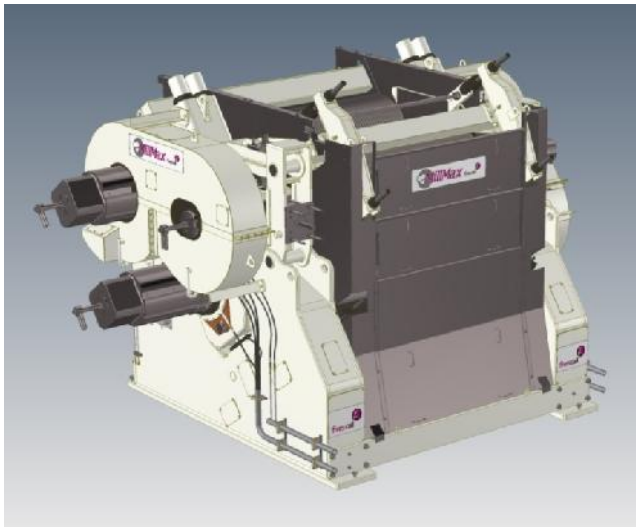
References List

Cane preparation installation objectives

Process

Extract the sugar from the shredded cane (for an optimized power absorbed)

Minimize bagasse humidity



Pol extraction (for cane f % fiber content) is assessed by :

Extraction (e) = Sugar in mixed juice % cane / Sugar % cane

-

Reduced Extraction (Deer) $E_{12.5}$ = 1- (1 - e) x (1 - f) / 7 f

(Mittal) $E'_{12.5}$ = 1 – 0.125 x (1 - e) / f

Mechanical

Reduce installation and maintenance costs

Be robust, reliable and operator-friendly

Energy & Environnment

Optimize the power absorbed per tonne of fiber

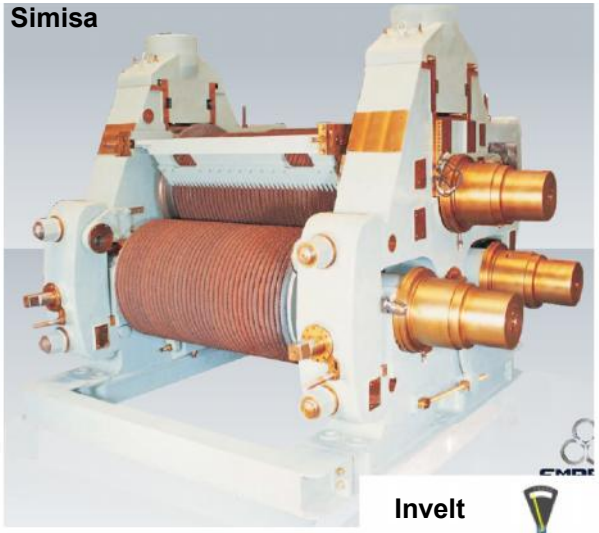
Reduce environnmental footprint

Savings

Maximize income of factory

Extraction conventionnal technologies

Simisa



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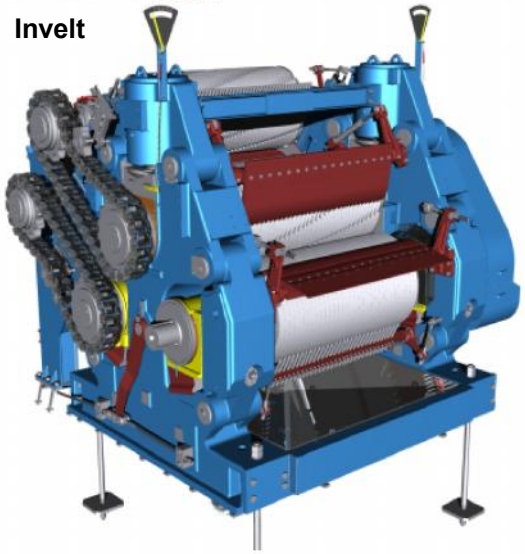

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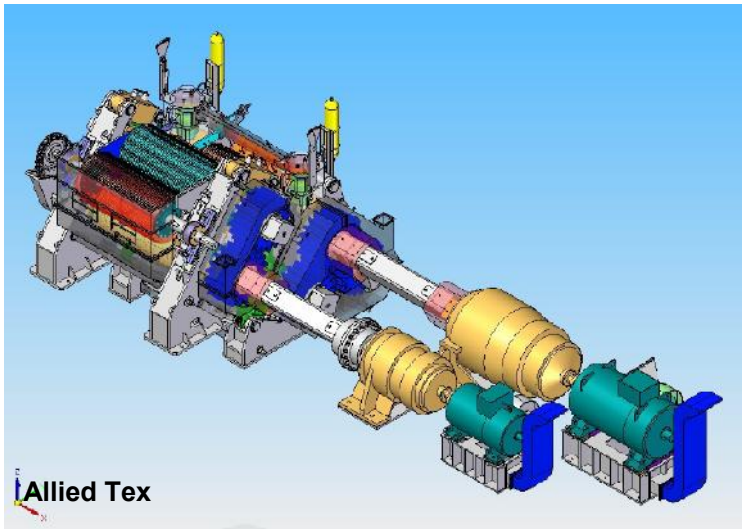
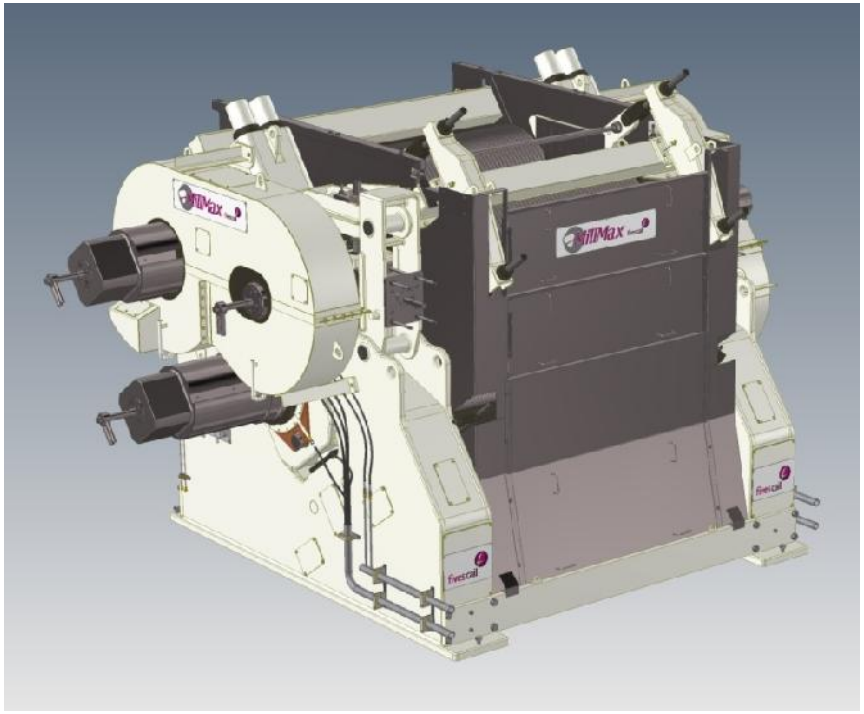
- « Good » extraction and final bagasse humidity achievable
- Robust
- High power absorbed per tonnes fiber
- High installation costs



Cane extraction innovative technology :
Fives Cail MillMax®

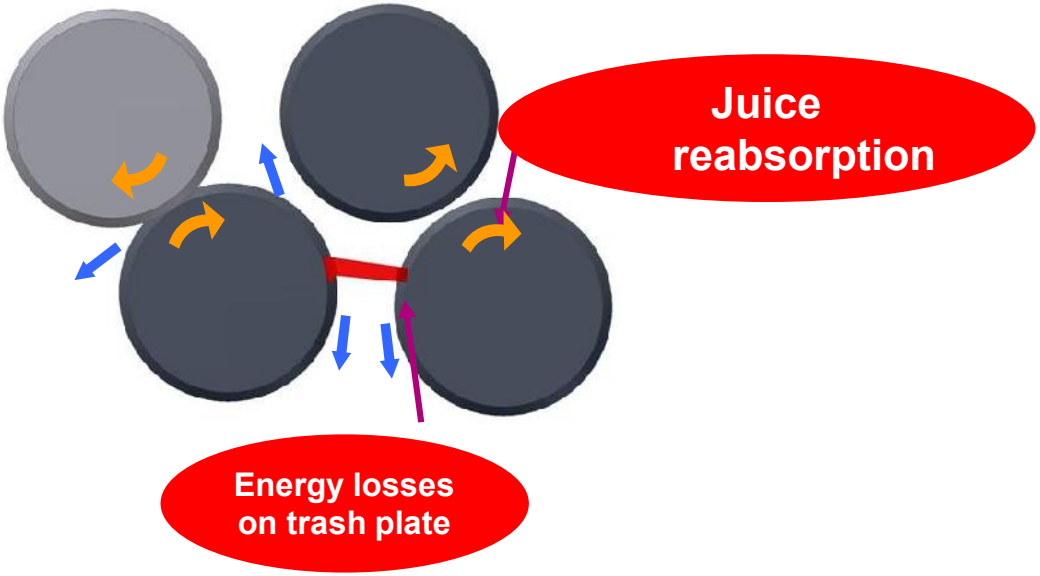
Because of Sugar industry facing significant increases in energy and raw material costs, Fives Cail developped an innovative Technology :

The MillMax®

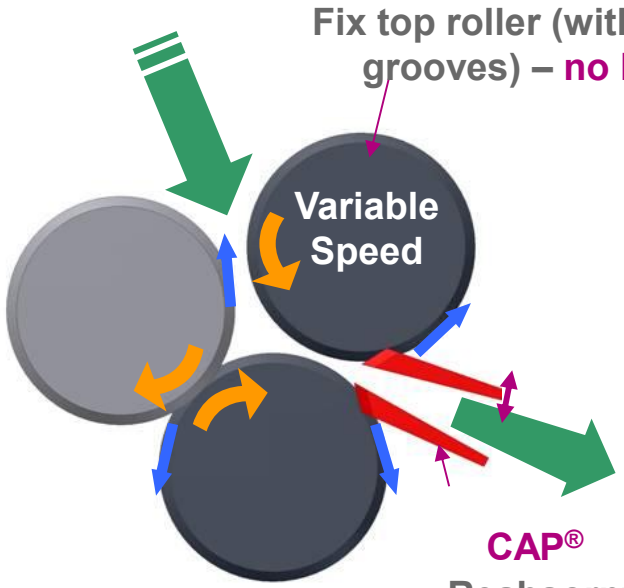


MillMax extraction principle

10 to 13 kwh /Tonne of fibre

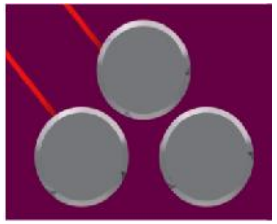
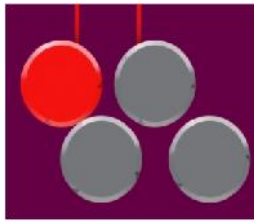
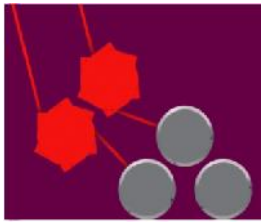
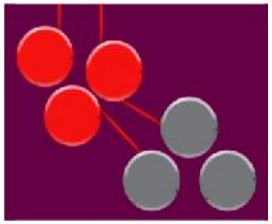
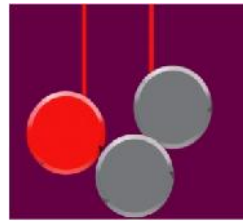


6 to 9 kwh /Tonne of fibre



No trash plate
No hydraulic pressure
No axial loads on gear reducer
Messchaert grooves on top and bottom rollers

MILLMAX® : Innovative technology

Mill	Conventional	Conventional	Conventional	Conventional	MillMax®
Pressure rollers	3	3	3	3	2
Additional rollers (feeder or pressure)		1	2	3	1
Configuration					

Capacity

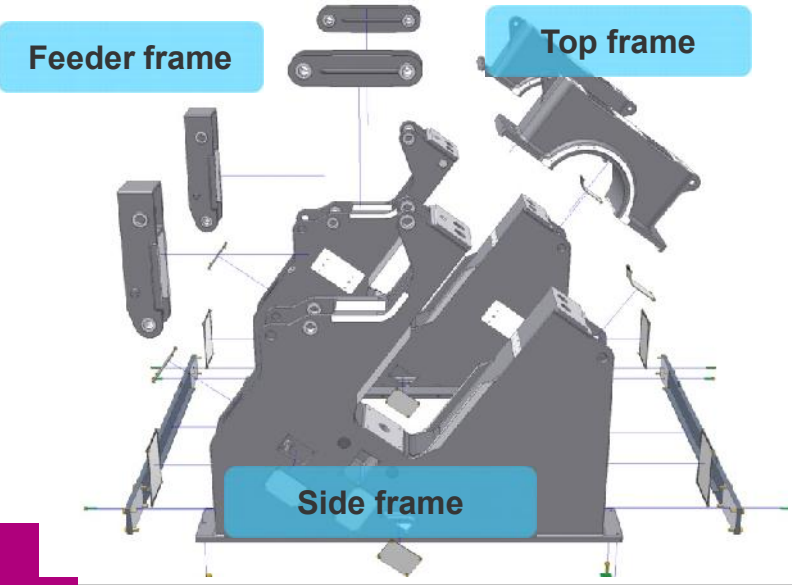
Performance

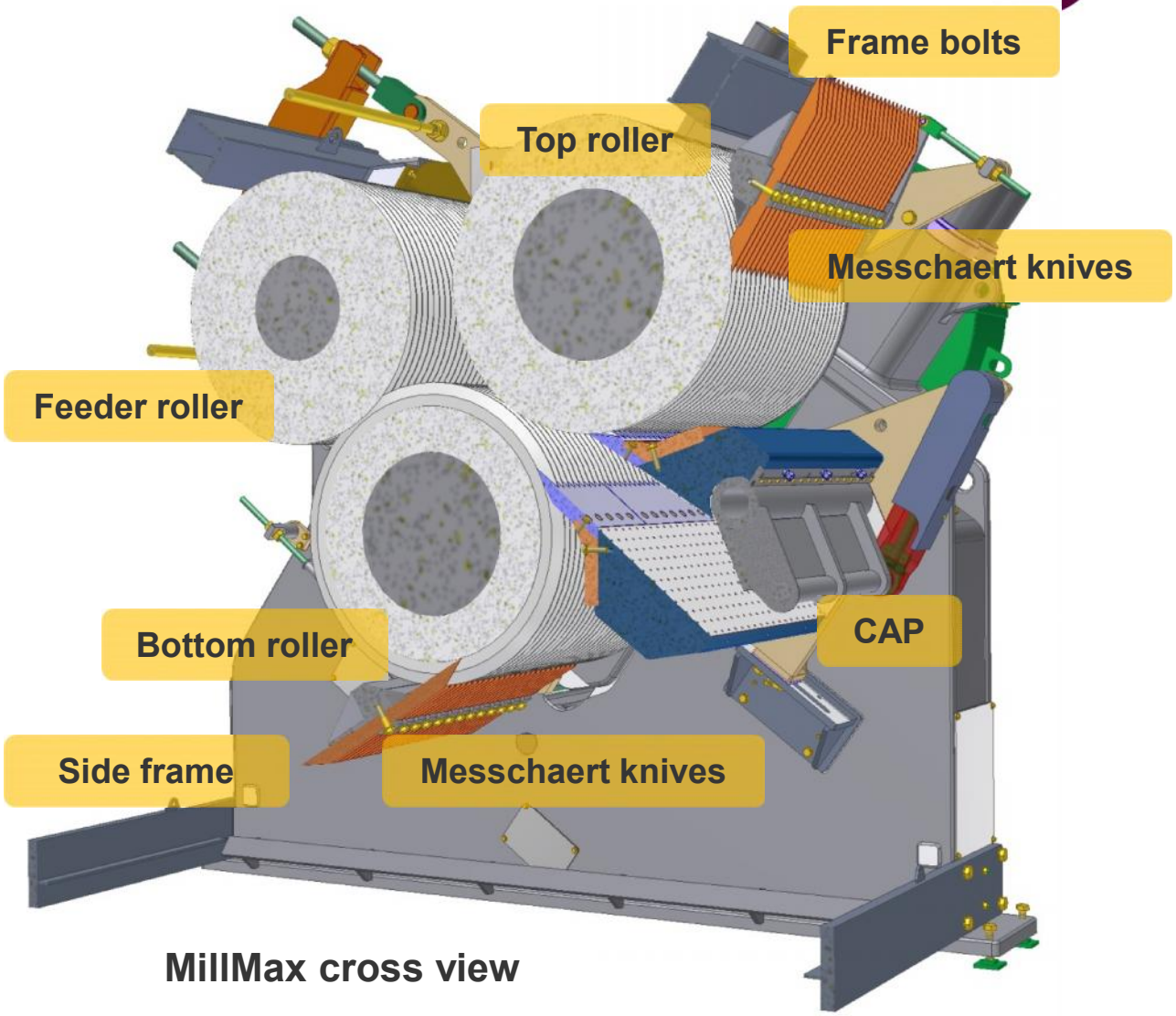
Power consumption

Conventionnal technology

Innovative Technology

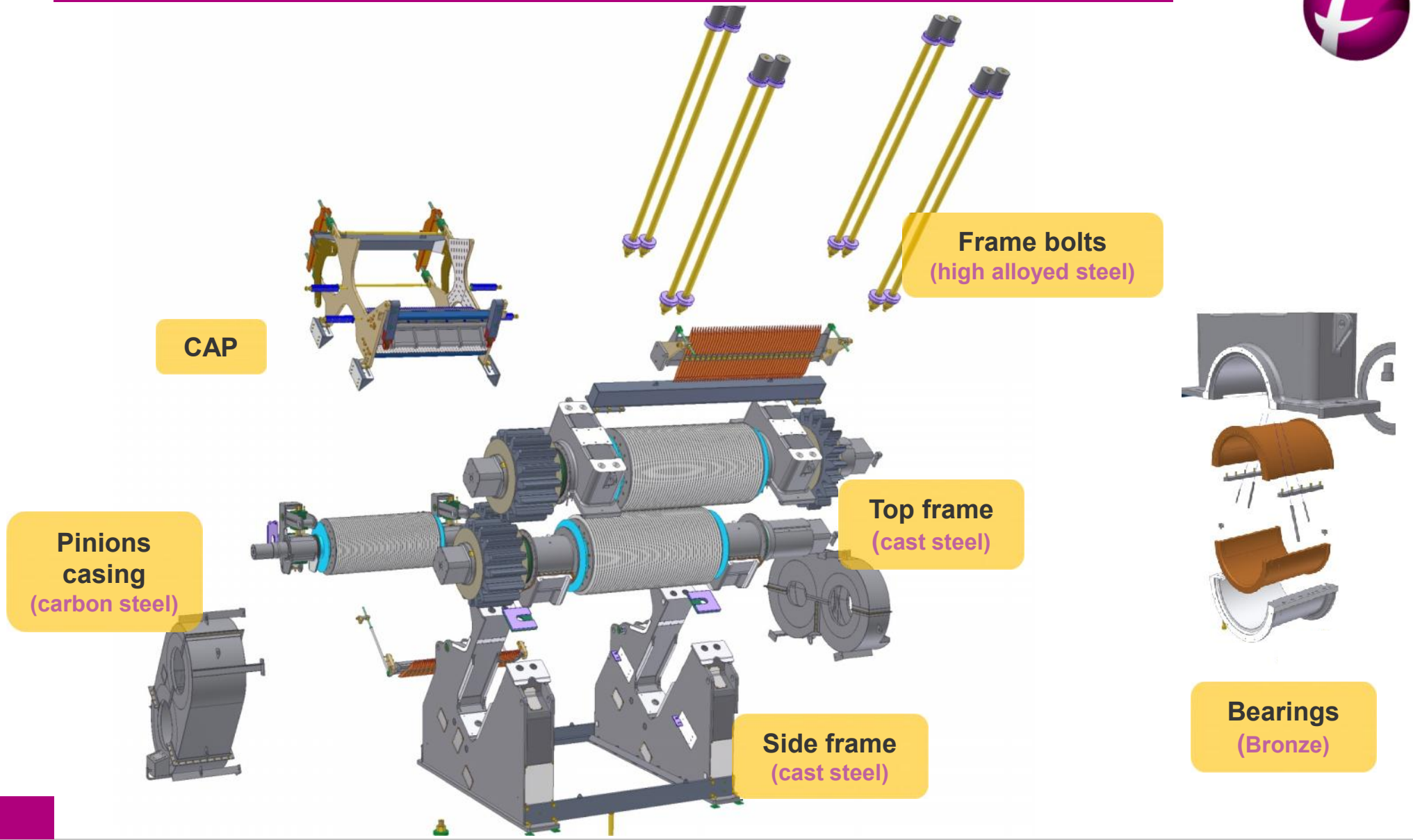
MILLMAX® main components



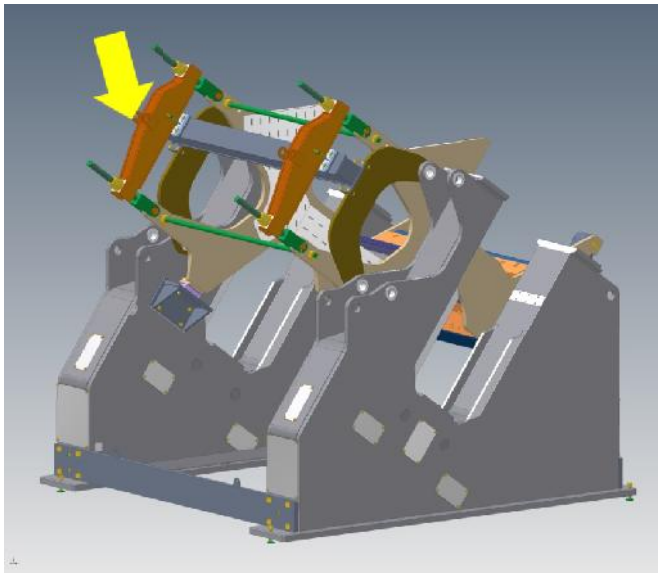


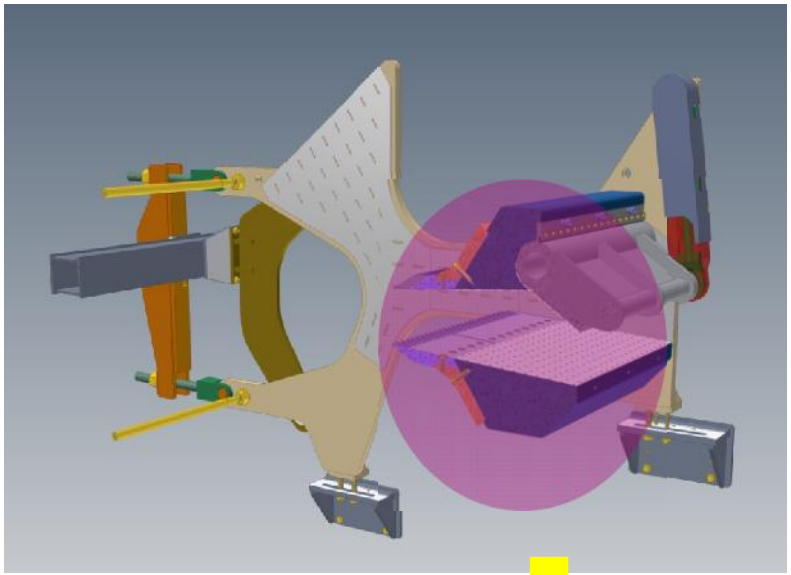
MillMax cross view

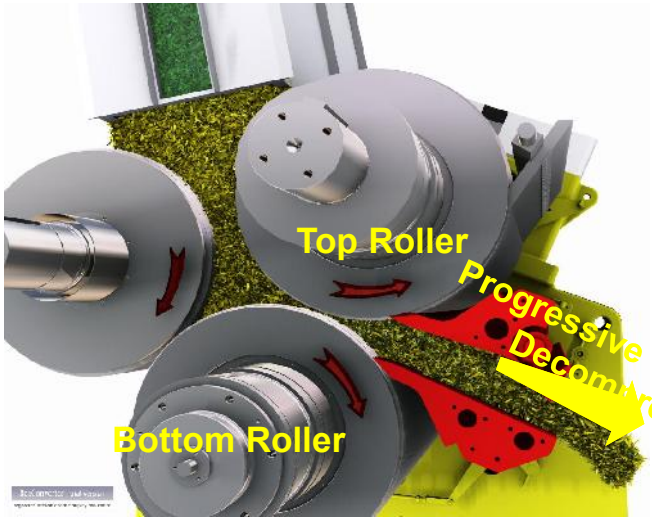
MillMax® main components

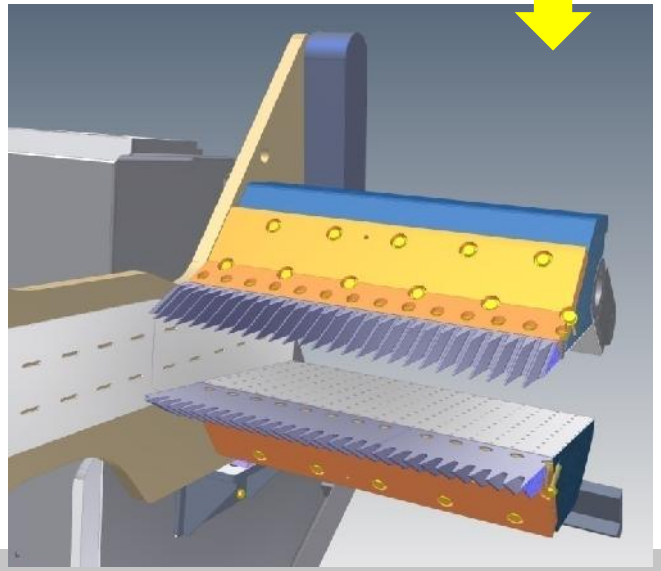


MillMax® : Main components CAP® - Anti-reabsorption device





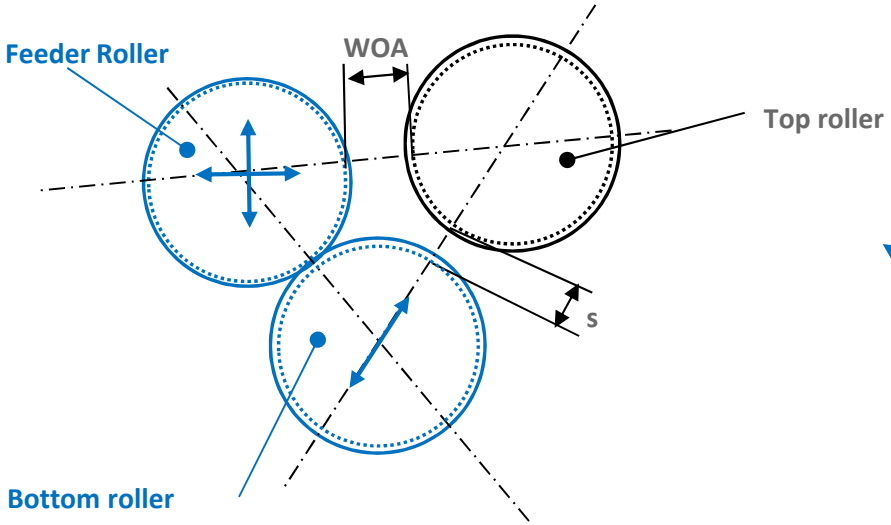


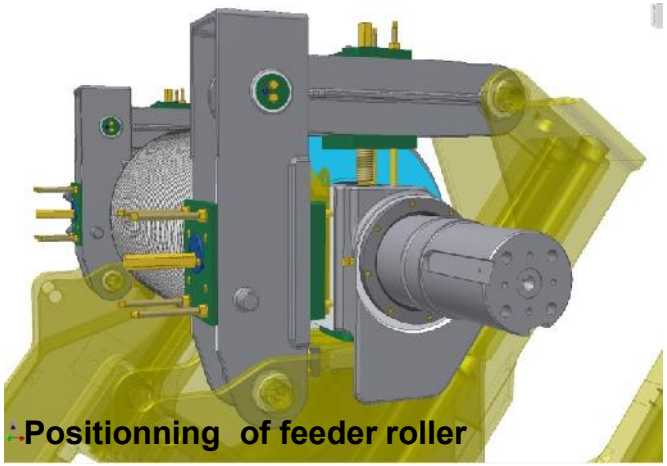


Optimization of design scrapers to ensure tightness juice-bagasse and life duration

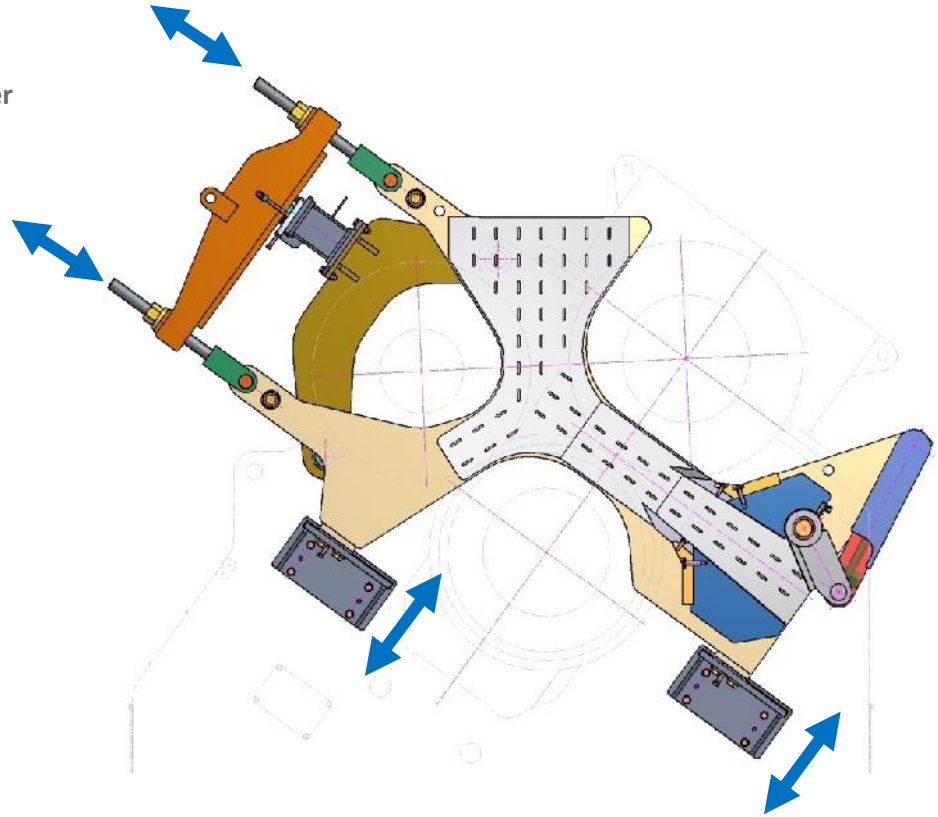
MillMax® : Possible Settings

1. Positionning of the bottom roller and feeder roller





2. Positionning of the CAP®



MillMax®: Range

MillMax®	Width (mm)	Width (‘’)	Shell diameter (mm)	Shell diameter (‘’)
MillMax® 66	1700	66	920	36
MillMax® 72	1800	72	960	38
MillMax® 78	1980	78	960	38
MillMax® 84	2134	84	1140	45
MillMax® 90	2300	90	1220	48
MillMax® 96	2450	90	1330	52
MillMax® 102	2600	102	1370	54

MillMax® - Energy consumption – Comparison with conventionnal technologies

Implantation	Pakistan	Guadeloupe	India	Senegal *(1)*
Position in tandem	1	1 to 5	1 to 4	1 to 5
Width *(m)*	2,134	1,980	1,980	2,134
Fiber content *(%)*	15	14	-	17
Capacity *(Tonnes of cane per hour)*	325	250	210	270
Power absorbed *(kW) (2)*	420	385	-	271
Specific power absorbed *(kW / Tonnes of fibre per hour)*	8,9	6,5	6,7	5,9

(1) The installation does not operate in nominal conditions
(2) The drives of MillMax® are Electrical drives (except 1st mill Gardel)

13 to 13.5 kw / Tonnes fibre per hour for conventionnal mill

MillMax– Its assets and Benefits

Process

« Good » extraction and final bagasse humidity achievable

Mechanical, operation

- Low maintenance costs (one roller less, no hydraulic lift)
- Low installation costs (drives…)
- Robust, Reliable and operator friendly
- Easy settings

Energy and Environnment

- Low power absorbed per tonnes fiber
- Reduce environnmental footprint

Savings

Permits to maximize incomes

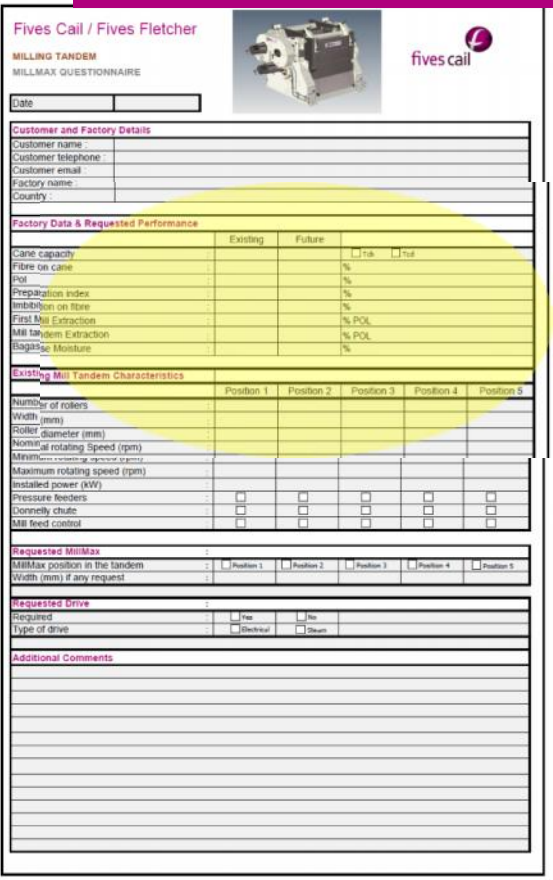
MILLMAX®: References

Equipment	Position	Factory	Country	Year
MillMax® 78	#1 & #5	Gardel	Guadeloupe	2006
MillMax® 78	#5	EID Parry (I) Ltd.	India	2007
MillMax® 78	#1 to #4	Krishnaveni Sugars Ltd.	India	2008
MillMax® 78	#1 to #4	Siruguppa Sugars & Chemicals Ltd.	India	2008
MillMax® 78	#1 to #4	Hemarus Technologies Ltd.	India	2008
MillMax® 78	#1 to #4	Dhanalakshmi Srinivas Sugars Ltd.	India	2008
MillMax® 78	#1	Mehran	Pakistan	2010
MillMax® 78	#1 & #5	Pucala	Peru	2010
MillMax® 78	#1	Mirpurkhas	Pakistan	2011
MillMax® 84	DW#2	Guariroba	Brazil	2006
MillMax® 84	DW#2	Vale do Paraná	Brazil	2006
MillMax® 84	DW#2	Ouroeste	Brazil	2006
MillMax® 84	#1	Al Abbas	Pakistan	2008
MillMax® 84	DW #2	Campina Verde	Brazil	2008
MillMax® 84	#1 to #5	Richard Toll	Senegal	2009
MillMax® 84	#1	Layyah	Pakistan	2011
MillMax® 90	DW #2	Santa Vitória	Brazil	2008
MillMax® 90	DW #2	Vale do Paracatú	Brazil	2008
MillMax® 102	#1 to # 5	Companhia Energética São José	Brazil	2006-7

MILLMAX®: References

Equipment	Position	Factory	Country	Year
MillMax® 84	#1	Safina	Pakistan	2012
MillMax® 78	#1	New Dadu	Pakistan	2012
MillMax® 84	#5	Layyah	Pakistan	2012
MillMax® 90	#3	Fatima	Pakistan	2012
MillMax® 84	#5	Chanar	Pakistan	2012
MillMax® 84	DW#2	Al Moiz	Pakistan	2013
MillMax® 90	#1	Hamza	Pakistan	2013
MillMax® 84	#1	Hamza	Pakistan	2013

MillMax®– Review of questionnaire


Fives Cail / Fives Fletcher

MILLING TANDEM

MILLMAX QUESTIONNAIRE

Date

Customer and Factory Details

Customer name :

Customer telephone :

Customer email :

Factory name :

Country :

Factory Data & Requested Performance

	Existing	Future	
Cane capacity			☐ Tch ☐ Tcd
Fibre on cane			%
Pol			%
Brix			%
Preparation index			%
Imbibition on fibre			%
First Mill Extraction			% POL
Mill tandem Extraction			% POL
Bagasse Moisture			%

Existing Mill Tandem Characteristics

	Position 1	Position 2	Position 3	Position 4	Position 5
Number of rollers					
Width (mm)					
Roller diameter (mm)					
Nominal rotating Speed (rpm)					
Minimum rotating speed (rpm)					
Maximum rotating speed (rpm)					
Installed power (kW)					
Pressure feeders	☐	☐	☐	☐	☐
Donnelly chute	☐	☐	☐	☐	☐
Mill feed control	☐	☐	☐	☐	☐

Requested MillMax

MillMax position in the tandem	☐ Position 1	☐ Position 2	☐ Position 3	☐ Position 4	☐ Position 5
Width (mm) if any request					

Requested Drive

Required	☐ Yes	☐ No
Type of drive	☐ Electrical	☐ Steam

Additional Comments

IP > 90 for good efficiency of Millmax

▲ Crucial input data to carry out a new sizing

▲ Possible results of the sizing

MillMax® - End of presentation

MillIMax®: A key equipment for energy balance of cane plant

City 100 000 residents

35 000 cars 15 000 km/an

240 000 TS

CO_2

160 000 MWh

(+ 10% compared with Diffuser)

FIVES CAIL Cane plant
10 000 TC/D

520 000 hL
Ethanol

2 400 000 TC

In Line SHREDDER

MillMax

Falling Film Evaporators

FC/FS CVP

ZUKA & FC 1550

FC KCP HP Boilers

Figures from FC feasibility study for GUARANI Sao Jose in 2006

MillMax® - performance & Results

→ **Same performance as conventional mills**

- 1st Mill extraction
- Last mill bagasse moisture in a tandem
- Bagasse moisture after diffuser
- MillMax® Tandem extraction

→ **Energy savings**

MILLMAX® 78: EID PARRY PUGALUR (INDIA)
5 Mills Tandem - #5 (LastPosition)

EID PARRY – 2009 crop		
Commissioning		2009
Cane rate	tch	Nominal : 180 Max : 210
Installation		4 x 78” conv. mills 1 MillMax® 78
Drive		Electric motor
Rotation speed	rpm	2.3 – 3.5
Power Consumption	kWh/tf	6,65 average
Bagasse moisture	%	48,6 a 51,6 50,3 average

MILLMAX® 78: GARDEL (GUADELOUPE)
5 Mills Tandem – Last Position

5 Mills Tandem – Last Position

Gardel's Last Mill – 2007 crop		
Commissioning		2007
Cane rate	tch	250
Fibre	%	14
Installation		#1, 2 and 4 : 4-roll 78" (*conventional)* #3 : 4-roll 66" (*conventional)* 1 MillMax® 78
Drive		Electric Motor + Variatior + Gearbox
Rotation speed	rpm	3,8
Power Consumption	**kW**	**200 to 250** **Other mill in tandem : 385 kW** **Savings: 40%**
	kWh/tf	**6,5**
Bagasse moisture	**%**	**48**

MILLMAX® 78: GARDEL (GUADELOUPE)
5 Mills Tandem – First Position

5 Mills Tandem – 1th position

Gardel's 1th mill – 2008 crop		
Commissioning		2007
Cane rate	tch	Average 250 – Max 300
Fibre	%	14
Installation		1 MillMax® 78 3 x 4-roll 78" (*conv. mills*) 1 MillMax® 78
Drive		Hägglunds Electro-Hydraulic drive
Rotation speed	rpm	4,5
Power Consumption	kW	**273**
	kWh/tf	**7,5** (former 1th mill: 12 kWh/tf) *Savings* : **37 %**
Extraction	%POL	**73 a 79**