# Joel Wiggins

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## Education

**Rice University**

Certificate (2021)

**Lamar University**

B.S. Chemical Engineering (2004)

## Summary


Chemical engineer with a natural curiosity of how different job roles and areas work together from back and middle office to the field. My career has taken me through different refinery technologies as both a Team lead and individual to an analyst with the commercial trading group. In each role I have been able to improve my soft skills like working through others to gain alignment as well as hard skills like validating price sets with LP optimization planning runs. I have a strong interest in continuously learning new things and working through challenges that provide that opportunity to learn and show how I can impact the bottom line.


## Experience

**Limetree Bay Refining**

Commercial Trading Linear Programming Analyst, Houston, TX (7/20-7/21)

Assigned to commercial trading group. Assessed crude and product price differentials relative to market pricing using the LP. Developed crude pecking order lists with most profitable crudes for three month and yearly budget. Identified decision points on price and utilization changes that might affect the order on a weekly basis and reported these to senior leadership in the commercial trading group. Developed optimized start up plans that transitioned to on stream running. Reviewed LP configuration for opportunities on crude composition, blending capability, etc. to improve profitability. Analyzed ongoing analysis of unit margins for both running and potential unit technologies like Isomerization.

- Identified issues and improved the accuracy of gasoline blending by improving the distillation, T50 and vapor to liquid ratio calculations. This allowed more profitable grades to be produced worth $50,000/day with no capital cost.

- Modified the LP to include resid and atmospheric column resid production to match the refinery operator blending capability worth $40,000/day.

- Used python to group data and show that historical pricing was not correlated with crude market pricing and improved pricing from the marketing group by $0.50/bbl on 5 target crude groups.

- Automated crude composition imports to the LP from a PDF.

- Increased LP optimization speed by 10X by using a cloud server that could also be used for future AI/ML projects.

- Reduced opportunity crude decisions to under an hour.

- Pricing and option data like volatility was used to develop a model that shows the current expected market movement and provide optimization target ranges and reduced risk to the refinery margin when not operating at the current conditions.

- Scenario optimization led to specific crudes and products to be bought and sold. This improved refinery stability and maximized profitability worth ($75,000/day) $0.75/bbl.

**Motiva**

Process Engineering Team Lead, Port Arthur, TX (10/14-7/20.)

Assigned to fuels refinery plant site. Led a group of seven charged with developing yield improvements and identifying areas where the LP and production could better align. Created simulations and LP submodels that can be used to update the LP. Assisted

finance on price and volume variance reporting and month end refinery site balance. Reviewed gain/losses on shipments and receipts. Led team to improve unit mass balances, develop submodel generation work processes, and tie out meter balances to actualized accounting information. Responsible for energy Intensity Index and yield reporting for Solomon tracking.Intermediate to advanced working knowledge and understanding of Crude Oil measurement and be the subject matter expert of the system and assets.Identifies and assists/solves challenging situations and unusual problems with limited guidance. Uses judgment to work on a team that identifies and analyzes liquid volume, balance, and measurement discrepancies.Performs processing duties involving repetitive/non-repetitive calculations, verifications, and data entry associated with oil measurement ticketing and month-end close activities.

- Set the vision to automate tasks that are difficult to retain knowledge on. Developed daily refinery material balance from meter and financial receipts.
- Improved coker margin by $75MM/yr by adjusting feedstock strategy with a kinetic model.
- Reformer blending rules updated along with finding meter corrections to match reformate and octane performance curve.
- Implemented training and process modeling procedures for maintaining and improving kinetic process models.
- Automated the running of the kinetic models to compare against actual and LP submodel results.
- Worked with some universities to develop projects to help with the kinetic modeling efforts to steer future development and resources.
- Developed hysys model of actual crude unit and swing cut planning model. Was able to verify performance over time and automate the process for producing crude planning files that met actual unit performance. ~$100MM
- Developed operational kinetic model and validated results against plant data. Developed LP submodel update process to match model to plant data. $25MM
- Led project to develop fence line balance with custody meter measurements and official financial receipts. Identified ~2MM/yr in potential imbalances.
- Identified gasoline blending give away issues resulting in $30 MM/yr savings
- Developed intermediate to advanced working knowledge and understanding of Crude Oil measurement—subject matter expert of the system and assets.

**Valero**

Economics Crude and Feedstock Coordinator, Port Arthur, TX (10/13 to 10/14.)

Assigned to fuels refinery plant site. Developed daily targets and movements letter from LP optimization cases. Worked with scheduling and operations to adjust as issues arose.  Back cast performance vs LP plan and report price and volume variances. Reviewed crude and gasoil blending receipts and shipments for potential blending limit issues.Implement monthly operating plan and operating strategies, review plant operations and laboratory analyses on a daily basis for better efficiency and compliance with operating plans; track and analyze deviations from operating plans daily.Coordinate with commercial and other refineries on supply chain requirements, changes, and needs and optimize intermediate stream dispositions, including quality, quantity, and inventory levels.Manage crude quality monitoring program including tracking lab analyses for crude batches received, updating crude assay library when required, and determining economic impact for quality deviations.Apply LP model for economic evaluation of operating scenarios, optimization of operating plans and back-casting of operations

Valero

*Process Engineer, Port Arthur, TX (11/07 to 10/13)*

Assigned to fuels refinery plant site. Performed tech service functions relating to day to day process & project problem solving. Process engineering functions encompassed monitoring unit performance, modeling unit operation, optimizing unit efficiency, originating operating procedures, and troubleshooting unit problems. Project engineering functions encompassed conceiving, justifying, designing, and implementing refinery projects for improving process efficiency, increasing product recovery, and complying with government regulations. Supported turnaround planning & associated shutdown activities as well as HAZOP reviews & associated follow-up actions. Unit assignment included reforming (CCR and multistage), FCC, gasoil hydrotreating, Decoking, and Crude distillation. Generate refinery performance reports, and industry reports. Ability to multi-task and communicate technical concepts and solutions effectively and at all levels of the organization. Ensure process safety, safety, and

environmental compliance by supporting incident investigations, procedure development, management of change and environmental reviews, as required. Support Capital Development Process through economic analysis and project justification. Champion projects, and programs that support refinery vision.

- Developed basis for Valero unit modeling and automated reconciliation to drive decision making on unit performance and accuracy of the LP. Models were updated with material balance data and operational data. The results were also easily compared to actual data to improve model predictions as well as LP curves of the units. Models of the coker, FCC, gasoil hydrotreater and crude unit were developed. The FCC model was able to increase rate by 10 Mbpd and improve volume gain. Methods used to develop the model and reconciliation were implemented at multiple Valero sites. ($30,000/day)

- Led a multidiscipline team to size and install pump and new piping system for cold plant startup post hurricane flooding for utility system startup.

- Increased max crude rate 15 Mbpd on a monthly average by adjusting crude mix and identify flushing line impacts on the coker feed meter.

- Reduced gas oil hydrotreater catalyst cost by half. Unit revamps reduced the hydrogen partial pressure which made Ni/Mo catalyst as effective as other lower priced alternatives that still allowed refinery to meet spec.

- Modified procedure to remove oil from amine emulsion online and reduce amine replacement cost.

- Revamped control strategy on undersized knockout drum to prevent downstream utilization impact on a high-pressure amine tower. Worth $2MM/yr.

- Wrote welding TAR job package for and implemented changes to amine tower regenerator and contactor on the FCC. The changes maximized feed sulfur during the gasoil hydrotreater end of run conditions with higher product sulfur and allowed more produced feed to be run.

**BP**

Operations Engineer, Texas City, TX (5/01 to 11/07)

Assigned to fuels refinery/chemicals plant site. Performed functions relating to day-to-day process & project problem solving. Unit assignment included ultraformer, sulfur recovery, and styrene. Unit monitoring, data analysis, KPI reviews and unit optimization. Troubleshoot process operations, equipment and product quality and communicating corrective actions. Provide technical assistance and serve as a back up to Process Supervisors and Lead Engineer. Generate ideas and scope for expense and capital projects. Drive implementation of small projects through all FEL process stages. Overseeing process specifications for equipment and materials and maintaining process optimization. Providing detailed process specifications, P&ID's and equipment data sheets for projects. Drive closure of open action items, procedure updates, investigations. Complete PSM activities including MOC, PHA's and LOPA for assigned units and new projects. Participate on teams associated with larger projects, business improvement, optimization, reliability, safety, turnarounds, and environmental compliance activities. Monitor and evaluate compliance with best practices through collaboration with internal and external networks. Provide process engineering support for startup, shutdown, and turnarounds. Actively promote the latest technologies and problem-solving solutions. Share and leverage technical expertise across other sites and forums. Establish and validate priorities, deliverables, and deadlines with supervision. Manage competing priorities, projects, and assignments. Manage time to deliver on assignments and commitments

- Developed 5 year technology plan for the sulfur recovery unit and improved unit process control strategy for a 90% reduction in yearly emissions and a yearly savings of $400,000 from improved yield.

- Developed process health monitoring report, hysys yield tool to optimize around downstream process unit aromatic recovery constraints and increase production for an added value of $2.2 MM per month.

- Improved tower process control scheme, and debottlenecked furnaces to improve yields and increase charge rate for the ultraforming unit $1.2 MM in additional revenue.

- Developed single point of reference for the refinery condensate system and located new condensate sources for upcoming TAR cycles. Improved understanding of condensate system reduced environmental emissions and realized $200,000 in savings.

- Optimized the scheduling of plant turnarounds to take advantage of market fluctuations for an increase in revenue of $2MM per year. Developed comprehensive automated report on refinery plan vs. actual production gaps.

- Developed models to predict raw material and energy consumption in the styrene unit for correct allocation of money in the budget.

- One year on 12 hour shifts providing TAR and start up assistance. Multiple unit equipment internal inspection and risk assessments for equipment out of scope.

- Reworked procedures to provide hold points and expected temp, pressure, and flow ramps during startup.

- Unit monitoring, data analysis, KPI reviews and unit optimization.

- Completed PSM activities including MOC, PHA's, and LOPA for assigned units and new projects.

**Englobal Engineering**

**Project Engineer, Beaumont, TX (11/03 to 5/04)**

Assigned to core consulting team. Projects included pump design, relief valve sizing and various design projects. Continuously developed solutions to refinery limitations or bottlenecks.

## Technical Skills

Languages: Python, SQL, VBA, Github,

Data Manipulation: Pandas, SQL, Databrics, Tableau, Pyspark

Modeling: Hysys, Promax, HTRI, KBC, PIMS, Spiral Assay, Spiral Suite

Other: Microsoft Excel, Futures, delta hedging portfolio, options trading, derivatives, Team Leadership, Team organization, data wrangling, data structuring, forecasting, Linear Programming (LP), Business Strategy, Tableau