

**CATALYST CASE STUDY NO. 01**
**SULFUR BURNING PLANT ACHIEVES LOW SO<sub>2</sub> EMISSIONS USING MECS® CATALYST IN ALL CONVERTER PASSES**
**Application**

MECS® has been providing a variety of vanadium based catalysts to the sulfuric acid industry for over 85 years. The applications have been wide ranging and are often very challenging, but MECS® catalysts continue to enable high conversion levels and minimized SO<sub>2</sub> emissions. Recent environmental regulations have required SO<sub>2</sub> emissions to be reduced to levels approaching 100 ppm in some areas of the world. This case study describes the use of MECS® high performance, low pressure drop catalyst in a new, sulfur burning acid plant in India to reduce SO<sub>2</sub> emissions to 100 ppm.

**Kiri Dyes and Chemicals Ltd., Vadodara, Gujarat, India**

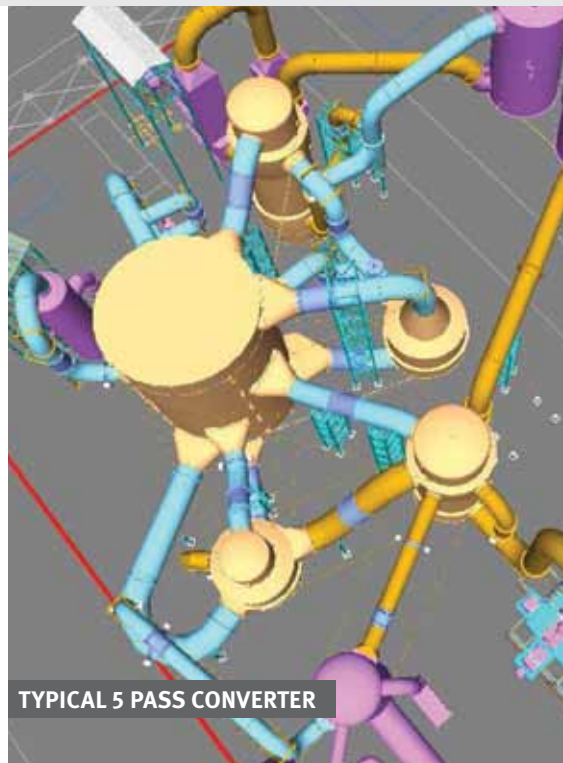
Kiri Dyes is a specialty chemical company in western India. They use sulfuric acid in the preparation of a variety of dye intermediates and also sell some of the acid on the local market. A new 525 MTPD sulfur burning plant was designed and built by Indian companies during 2008-2009, and MECS® designed the catalyst loading for the operating parameters listed in the table below.

**OPERATING CONDITIONS/REQUIREMENTS**

ACID PRODUCTION	525 MTPD
PLANT DESIGN	3 X 2 IPA
FEED GAS	10.00% SO <sub>2</sub> & 10.95% O <sub>2</sub>
EFFECTIVE CONVERTER DIA.	6650 MM
GUARANTEED CONVERSION	99.91%
EXIT GAS EMISSIONS	100 PPM SO <sub>2</sub> OR LESS

**MECS® converter loading design**

This arrangement provided a unique situation. XLP ribbed ring catalyst; would have produced extremely low pressure drop through the various beds resulting in poor gas distribution and reduced conversion efficiency. Therefore, the MECS® design required the use of LP-110 rings in all of the catalyst beds in order to meet the minimum desired bed pressure drops and to minimize the blower pressure requirements. Cesium catalyst was not utilized in this low emissions design. The catalyst loading was 219 liters per metric ton of acid produced. By optimizing the bed inlet temperatures, the catalyst design maximized the conversion in each pass.



TYPICAL 5 PASS CONVERTER

**MECS® LP Catalyst Advantages:**

- Smooth rings for low pressure drop
- High conversion activity from the hollow ring design
- Thermally stable composition
- Uniform dust control for less dust fouling
- Low Screening losses



**MECS®**  
**CATALYST®**

Learn more at [www.mecs.dupont.com](http://www.mecs.dupont.com)

# SULFUR BURNING PLANT ACHIEVES LOW SO<sub>2</sub> EMISSIONS USING MECS® CATALYST IN ALL CONVERTER PASSES

## Results for Kiri Dyes and Chemicals Ltd.

Start-up for the new plant was January of 2010. Operating data collected during the six months after start-up indicated that at non-optimized bed inlet temperatures, the stack emissions were 96 ppm SO<sub>2</sub>. The various bed pressure drops were measured to be between 50 and 100 mm WC (*within the design parameters*). The measured temperature rises

across the passes indicated good catalyst performance in each of the beds.

Kiri Dyes was able to achieve 99.91% conversion using all vanadium catalyst in a 3X2 converter. The installation and performance of the MECS® LP-110 catalyst throughout the converter, has resulted in another very satisfied customer.

### DESIGN TEMPERATURE PROFILE

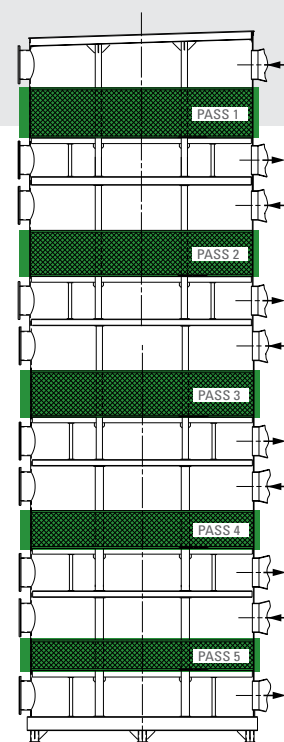
BED	INLET		OUTLET	
	TEMPERATURE °C		TEMPERATURE °C	
1	420		613	
2	440		507	
3	440		455	
4	440		452	
5	418		418.2	

### MEASURED TEMPERATURE PROFILE

BED	INLET		OUTLET	
	TEMPERATURE °C		TEMPERATURE °C	
1	410		605	
2	425		500	
3	435		452	
4	458		470	
5	427		427	



MECS Inc.  
**CATALYST**  
SO<sub>2</sub>/SO<sub>3</sub>



LP-110: ALL PASSES



[www.mecs.dupont.com](http://www.mecs.dupont.com)

**North America**  
**MECS Headquarters**  
Chesterfield, Missouri, USA  
Tel: +1-314-275 5700  
[northamerica@mecsglobal.com](mailto:northamerica@mecsglobal.com)

**South America**  
Barueri, Sao Paulo, Brazil  
Tel: +55-11-4166 8000  
[brazil@mecsglobal.com](mailto:brazil@mecsglobal.com)

**Europe/Africa**  
Brussels, Belgium  
Tel: +32-2-658 2620  
[europe-africa@mecsglobal.com](mailto:europe-africa@mecsglobal.com)

Milan, Italy  
Phone: +39-02-8969 0658  
[italy@mecsglobal.com](mailto:italy@mecsglobal.com)

Johannesburg, South Africa  
Tel: +27-11-708 9860  
[southafrica@mecsglobal.com](mailto:southafrica@mecsglobal.com)

**Asia Pacific**  
Hong Kong, China  
MECS Far East Limited  
Tel: +852-2734 5388  
[hongkong@mecsglobal.com](mailto:hongkong@mecsglobal.com)

Shanghai, China  
MECS Chemical Plants  
Equipment (Shanghai) Co., Ltd  
Tel: +86-21-6182 1111  
[shanghai@mecsglobal.com](mailto:shanghai@mecsglobal.com)

Mumbai, India  
MECS India Private Ltd.  
Tel: +91-22-6774 9500  
[india@mecsglobal.com](mailto:india@mecsglobal.com)