

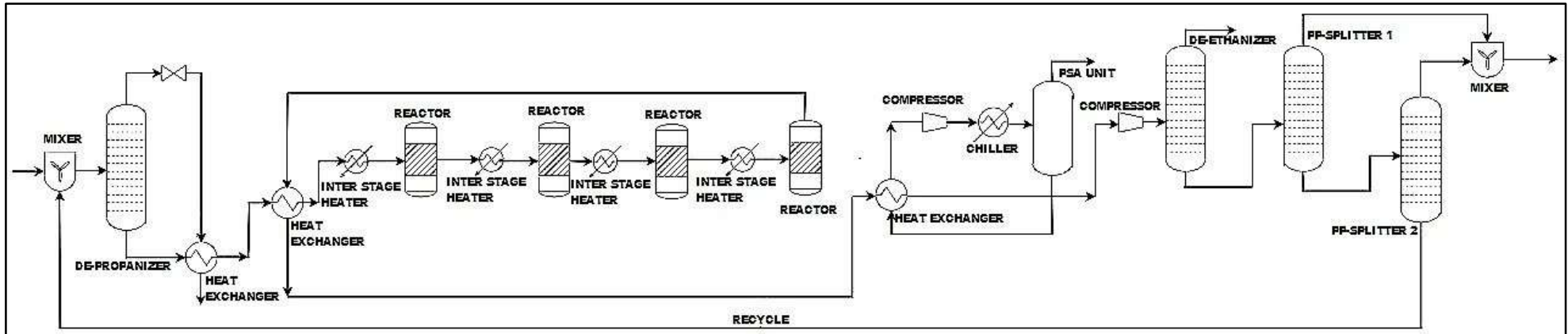


## Final Year Project Showcase for Batch-2016

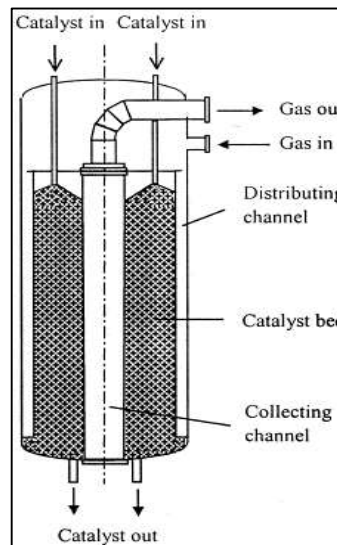
<b>Department of Chemical Engineering</b>		
<b>1</b>	<b>Project Idea</b>	<p>In Pakistan, propylene comes mainly from imports, so to meet its requirements; PDH technology is the best solution for the country. In the Propane Dehydrogenation (PDH) process, propane is dehydrogenated into propylene. This technology has received much attention worldwide and the production of propylene by this technology is growing rapidly. The most attractive aspect of this technology is the single feed/single product feature. This technology is also a cost-effective source of propylene.</p> <p>OLEFLEX technology is chosen to be the best alternative among all other PDH technologies due to its high selectivity and continuous catalyst regeneration unit. The major focus of this project is on modelling and steady state simulation (excluding the Continuous Catalyst Regeneration (CCR) Unit) to achieve an overall 40% propane conversion and a propylene production capacity of 600 kMTA with an optimum propylene yield.</p>
<b>2</b>	<b>Process</b>	<p>Propane is converted into propylene by catalytic dehydrogenation using OLEFLEX technology. The OLEFLEX technology uses platinum based on alumina catalyst to promote the dehydrogenation reaction. The OLEFLEX technology includes four radial flow moving bed reactors (with an overall propane conversion of 40%) which facilitate the endothermic dehydrogenation reaction. An Inter-stage heater is included just right after each reactor to maintain desired temperature of 600°C. A PSA unit and a De-Ethanizer column is used for hydrogen and other side products recovery. In addition, two Propane-Propene Splitters are used to achieve maximum separation of propane and propylene. Unconverted feedstock is recycled and combined with fresh feed.</p>
<b>3</b>	<b>Outcome</b>	<p>Results show that at propylene production capacity of 600 kMTA, 97.64 mol% of propylene yield has been achieved. This project is highly profitable as it has a small payback period of 5.2 years with the potential to generate revenue of approximately \$ 1.8 - 1.9 billion in 20 years of operation.</p>



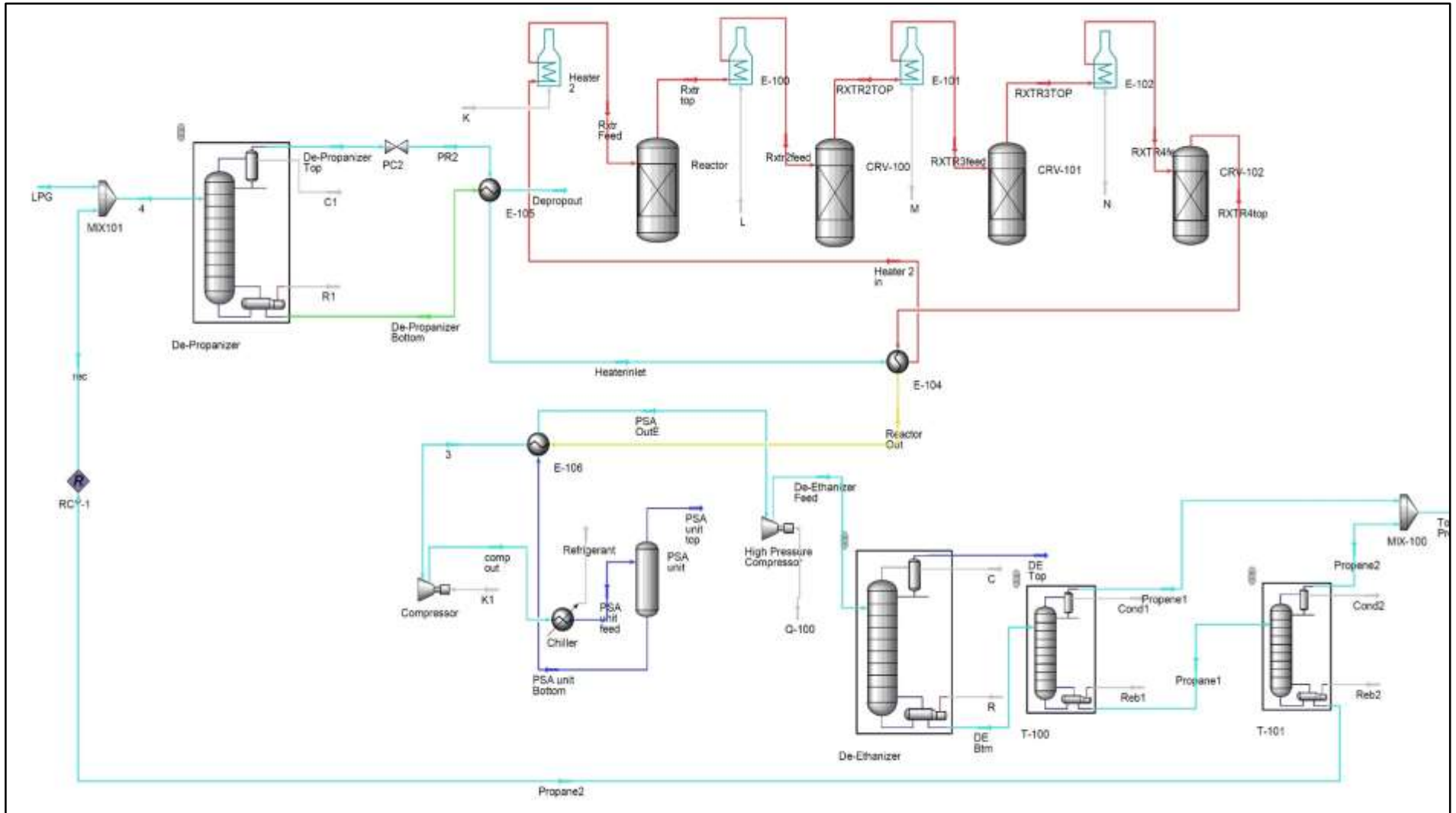
4	<b>Evidences (Theoretical Basis)</b>	This project's simulation model achieved propylene production capacity of 600 kMTA with an overall yield of 97.64 mol%. Whereas, the OLEFLEX process developed by UOP LLC (Des Plaines, Ill.; www.uop.com), is suited to produce 650 kMTA of propylene with an overall propylene yield of about 90 mol%., in the presence of platinum catalyst.
5	<b>Competitive Advantage or Unique Selling Proposition</b> (Cost Reduction, Process improvement, Attainment of any SDG (Sustainable Development Goal), increase of market share or capturing new market or having superior performance over competitor. In summary, any striking aspect of the project which compels industry to invest in FYP or purchase it. Some detail description is required in terms of how, why when what. You can select one or more from following dropdown and delete rest of them)	
a	<b>Process Improvement which leads to superior product or cost reduction, efficiency improvement of whole process</b> (e.g. What is issue is current process and what improvement you suggests)	As per the scope of this project, steady state simulation is the main focus which excluded the CCR Unit. So to further improve, the process simulation can be taken to next level of dynamic simulation and continuous catalyst regeneration (CCR) unit can be included with further cost optimization.
b	<b>Any Environmental Aspect</b> (e.g. carbon reduction, energy efficient etc.)	There are lowest emissions of CO <sub>2</sub> , NO <sub>x</sub> , SO <sub>x</sub> etc in the OLEFLEX technology. Moreover, a non-toxic catalyst (Pt based) system is used in the process in which the catalyst is fully recyclable.
c	<b>Any Other Aspect</b>	The PDH Technology will also help to substitute polymer imports that will reduce the imports and strengthen the economy of Pakistan.
6	<b>Target Market</b> (Industries, Groups, Individuals, Families, Students, etc) Please provide some detail about user of the product, process or service	This project mainly targets the chemical and polymer industries. Propylene and its derivatives are used in the production of propylene glycols, manufacturing of the phenolic resins, elastomers etc. Propylene is primarily used in the production of polymer propylene which can be a great alternative of polyethylene plastic.
7	<b>Team Members (Names &amp; Roll No.)</b>	Ghadia Ahmed (CH-16029), Mubashira Mansoor (CH-16009), Syeda Rida Anwer (CH-16024)
8	<b>Supervisor Name</b>	Dr. Fahim Uddin
9	<b>Pictures</b>	Process Flow Diagram, Radial Flow Moving Bed Reactor, Project Simulation



**PROCESS FLOW DIAGRAM**



**RADIAL FLOW MOVING BED REACTOR**



PROJECT SIMULATION