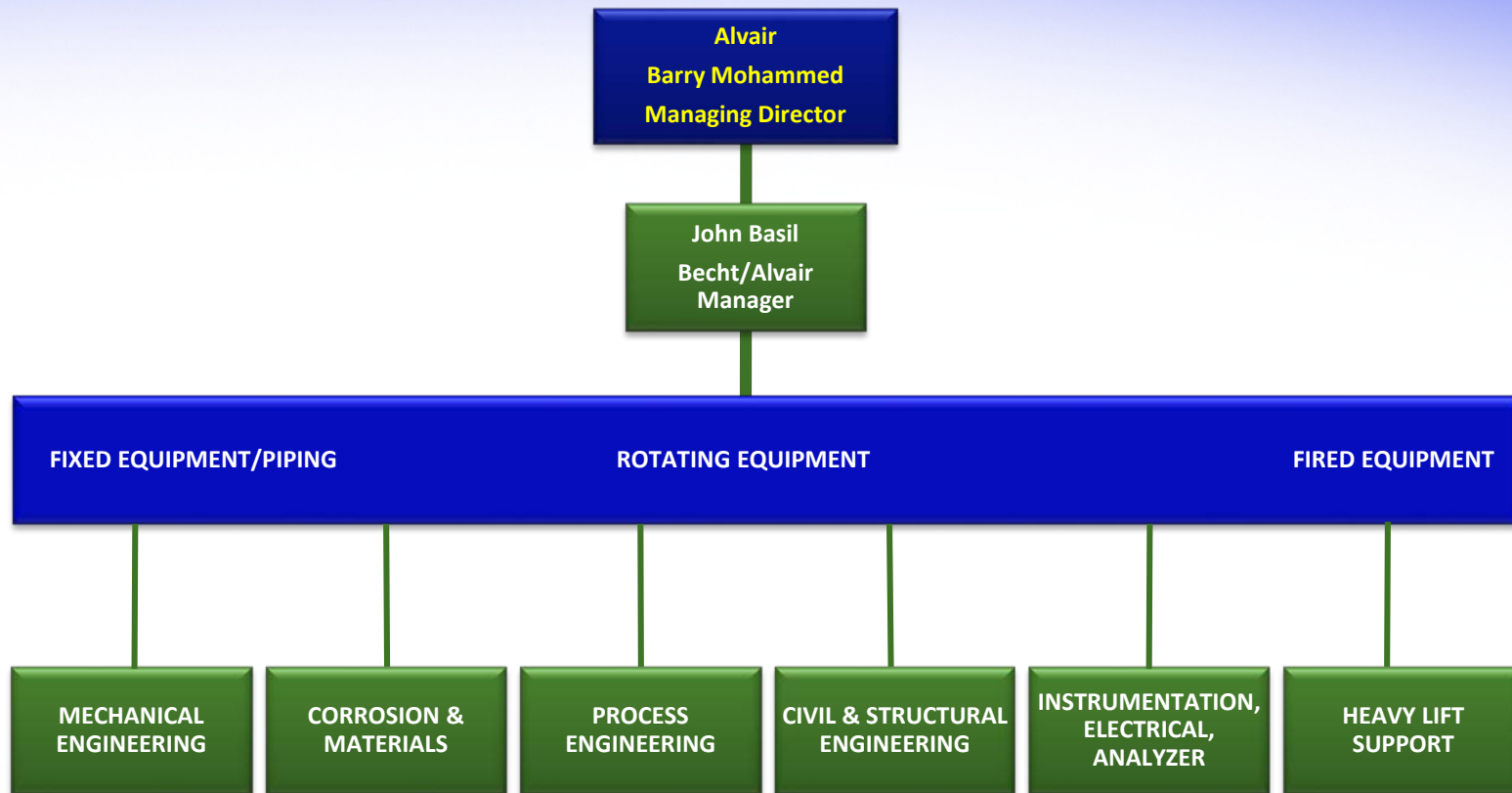


ALVAIR CORPORATE ENGINEERING SUPPORT





Introduction To Becht Engineering Co., Inc.

We Solve Problems
Engineering From An Owner's Perspective



Overview of Services

- Consulting on process equipment
- Reliability improvement
- Project and turnaround services
- Heavy lift consulting
- Process consulting
- Operations support
- Process Safety Management
- Instrumentation & Controls
- Technical training
- Laser scanning & Dimensional Control



50+ Years of Experience



- 50+ years of engineering excellence
- Third generation leadership
- New Jersey Business/Family Business of the Year – 2009/2012
- A rapidly growing company continuously adding new services and industry experts
- Led by industry experts
- Highly responsive to client needs
- We take care of our staff
- We work safely



Example Becht Clients

ExxonMobil	Philadelphia Energy Solutions	Hellenic Petroleum	Praxair
Valero	Ergon	KNPC	Linde
BP	Alon	Petrobras	Air Products
Shell	CHS	Petrotrin	Airgas
Motiva	Syncrude	Petrojam	TransCanada
Chevron	Imperial Oil	LyondellBasell	GE Oil & Gas
Tesoro	Irving Oil	Williams	JGC
HollyFrontier	Suncor	Dow	Westinghouse
CITGO	CNRL	INEOS	URS
PBF	NWU	Petrologistics	Shaw
Phillips 66	Nexant	DuPont	Fluor
Calumet	Tasnee	Nova	Jacobs
ARG	Dolphin Energy	Hydro Agri	KBR
Western Refining	Saudi Aramco	Monsanto Enviro Chem	Colt Engineering
CVR	SAMREF	Aventis	
Flint Hills Resources	ADGAS	SABIC	
United Refining	RasGas	Bayer	
		OxyChem	

Code Credentials – Becht Staff Involvement



Becht Engineering has experts covering all types of process equipment, most with over 30 years experience, coming from top Owner companies

Becht holds over 40 positions in ASME, API and ASTM Codes and Standards Committees, and has chaired many of them

ASME COMMITTEES

- ASME President
- Board of Governors - Current & Former Members
- Board on New Development - Current Chair
- Board on Hearings and Appeals - Former Chair
- Board on Nuclear Codes and Standards - Current Member, Former Chair
- Board on Pressure Technology Codes and Standards - Former Chair, VP & Members
- Board on International Standards (Inactive Committee) - Former Member
- Board on Council Operations - Former Chairs
- Council on Standards and Certification - Current Member, Former Chairs & Sr. VP's

ASME POST CONSTRUCTION STANDARDS

- Post Construction Standards Committee - Former Chairs & Vice-Chairs
- Post Construction Executive Committee - Current Members, Former Chairs & Vice-Chairs
- Subcommittee on Repair and Testing - Founding Chair, Current Member, Former Chair & Members
- Subcommittee on Inspection Planning - Current Member
- Subcommittee on Flange Joint Assembly - Current Chair
- Subcommittee on Flaw Evaluation - Former Member

ASME PIPING AND COMPONENT CODES AND STANDARDS

- B31, Code for Pressure Piping, Executive Committee - Current & Former Members
- B31, Code for Pressure Piping, Mechanical Design Committee - Current Vice-Chair & Member, Former Vice-Chair
- B31, Code for Pressure Piping, Standards Committee - Current Members, Former Chair
- B31.3, Process Piping Section Committee - Current Members, Former Chairs
- B31.12 Hydrogen Piping and Pipelines Section Committee - Current Members
- B31.3 Subgroup on High Pressure Piping - Former Chair
- B31.3 Subgroup on Design - Current & Former Members
- B16 Standards Committee for National & International Standardization of Valves, Flanges, Fittings, Gaskets - Current Member
- B16 Subcommittee on Steel Flanges and Flanged Fittings - Current Member, Former Chair
- B16 Subcommittees on fittings, gaskets, copper components and valves - Current Member

ASME BOILER AND PRESSURE VESSEL CODE COMMITTEES

- Committee on Pressure Vessels (BPV VIII) - Current Chair & Members, Former Members
- Subcommittee VIII, Pressure Vessels (Inactive Committee) - Former Vice-Chair & Members
- Committee on Transport Tanks - Former Member
- Committee on Construction of Nuclear Facility Components - BPV III - Current Vice-Chair
- Design and Analysis Committee (Inactive Committee) - Former Chairs & Members
- Subgroup on Design Analysis (BPV III & VIII) - Former Chairs & Members
- Executive Committee on Strategy and Project Management (BPV III) - Current Chair
- Project Team on Hydrogen Tanks - Current Member
- Special Committee on Interpretations (BPV III) - Current Chair
- Special Interpretations Committee (SC -VIII) - Current Member
- Special Working Group on High Density Polyethylene Piping (SC III) - Current Member
- Special Working Group on High Pressure Vessels, Section VIII, Div 3 (Inactive Committee) - Former Chair
- Standards Committee on Qualification of Mechanical Equipment - Current Member
- Subcommittee on Accreditation - Former Member-Alternate
- Subcommittee on Design - (Inactive Committee) - Former Members
- Subgroup on General Requirements (BPV III) - Current & Former Members
- Subgroup on High Pressure Vessels (Section VIII, Div 3) - Current Member, Former Chair
- Subgroup on Design (BPV VIII) - Current Member, Former Chair & Members
- Subgroup on Design SC-VIII (Inactive Committee) - Former Chair & Members
- Subgroup on Design/Analysis (SC-D) (Inactive Committee) - Former Chair & Members
- Subgroup on General Requirements (BPV VIII) - Current Member, Former Chair
- Subgroup on Heat Transfer Equipment (BPV VIII) - Current Member, Former Chair
- Subgroup on Toughness (BPV II & VIII) - Current Member
- Subgroup on Component Design - Current Member
- Subgroup on Elevated Temperature Design - Current Member, Former Chair
- Task Group on Impulsively Loaded Vessels (SC VIII) - Current Members
- Technical Oversight Committee (former Main Committee) - Current & Former Members
- Working Group on Piping (BPV III) - Current Members, Former Chairs & Vice-Chair
- Working Group on Piping (SG -D) (BPV III) - Current Member
- Operation and Maintenance of Nuclear Power Plants – Piping Group - Current Member
- Task Group on Buried Pipe - Current Member
- Working Group on Supports (BPV III) - Former Member
- Working Group on Design-By-Analysis (BPV VIII) - Current Member
- Subgroup on External Pressure (BPV II) - Current Vice-Chair

Code Credentials – Becht Staff Involvement



ASME/API

- ASME/API Joint Fitness-for-Service Committee (API 579/ASME FFS-1) - Current Members, Former Vice-Chairs & other Members
 - Chair of Part 7 Hydrogen Blistering

API / COMMITTEE ON REFINERY EQUIPMENT

- Subcommittee on Corrosion and Materials – Current Members
 - Task Group on API 941 High Temperature Hydrogen Attack – Current Members and technical editor for API 941 TBD revision 1
 - Task Group on API 939-C Sulfidation - Author and Current Vice Chairman
 - Task Group on API 945 Amine Cracking – Current Chairman
 - Task Group on API 970 CCD/IOW - Current Members
 - Task Group on API 584 IOW's - Member
 - Taskgroup on API 571 Refining Damage Mechanisms – Former Chair
 - Task Group on API 934 Heavy Wall Vessels - Members
 - Part F) Development of a Guidance Document for Establishing Minimum Pressurization Temperatures for Heavy Wall Reactors in Hydrogen Service – Technical Editor and Current Member
 - Part G) Coking Drums in Delayed Coking Units – Technical Editor and Current Member
 - Parts H& I Hydrotreater reactors (Maintenance and inspection) – Current Member
 - Task Group on API 580/581 RBI Member
- Subcommittee on Piping - Former Vice-Chair
- Subcommittee on Above Ground Storage Tanks - Former Member
- Subcommittee on Heat Transfer Equipment - Former Chair
 - Task Group on Shell & Tube Heat Exchangers - Former Member
- Task Group on Air Cooled Heat Exchangers - Former Member

ASCE

- Working Group on Revision of ASCE Standard 4 Seismic Analysis of Safety-Related Nuclear Structures - Voting Member
- ASCE Dynamic Analysis of Nuclear Structures (DANS) Committee - Current Member
- Working Group on Revision of ASCE Standard 43, Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities – Voting Member

ADDITIONAL COMMITTEE INVOLVEMENT

- MTI - Board of Directors - Current Member
- MTI – Knowledge Management Project Development Committee - Current Chair
- NACE STG 34 Refining Corrosion – Current Members
 - SP-0296 Wet H₂S Cracking Inspection - Vice Chair
 - Publication 34103 Sulfidation Corrosion – Vice Chair
- AWS A5 (Filler Metals) Committee - Source for ASME IIC - Current Member
- ASTM F-17, Plastic Piping Systems Main Committee - Current Member
- ASTM Standards and Certification Board of Directors - Current Member, Former Chair
- ASTM Committees CO3, C-16, and D-20.23 - Current Member
- ISA – The International Society for Measurement & Control, member of SP 93, Sealing Technologies Committee - Former Member
- Materials Technology Institute's Technical Advisory Council Committee - Current Member
- Materials Technology Institute, Evaluation of Gaskets Committee - Current Member
- US TAG for ISO/TC 153/SC 1 – Valve Design, Manufacturing, Marking and Testing - Current Member
- US TAG for ISO/TC 5/SC 10 – Metallic Flanges and Their Joints - Current Member
- US TAG for ISO TC 197 – Hydrogen Technologies - Current Member
- US TAG for ISO TC 11 - Boilers and Pressure Vessels - Current Member
- Joint ASME – IEEE Seismic Qualification Committee - Former Chair
- ASME – ASCE Joint Task Group on Buried Piping - Founding & Current Chair
- Process/Industry Practices (PIP): Coatings and Insulation - Former Function Team Leader
- Process Industry Practices (PIP): Piping - Former Member
- Society for Protective Coatings (SSPC): Standards Review Committee - Former Member
- US DOE Hydrogen Safety Panel - Current Member
- The Materials Properties Council - Former Member
- Section III, SG on General Requirements - Current Member
- Section III, SWG on Polyethylene Pipe (Inactive Committee) - Former Member
- Section III, Working Group on Piping Design (Inactive Committee) - Former Member
- PVRC Committee on Continuing Operation of Equipment - Former Chair
- ASME Hydrogen Steering Committee (Inactive Committee) - Former Chair
- ASME High Pressure Systems Committee - Former Vice-Chair & Member
- ASME Task Group on Risk Analysis for the Critical Assets Protection Initiative - Former Chair & Member
- ASME BPTCS Ad Hoc Task Group on Incorporation of Risk Based Principles into Pressure Technology Codes and Standards - Former Chair & Member
- PVP Design and Analysis Committee - Current Chair
- PVP Executive Committee - Current Member
- Working Group Duties and Responsibilities (SGGR-BPVIII) - Current Member
- QAI-1 Qualification for Authorized Inspection - Former Chair
- Subcommittee on Accreditation of Authorized Inspection Agencies - Current Member-Alternate
- National Commission for the Certification of Crane Operators (NCCCO) - Vice President, Board of Directors

Industry Leading R&D Projects

ASME

- Roadmap for the development of ASME Code Rules for High Temperature Gas Reactors
- Extend Fatigue Exemption Rules for Low Cr Alloys into the Time-Dependent Range for Section VIII, Div 2 Construction
- Design Factor Guidelines for High Pressure Composite Hydrogen Tanks
- Time-Dependent Allowable Stresses in the Creep Range
- Pressure Equipment Integrity Life Cycle Management
- Improvements and Consistency of Stress Indices and Stress Intensification Factors
- Improved interface of ASCE -7 and ASME B31 for Seismic Design
- Code rules for the assessment of corroded buried pipe

MTI

- Statistical Analysis of NDE Data
- Repair and modification of Lined Equipment
- Risk Based Inspection for Polymers
- Inspection and Evaluation of Old Equipment Lacking Documentation

EPRI

- Boiler Return Bend Remaining Life Estimator
- Comparison of Creep Simulation Methodologies
- Buried Pipe Design Guide
- Buried Pipe Inspection and Fitness-for-Service
- Use of HDPE Pipe for Safety-Related Applications
- Integrity assessment of cement-lined pipe

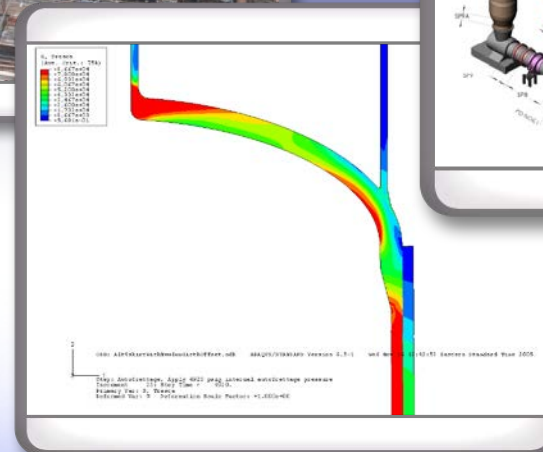
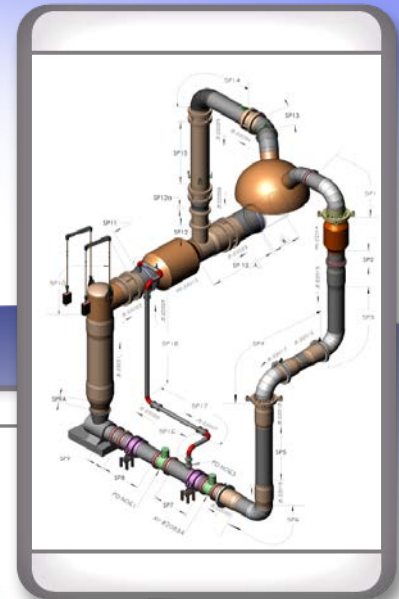
API

- Design, Fabrication, Operational Effects, Inspection, Assessment, and Repair of Coke Drums and Peripheral Components in Delayed Coking Units

Equipment Consulting



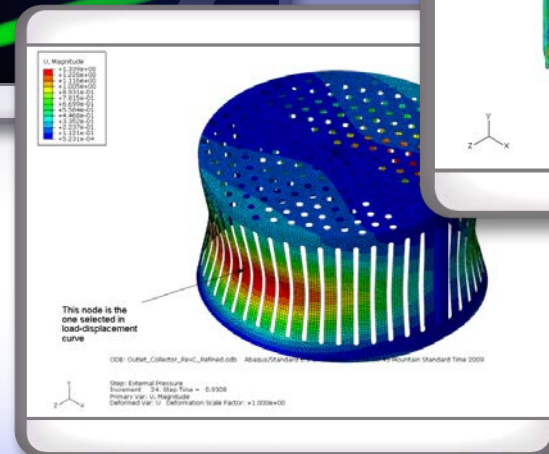
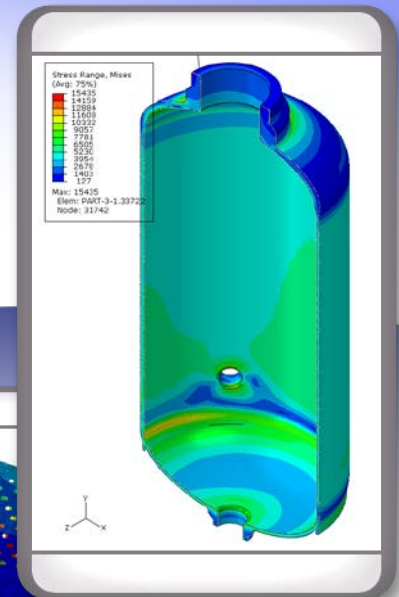
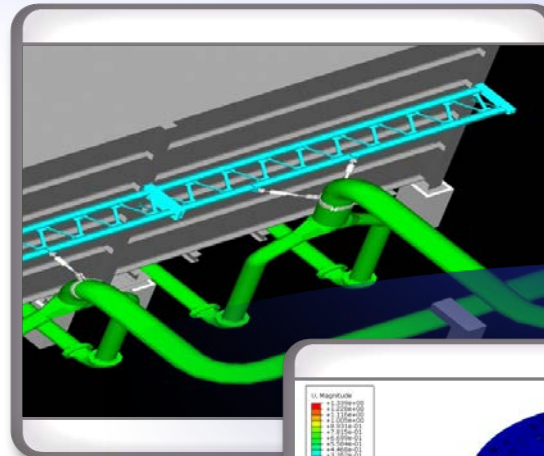
- Design for challenging services
- Fitness For Service
 - Brittle Fracture
 - LTA
 - Fracture Mechanics
- Rerating
- Analysis
 - FEA
 - Pipe stress
 - Vibration
- Data Acquisition
 - Noise
 - Vibration
 - Coke Drum Health Monitoring
- Failure Analysis



Equipment Consulting



- Pressure vessels
- Piping
- Machinery
- Fired heaters and boilers
- Tankage
- Instrumentation and controls
- Electric power systems
- Structures



Equipment Consulting



- Rotating Equipment
 - Problem Solving
 - Failure Investigations
 - Machinery Re-Rates
 - Design Study Reviews
 - Machinery Reliability Plans
 - Facility Reliability Audits
 - Machinery Overhaul Supervision
 - Witness Testing & Shop Inspections
 - Vibration Analysis & Condition Monitoring



Corrosion & Materials Consulting



- Refining and petrochemical industry experts with owner-operator experience
- Integrity Operating Windows (IOW's) and Corrosion Control Documents (CCD's)
- Perform HTHA risk evaluations
- Answer man services
- Manage/support FFS assessments
- Expert witness
- Corrosion and materials specific training
- Edit technical documents for API and NACE

Equipment Repair

- Creative solutions, design and leadership for challenging repairs



- Structured Work Processes documented in the Reliability Technology Manual Modules:
 - Reliability Gap Assessments
 - Reliability Priority Screening and Criticality Evaluation
 - Risk Based Equipment Reliability Plans (ERP) for all equipment disciplines
 - Risk Based Work Selection for Turnaround Workscope Reviews
 - Root Cause Failure Analysis
- Proprietary and custom built tools and software for implementation of modules:
 - Web Based documentation tool (STIER) for Equipment Reliability Plans
 - RBWS tool (STRAITS) for facilitation, documentation and reporting risks and B/C Ratios
 - BIDES for Damage Mechanism Identification and developing Inspection Programs
- Experienced team of SMEs for execution, mentoring and training of reliability initiatives



Turnaround Services



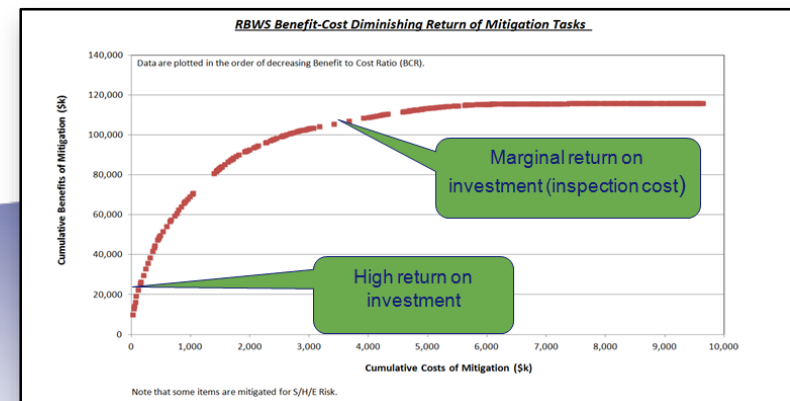
- Leadership
- Planning and scope development
- Inspection planning
- Risk Based Work Selection (proprietary software)
- Turnaround readiness reviews
- Gap closure
- Field execution coordination and oversight
- Operations support
- Shutdown/Startup Optimization
- Heavy lift planning, review and field coordination/oversight
- Engineering for discovery work
- Post turnaround review



Risk-Based Work Selection



- Proper Worklist development is key to Turnaround excellence
- Risk Based Work Selection (RBWS) is a systematic risk-based approach to define, justify and select work to meet business objectives
- Balances plant performance and cost by combining reliability, risk management and financial concepts
- Ensures that only work with a valid business or S/H/E justification is included on the turnaround Worklist
- Becht RBWS Work Process is embedded in our STRAITS© software
- Data from past TAs in industry shows that a minimum of 20-25% reduction in Worklist and Costs are achievable

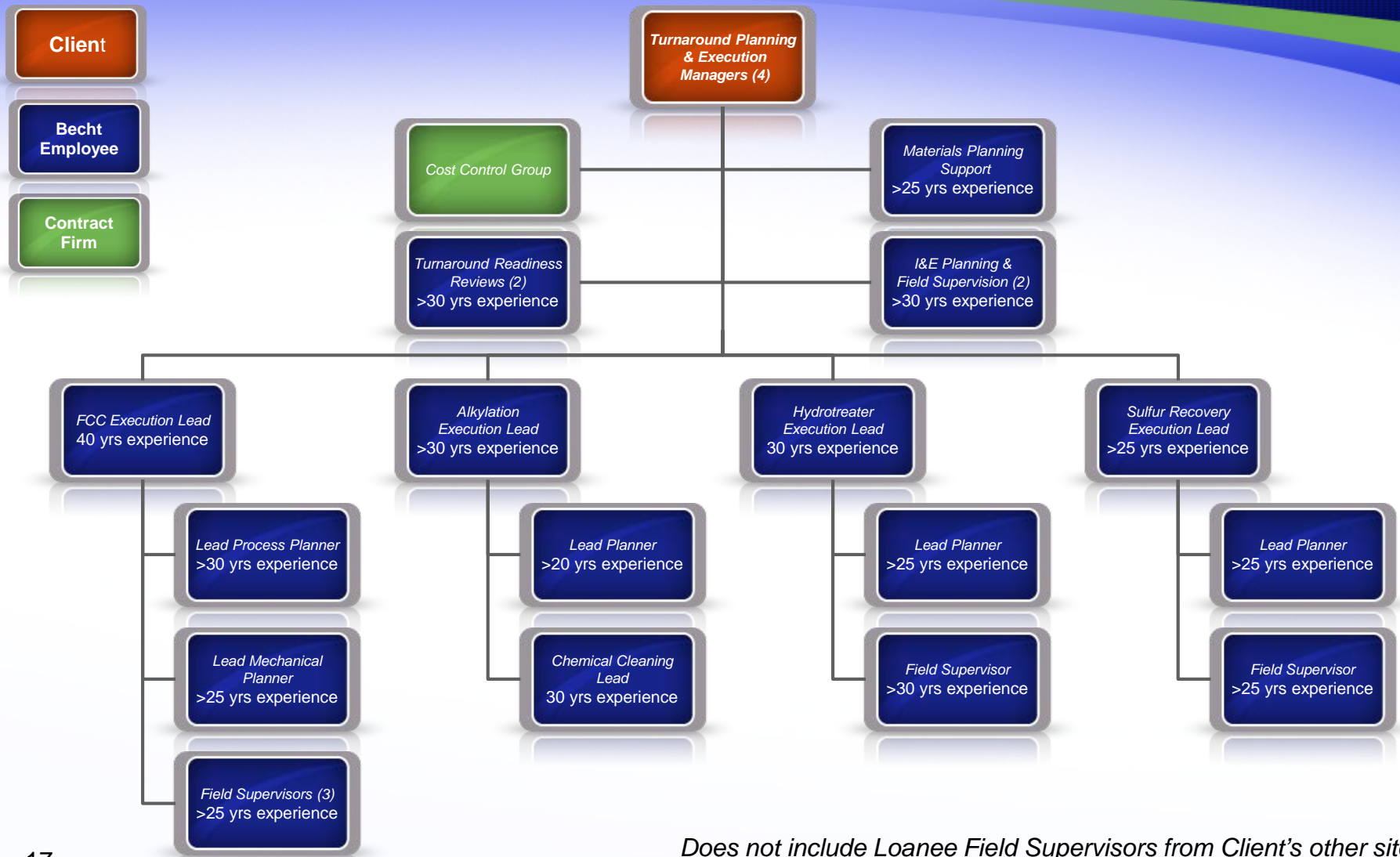


Turnaround Inspection Planning

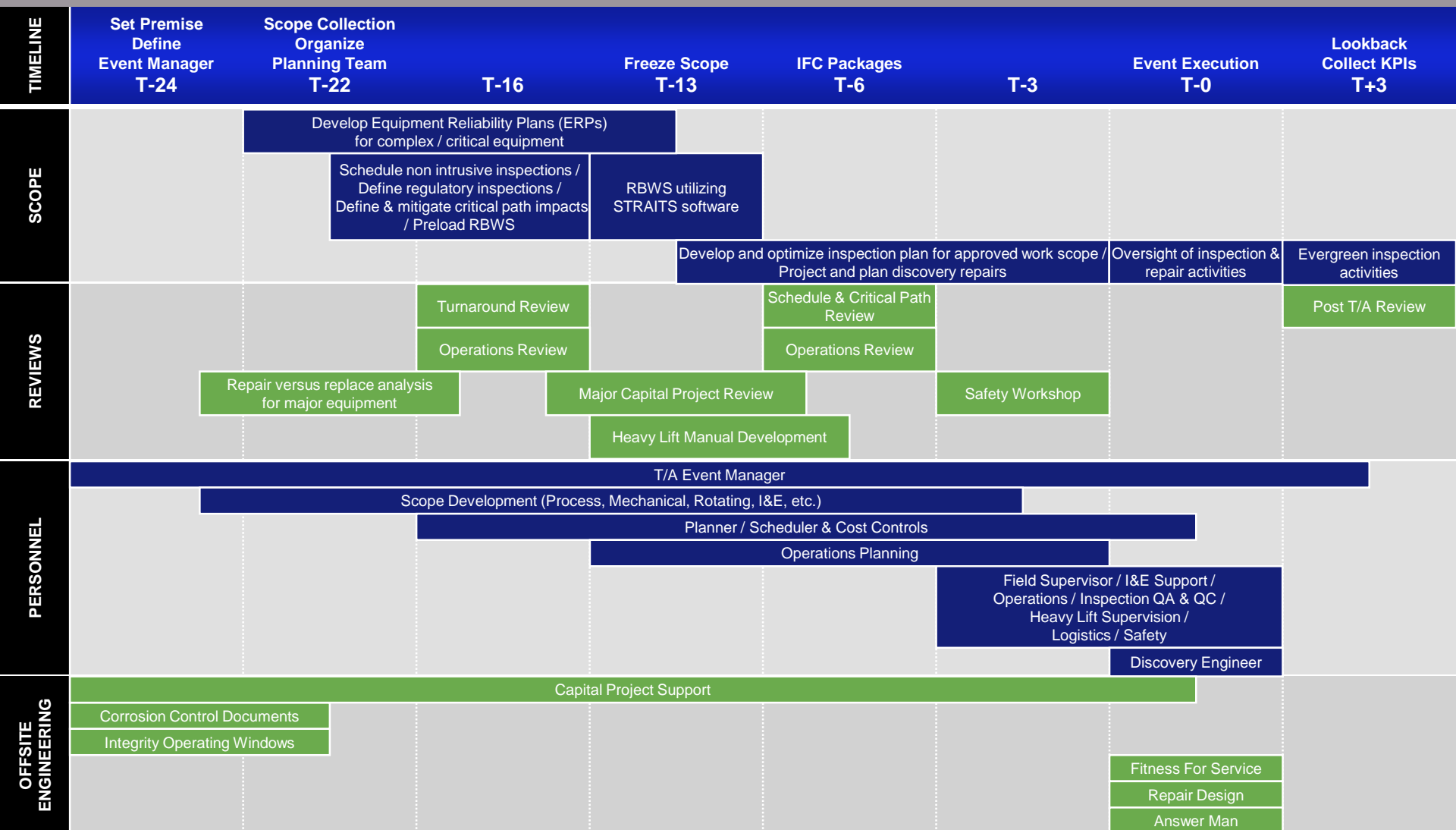
- Mitigate a clients Regulatory and Business risk utilizing industry best practices
- Provide Risk Based / Cost Benefit Assessed Inspection Plans
- Mitigate inspection discovery and critical path impacts – no surprises
- Identify and provide planning options to assess equipment posing cost and schedule impacts to turnaround – “What-If’s”
- Prioritize equipment for discovery inspections to eliminate T/A delays
- Provide detailed and optimized inspection plans
- Project, plan, estimate, and schedule for anticipated repairs
- Expedite assessing equipment posing threat to impact T/A cost or schedule during execution phase of T/A



Example Turnaround Block: 20 Becht Employees On Owner's Team



Holistic Turnaround Support



Independent Reviews

- Independent Project – Scope, schedule, cost
- Technology – Integration, step out, scale up
- Project Technical – Owner's representative SME review
- Constructability – Owner/Contractor alignment
- Pre-Startup Safety – Training, walkdowns, procedures
- Turnaround Readiness – Scope challenge, risk, schedule, start-up/shutdown review
- Reliability – Mechanical integrity including inspection and fixed/rotating equipment
- Due Diligence – Acquisition risk and gap analysis



Heavy Lift Consulting



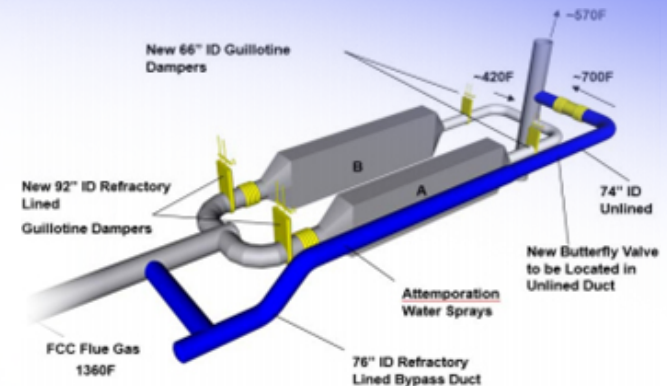
- Development of lift strategy
- Detailed review of crane contractor lift plan
- Preparation of comprehensive lift manuals
- Development of procedures for crane load test
- Oversight of crane erection, heavy lift and disassembly
- Crane safety training
- Lift director training
- Evaluation of crane foundation design
- Design of lift lugs, spreader beams and other special lift devices
- Investigation of crane incidents



Process Consulting



- Troubleshooting and optimization of process equipment
- Process design including simulation, H&MB, and PFD development
- Staff augmentation for turnaround support or ongoing mentoring
- Design review of FEED packages as owner representative
- Cold eye review of new processes



Experienced Operations Support



- Capital project execution
 - Operating procedures, 3D model reviews, PSSR
- Turnaround support
 - Planning, permitting, execution
 - Startup and shutdown review including procedures, decontamination, resource planning, and isolation plans.
- Mentoring and training of operations personnel



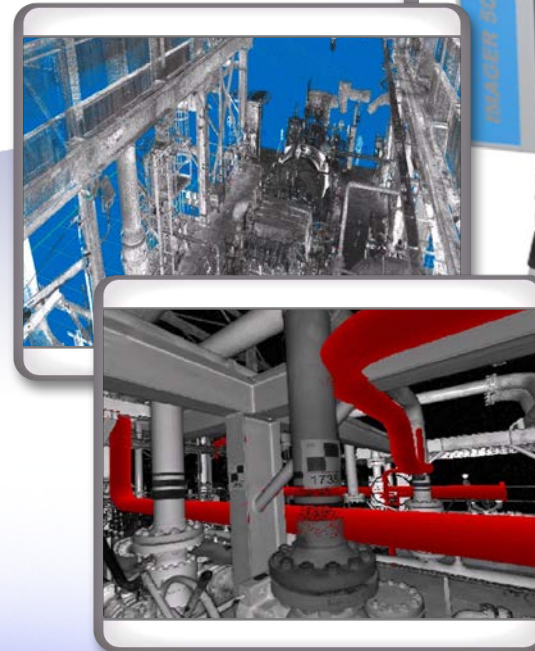
- Broad range of coverage
 - **Process Safety Calculations**
 - Nuts and bolts of compliance
 - **Compliance & Stewardship**
 - Following mandated OSHA programs
 - **Operations Excellence**
 - Going beyond mandated OSHA programs
 - **Incident Investigations**
 - Understanding and preventing future incidents



Laser Scanning Services



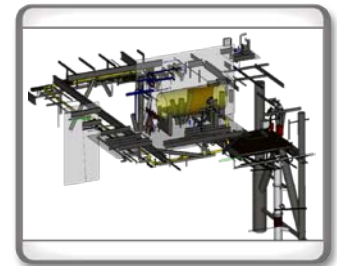
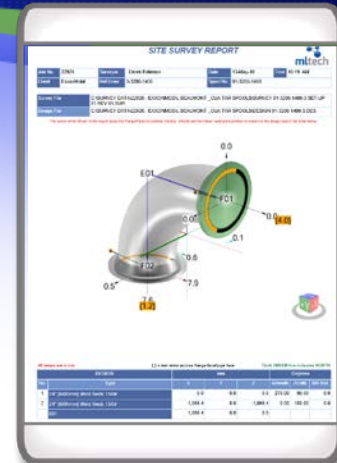
- Largest provider of scanning services in the United States
- All work done lump sum --- geared towards efficiency
- We have a proprietary process that we use to make sure that all of the scanned data ties directly to your plant coordinate system
- All registration is performed prior to leaving the site



Dimensional Control Services



- Single operator system offers technological alternative for projects which require instant results, higher accuracy, on a smaller budget
 - Instant on-location piping/structural generated models
 - Flexible for any data collecting task
 - Pipe fabrication QC script provides automated generated QC reports
 - Download capability for “autogen” spool designs files, ensuring a closed loop between design house designs and fabrication results
 - Data collected to within 1/16” reflectorless and 1/32” reflector
 - Component positioning feature provides live updates on positioning of large or small components
 - Provides complete auditable files
 - Reflector and touch free data collection



Technical Training



- We offer technical courses covering all areas of our expertise
- Taught by industry experts with significant field experience – offer a practical approach to each lesson
- Public courses
- Private, customized, on-site courses



Becht Engineering Can Help



- Consulting on process equipment
- Reliability improvement
- Project and turnaround services
- Heavy lift consulting
- Process consulting
- Operations support
- Process Safety Management
- Instrumentation & Controls
- Laser scanning
- Technical training



Key Becht Engineering Contacts



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