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11th TECHNICAL SEMINAR

WCC GST SAFETY WORKSHOP

TABLE TOP EXPO

November, 14-16, 2018
Monterrey - Mexico

EPC - Cost Advantages of Skid Mounted CA Plants

HEINZ MEZGOLITS

ALBERTO GONZALEZ



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This presentation incorporates an economic evaluation of the total investment costs of an EPC Chlor-Alkali Project considering all necessary steps: PM, Engineering, Procurement & Logistics, Construction, Mechanical Completion and Start-Up under the assessment of two project construction alternatives:

1. Conventional or Site Erected Grass Root Plant
2. Packaged or Skid Mounted Plant



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The Packaged Plant concept in the Chlor-Alkali Industry has been highly accepted and has been successfully introduced by CONVE in both,

Industrialized Countries

Developing Countries

The concept of Skid Mounted Construction was first introduced in the world for a Cl₂ Plant by CONVE in Guayaquil, Ecuador. This chlor alkali plant, owned today by QUIMPAC, is now successfully in operation since 1996.



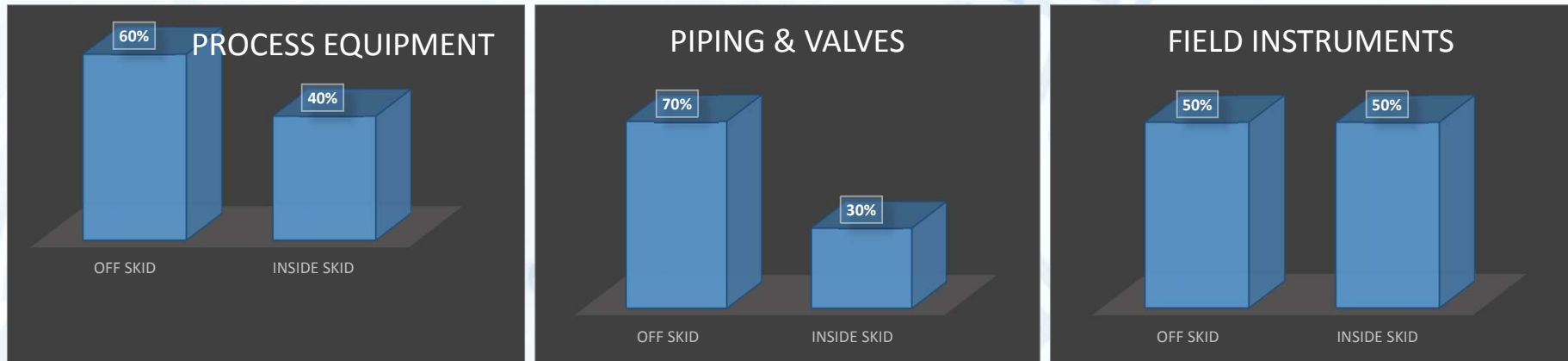
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Percentage of Equipment integrated in Packaged Units



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12 tpd Cl₂ Liquefaction Skid



50,000 tpy Skid Mounted plant



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The investment estimate values under the following cost break down example are based on latest projects executed by CONVE. It considers both construction alternatives, showing per result a 10% higher investment cost for a Conventional Site Mounted Plant than for the Skid Mounted alternative. The main factors which cause the higher cost are explained as follows:

SKID MOUNTED PLANT 50,000 MTPY NaOH			CONVENTIONAL SITE MOUNTED PLANT 50,000 MTPY NaOH		
PM, ENGINEERING & PROCUREMENT	\$ 5,000,000	10.0%	PM, ENGINEERING & PROCUREMENT	\$ 5,000,000	9.1%
EQUIPMENT	\$ 27,700,000	55.4%	EQUIPMENT	\$ 27,700,000	50.4%
MODULE FABRICATION & LOGISTICS	\$ 2,800,000	5.6%	MODULE FABRICATION	\$ -	0.0%
CIVIL CONSTRUCTION	\$ 6,000,000	12.0%	CIVIL CONSTRUCTION	\$ 7,800,000	14.2%
PLANT ERECTION	\$ 7,500,000	15.0%	PLANT ERECTION	\$ 13,500,000	24.5%
START UP COSTS	\$ 1,000,000	2.0%	START UP COSTS	\$ 1,000,000	1.8%
TOTAL INVESTMENT COST	\$ 50,000,000	100.0%	TOTAL	\$ 55,000,000	100.0%



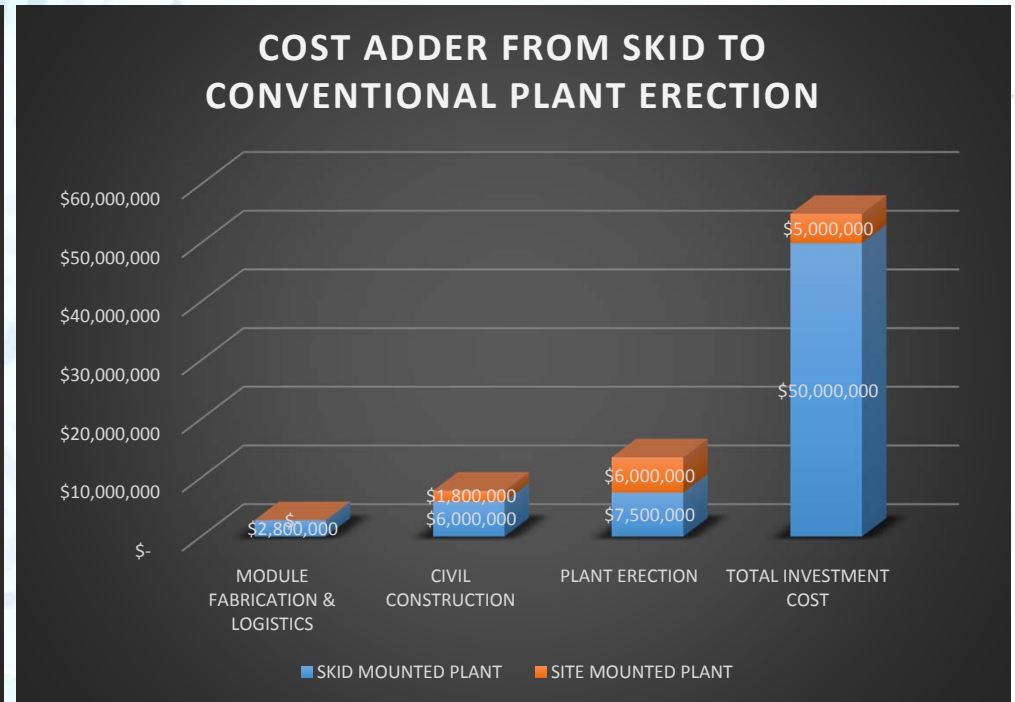
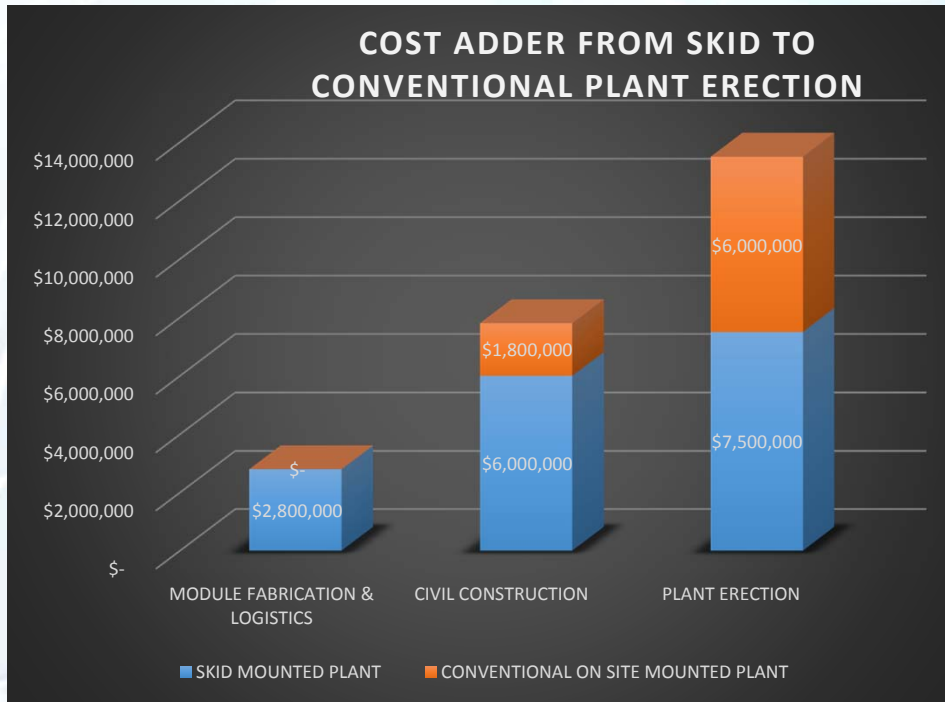
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COST ADDER BASED ON SKID TO CONVENTIONAL PLANT ERECTION



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Skid Mounted Plants will conclude Mechanical Completion 5 months ahead from Conventional Erected Plants

SKID MOUNTED PLANT - 50,000 MTPD NaOH																									
MONTHS	MH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
ENGINEERING																									
PROCUREMENT																									
MODULE FABRICATION																									
GROUP #1	75,000																								
GROUP #2																									
GROUP #3																									
GROUP #4																									
GROUP #5																									
CIVIL CONSTRUCTION																									
ERECTION																									
MILLWRIGHT/EQUIPMENT SETTING																									
LARGE TANKS	75,000																								
LARGE EQUIPMENTS																									
SET IN PLACE MODULES																									
PIPERACKS / STRUCTURES																									
SMALL EQUIPMENTS																									
ELECTROLYZER FRAME ASSEMBLY																									
PIPING																									
MODULE INTERCONNECTION	75,000																								
INTERCONNECT PIPING																									
ELECTRICAL																									
SUPPORTS, CONDUITS, BOXES	75,000																								
SET GEARS AND PANELS																									
WIRE AND CABLE INSTALLATION																									
CABLE TRAYS																									
CONTROLS																									
LIGHTING																									
12 KV AND ABOVE																									
INSTRUMENTATION																									
BENCH TEST ALL FIELD INSTRUMENTS	75,000																								
INSTALL ALL FIELD INSTRUMENTS																									
INSTALL CONTROL EQUIPMENT																									
TERMINATE CONTROL WIRING																									
MECHANICAL COMPLETION																									
COMMISSIONING AND START UP																									

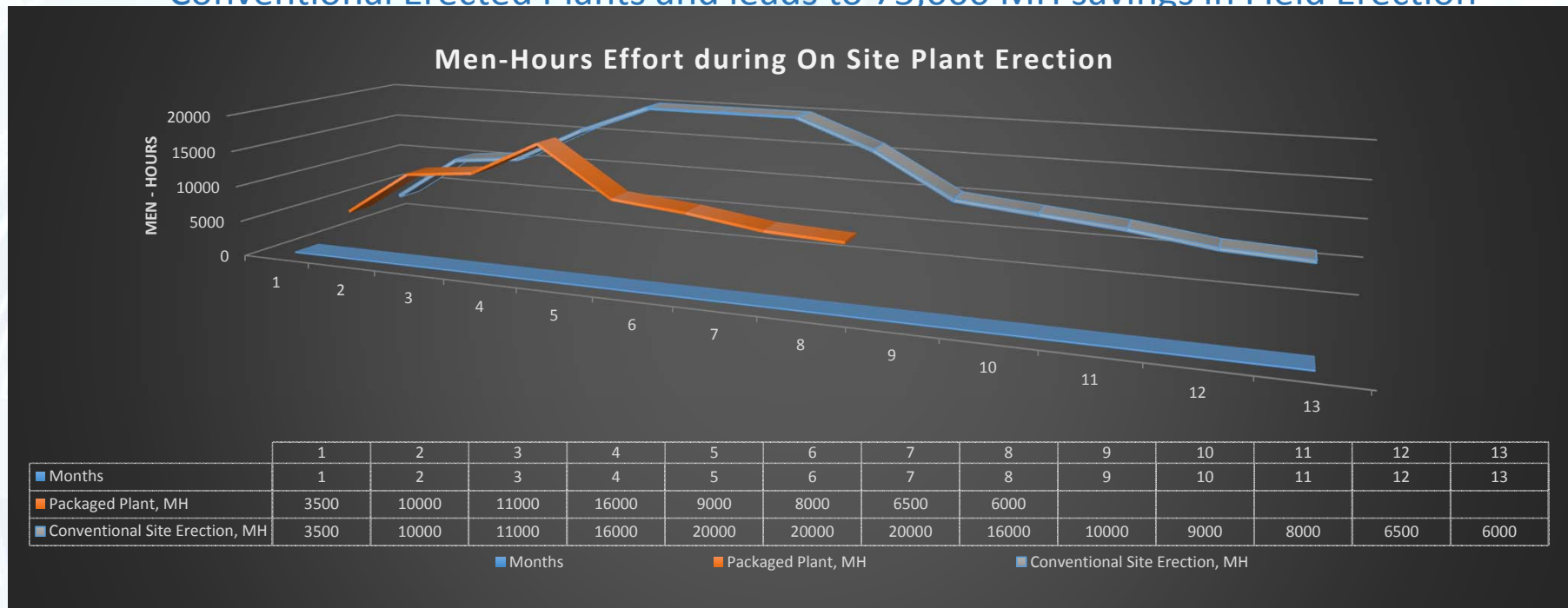
CONVENTIONAL ON SITE MOUNTED PLANT - 50,000 MTPD NaOH																														
MONTHS	MH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
ENGINEERING																														
PROCUREMENT																														
CIVIL CONSTRUCTION																														
ERECTION																														
MILLWRIGHT/EQUIPMENT SETTING																														
STORAGE TANKS	150,000																													
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On Site Erection Activities with Skid Mounted Plants will conclude 5 months earlier than with Conventional Erected Plants and leads to 75,000 MH savings in Field Erection



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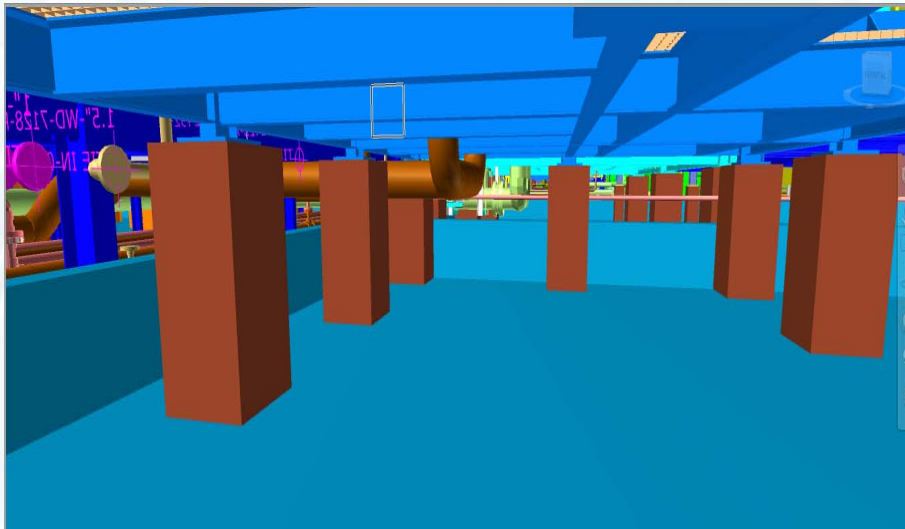
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THE PACKAGED PLANT ALTERNATIVE LEADS TO SIGNIFICANT COST SAVINGS DURING THE CIVIL CONSTRUCTION PHASE DUE TO FOLLOWING REASONS:



CONCRETE PEDESTALS ARE PRE-DESIGNED AND BUILD BEFORE THE MODULES ARE PLACED IN PLACE



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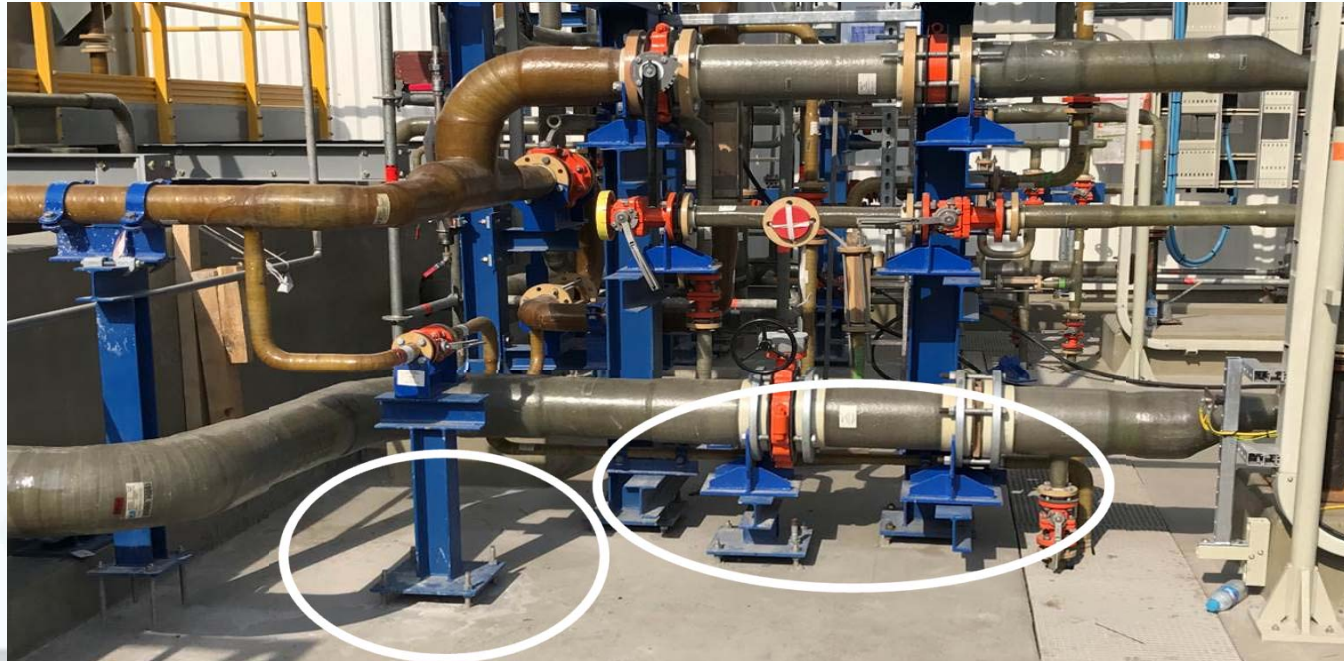
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DURING EQUIPMENT ERECTION ON SITE, CONCRETE FORMWORK ACTIVITIES SCHEDULE DEPENDS ON STRUCTURAL AND EQUIPMENT / PIPING INSTALLATION CONCLUSION.



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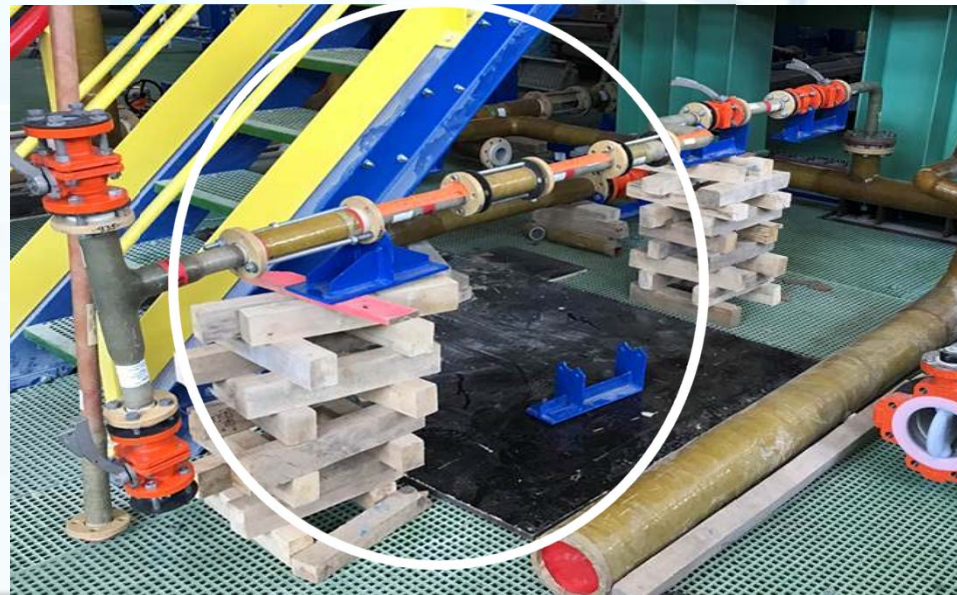
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THE CIVIL CONSTRUCTION SCHEDULE WILL ALWAYS DEPEND ON THE EQUIPMENT INSTALLATION ACTIVITIES, CONSEQUENTLY THE CIVIL WORK ACTIVITIES WILL BE EXTENDED BY ABOUT 5 MONTHS VS. THE PACKAGED PLANT ALTERNATIVE



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CONVE's Skid Manufacturing Workshops



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Either by Ocean or Land, our
Plants are made Ready to
Travel!



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THANKS FOR YOUR GREAT ATTENTION!

Any questions?



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