Flow Engineering Inc.

Innovation| Inspiration | Technology

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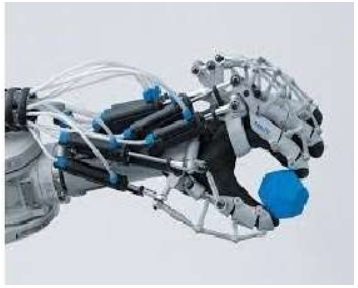
Innovation by Instinct

Innovation and Engineering Services

- Research and Development Services
- Product Design and Engineering
- Re-Engineering / VAVE
- Automations and Robotics









About us

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Flow Engineering Inc. is a Center of Innovation that provides Simple Solutions for Complex problems. It's an Adison Group company supporting its customers in developing cutting-edge technology and incubating next-gen products. We are research-oriented, with Engineering and R&D infrastructure all under one roof. We can be a good catalyst to reduce time to market. We support your product development cycle from Radical innovation to Physical Product Validation

Our Services and Products are

1. Next-gen Product development and Engineering services
2. Manufacturing of Hydro Test Rigs, Test Infrastructures and Industrial equipments
3. Design and Installation of Manufacturing line Automation and SPM's.
4. Component development, Contract manufacturing & Production support

We bring value to our customer. .

- Keeping our customer ahead in technology
- Make them cost competitive optimizing the product and process
- Time to Market; to be ahead of competitor
- Resolving Product Challenges / Field failures
- Reduce Engineering & Product Development Cost

Our Core Values :

People: Committed to People, Committed to the Future

Client Value: Creating value being responsive, relevant and consistent

Integrity: Inspiring trust being transparent and honest, matching our behavior to our words and actions.

Excellence: Creativity, Innovation & Lateral thinking challenging status-quo

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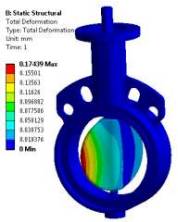
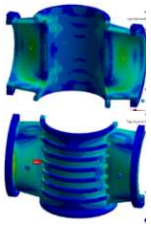
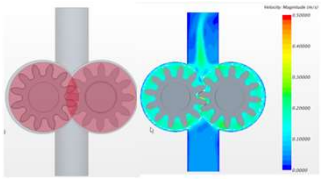
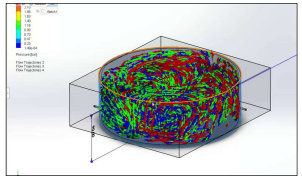
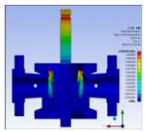
Flow Engineering Inc.

1. Concept Research, Design and Validation
2. Product Design and Detailing
3. Proto development and Testing
4. Product Re-Engineering and Reverse Engineering
5. Product localization and Technology Transfer
6. Electronic integration, PLC, SCADA development & IoT
7. CAD : 3D Modeling and Detailing, Legacy digitization
8. Virtual Analysis : CAE/ CFD/FSI
9. Bio Technology Engineering products





Hydro-Test Rigs and Equipments

1. Hydro-Test Rigs for Industrial Pumps and Valves.
2. Hydraulic Test rigs for Pumps, Valves and Accessories.
3. Hydro-Test Rig for Gas cylinders, DI Pipes & other products
4. Assembly line automation and EOL tester
5. Customized Testing Equipments









Served Industries

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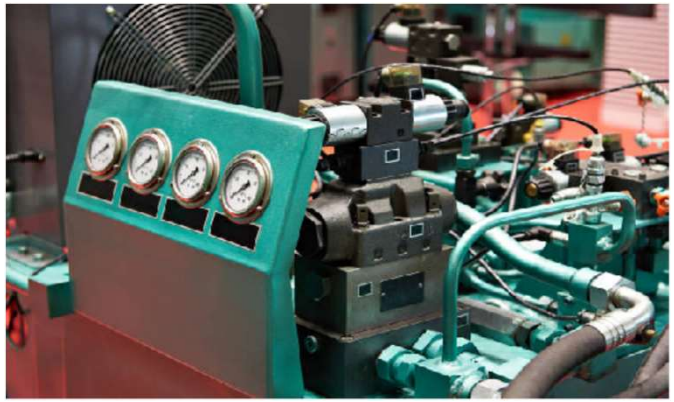
Having expertise and command on **Flow Engineering domains** like Industrial Pumps and Valves, Hydraulics, Pneumatics, Hydro-Pneumatics; Servo-Hydraulics, Electro-hydraulics, Electro-Pneumatic, Electronic Integration; PLC, SCADA and IoT, We serve the following industries to the extent of product life cycles from concept to proto validation.

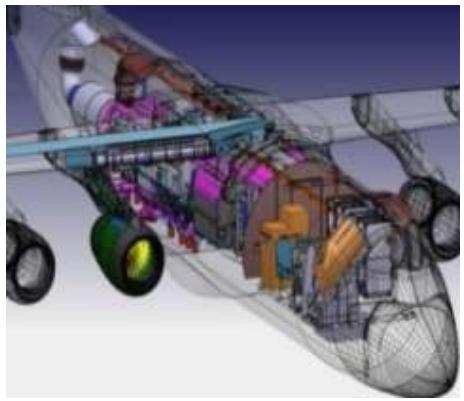
Pumps, Valves, Actuators and Automations



Fluid Power Industries
(Hydraulics, Pneumatics & Servo-hydraulics)

Renewable Energy and Gases

EXCON Equipment Accessories
(Hydraulics and Automations)



Aerospace, Marine and Defence
(Hydraulics, Pneumatics & Servo-hydraulics)

Automotive Hydraulics
(Flow Engineering)

Our Clientele

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HAL
Hindustan Aeronautics Limited

ARAI
Progress through Research

NLC India Limited
('Navratna' - A Government of India Enterprise)

BHEL

TORISHIMA

PENTAIR

VELAN

CURTISS-WRIGHT

WEIR
MINERALS

belgaum aqua

TATA MOTORS
Connecting Aspirations

WIPRO
Applying Thought

EATON
Hydraulics

Malimbus
Valves & Control Pvt. Ltd.

SYNERGY

KANSEI
Valves and Automations LLP.

Clartech Engineers Private Limited

RASHMI GROUP

WELSPUN

Dare to Commit

S R RUNGTA GROUP
Rungta Mines Ltd.

JINDAL SAW LTD.
JINDAL TOTAL PIPE SOLUTIONS

TAL
TAL MANUFACTURING SOLUTIONS LIMITED
A TATA Enterprise

College Of Engineering Pune
(An Autonomous Institute of Govt. Of Maharashtra)

hycons®

Ross & Mount

ALTRAN

iLenSys

Spectalite

Wilson Technologies, Inc.

PREMIER

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Innovation and Engineering Services

Research & Development

Radical Innovation
Concept Research
Design & Validation
Idea Transformation

Product Design

Product Architecture
Design & Verification
Proto Development
Testing & Validation

INNOVATION AND ENGINEERING SERVICES

Re-Engineering

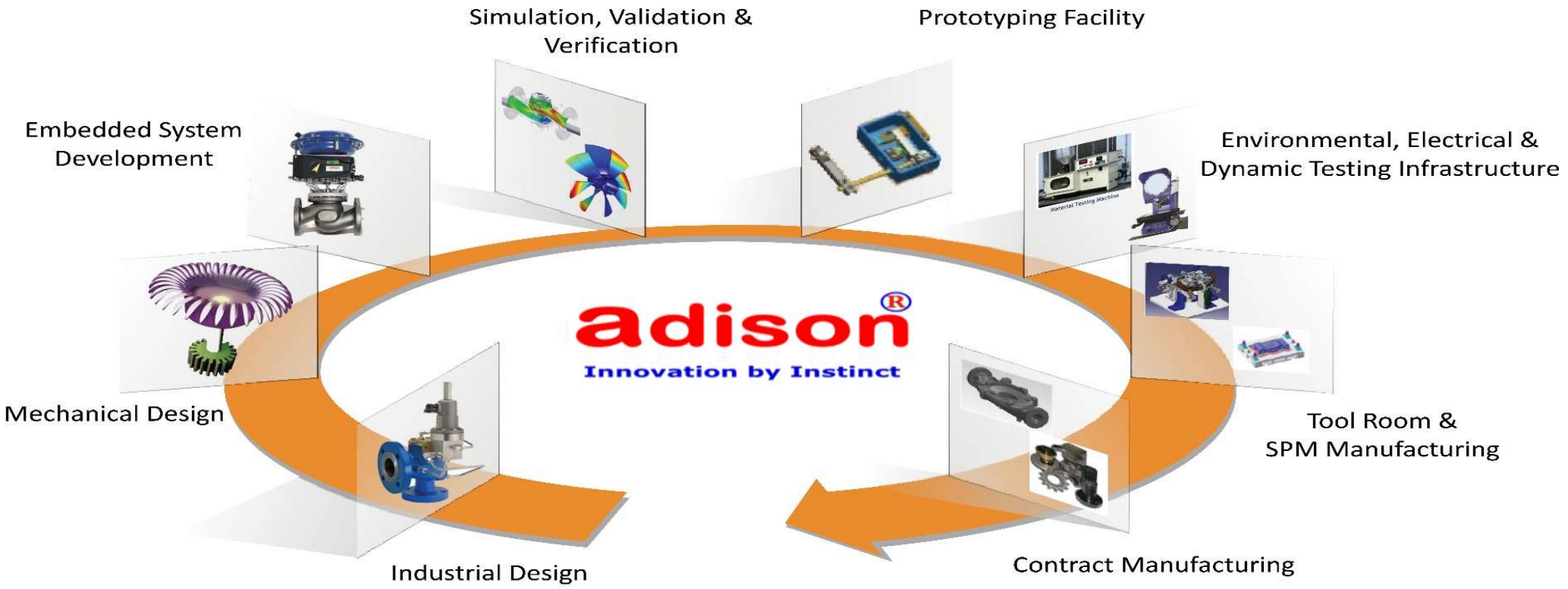
Reverse Engineering
Modelling & Detailing
Value Engg & Analysis
Rapid Prototyping

Manufacturing Engineering

Technology Transfer
Process Planning
Patterns & Moulds
Jigs, Fixture & Tools

Product Development Services

We provide End-to-End product development solution from Design to prototyping & contract manufacturing. Adison has built a echo-system such that, the customer can rely upon to get hassle-free Product development and VAVE



One stop for End-to-End Product Development solution

Competitive in Market → Flexible for Application → Easy to Manufacture → Optimized Design → Better Value Addition

Capability, Competency And Infrastructure

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Domain Expertise in

- Design, Development, VAVE / Reverse Engineering of
  - Industrial Valves Pumps & Actuators
  - Hydraulic Products, systems, equipments
  - Hydro-pneumatic systems & equipments
  - Electronic integration, **PLC and SCADA** development
- Design and Manufacturing of
  - Assembly and Testing line Automation
  - Manufacturing Tools, Moulds & BIW fixtures
  - Hydraulic Machines, Systems and SPM's
  - Hydro-Test rigs and Hydraulic Test equipments

Infrastructure and Echo-system

- Two Design Centres in Bangalore and Belgaum with advance legal licences of CAD CAE & CFD
- Well equipped Tool room with conventional machines , manual expertise and Test infrastructure
- CNC Turning Centre, VMC (Machining Centre) and other advance machineries
- Local to global supply chain with project partnerships
- Access to accredited Labs & Institution.
- 13000 Sq. ft land is acquired and Proposed to establish advanced SOA Manufacturing facility

Team strength

- Strong in Engineering Basics & standards
- Well versed and flexible with CAD, CAE & CFD Tools
- Team of Young, Dynamic and multi-skilled Engineers guided by expert consultants
- Innovative, Creative and Out of box ideas
- Disciplined, Quick learner and adaptable to environment & Processes
- Hands on experience in Manufacturing processes
- Knowledge of Product Development process

Infrastructure Images

SolidWorks
AUTODESK
ANSYS FLUENT





Udaykumar Painter Business Head

adison® Innovation by Instinct

Mechanical Engineer with 25+ years of experience in Hydraulic & Process related industries
Proven Global leader who has established and lead the Engineering, Design and Technology Centres
Developed 100+ products, 25+ Systems, Equipments , SPM's & Automations with innovative concepts.
Registered two global **Innovation patents** for new concept**.**
Can do attitude, Lean thinking, Acute problem solving and providing simple solutions to complex problems.

Has proven experience in Product development Life Cycle

CAREER ASSOCIATION

Has hands on experience in Design, Development & Testing of Industrial Valves for Minerals, Oil & Gas, Power and other process industries

- Butterfly Valve, Ball Valve, Pinch Valve, Plug Valves
- Gate, Globe & Check Valve, Auto Changeover Valve
- Safety Relief Valve, Pressure control & Pressure reducing Valves,
- Aero-flow control Valve, Super-saturation Valves
- Pneumatic and Hydraulic Actuators (Linier & Quarter-Turn) with fail Safe features,

- Design & manufacturing of various test station using Hydraulic, Pneumatic & Embedded concepts
- Design & Development of Hydraulic Cylinders, Jacks, Power-packs, Systems & test stations.
- Hydraulic Test Rigs, Tooled up Special Purpose M/c's & Manufacturing automations
- Good knowledge of Engineering standards, ANSI, ASME, API, EN and ISO standards
- Track record of successful completion of multi-million dollar global engineering projects

SULZER

tyco

WEIR

pricol

polyhydron

Career Associations

Sulzer Pumps – Vice President, Global Technology Center

Tyco Valves & Controls (EMERSON) – Head Engineering

Pricol Technologies (CAPAGEMINI) – Vertical Head (Flow Engineering)

Weir India (UK based MNC) – Head – Valve Design Center

Polyhydron Pvt. Ltd - JV with Oil Gear USA – Manager R&D

What We do

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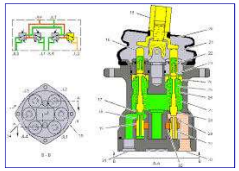
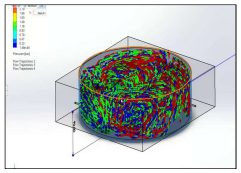
We provide the confidence to our clients with our innovative solution to various challenges providing various design and development services. We have complete infrastructure and expertise which can provide value differentiators.

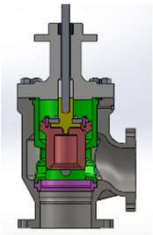
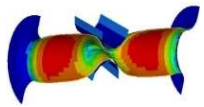
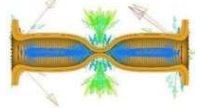
Concept Research & Development



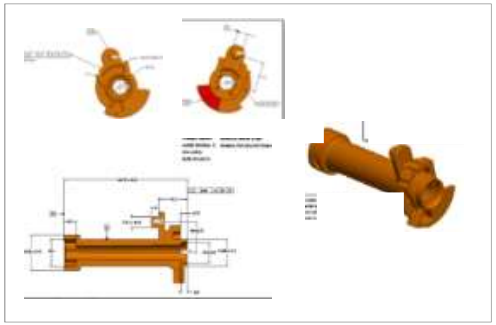
- Radical Innovation
- Incremental Innovation
- Idea Transformation
- Concept Design and Validation
- Concept to Product design
- Patent Research & filing
- Concept commercialization
- Concept certification

Design & Development

- Concept Design & Development
  - New concept / available concepts
  - Mix & match of different concepts
  - Multiple Series or Variants
- Virtual validation (CAE, CFD, FSA)
- Virtual v/s Physical Co-relation
- Design Evaluation & validation
- Localization or Technology Transfer

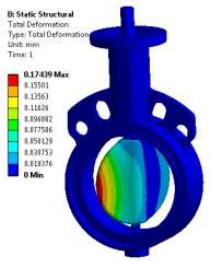
Product Engineering



- 3D Modelling and Detailing
- Product Architecture
- Design and Verification
- Proto Development
- Testing and Validation
- Manufacturing Drawing
- Geometrical Dimension & Tolerance
- Manufacturing Process drawing

Re-Engineering / VAVE





- **Reverse Engineering** to provide
  - Design Verification
  - Product Specification
  - Material Analysis & alternatives
- **Cost Reduction** through
  - Design & Process optimization
  - Weight optimization
  - Alternate Material
- Embedded Integration

Engagement Models

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We partner with our customers thru various business models according to their convenience. Our USB's are

- Dedicated, Quick turn around facility to speed up your time to market
- Innovative Options to save tooling cost
- Skilled People – Scientific approach – Rapid delivery
- Focus on Form, Fit and Function
- Lean paper work for quick dispatch.

100% Security to your Designs & Ideas

Offshore Development Center

- Dedicated setup viz. Computers and resources being managed by Customer directly / Indirectly
- Core team is exclusively working for a client as an extension of the clients engineering team

Resource Engagement Model

- Team will exclusively working for a client as an extension of the clients engineering team
- Flex team support the customer for additional work load as and when required

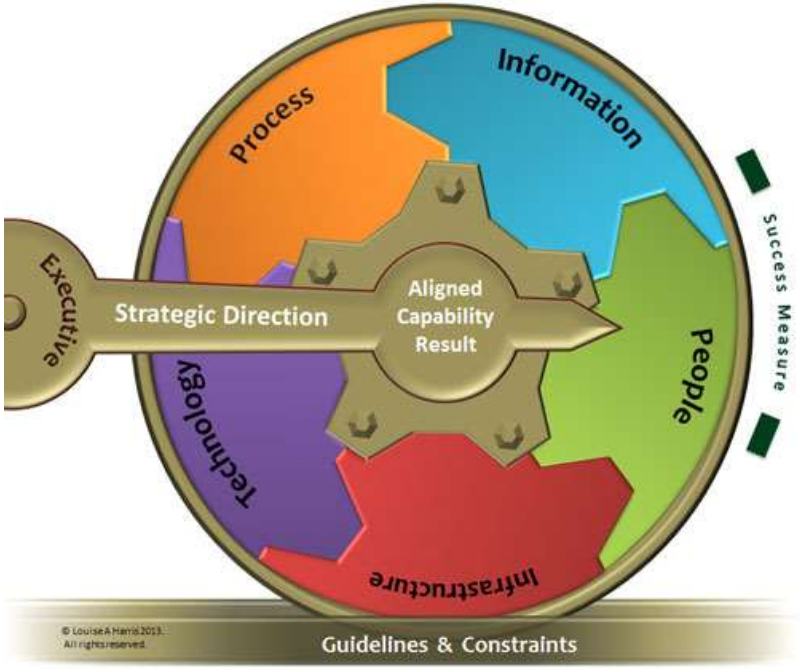
Project Based Model

- This model is suitable where the project scope is well defined, unchanging with reasonable stand-alone.
- Resources are flexible and limited to the project schedule.

Single piece MOQ Model

If an Idea flashes, we make it to a design;
If there is a design, we make it to a product
It is a piece of thought, Not everyone can do it.
Skilled, creative, motivated, smart are chosen

We use creativity over investing in the permanent tools. Budget be spent to try more design.



Some Relative Case Studies

Design and Prototype Manufacturing Of Angle Valve

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Product design from Concept

- Skeleton Design from concept
- Preparation Of **Design Calculation sheet**
- Validate Design calculation sheet using CAE, CFD
- Trim Design / Flow path / Shell design
- Mechanical structure Design
- Seal selection / Material selection
- Actuator and Accessories Design
- Design freeze and 2D drawing
- BOM preparation from 3D Cad drawing

Prototyping and Testing

- Pattern and Mould Design
- Casting Development
- Component manufacturing
- Valve Assembly
- Hydraulic Actuator Manufacturing
- Actuator Assembly
- Valve Testing

Indian DI Pipe manufacturing Company

Instructions: add inputs from Customer Select. For designing the valve standards, selec
and actuator sizes available to ensure safety factors are acceptable.

Valve Size	Dvalve	10	inches
Valve Ansi Class	ANSI	1500	-
Body Material	Matl	WCB	-
Actuator Piston Area	Ap_act	133	square inch
Actuator Design Pressure	Pd_act	100	psi
Actuator Design Thrust	Td_act	13300	pounds

Outputs - Safety Factors from BCV Design Standard

DS Pressure Seal Bonnet

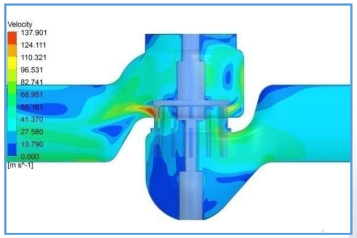
Safety Factor of gasket at MAWP	SFgkt_MAWP	1.8
Safety Factor segment ring (ambient)	SF_sr	1.8
Safety Factor Segment Ring compressive st	SF_sr_c	1.9

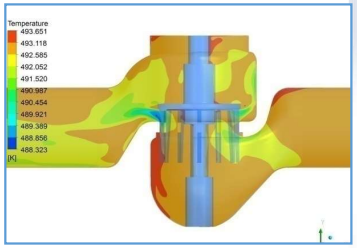
DS Stem Design

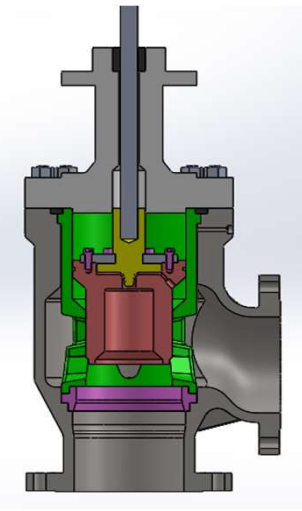
Safety Factor - stem tensile and compressive stress	SFstemtensile	1.0
Safety Factor - thread shear stress	SFstmthread	1.8
Safety Factor - thread tensile stress	SFstmthread	1.0
Safety Factor - buckling stress	SFbuckling	1.3
Safety Factor - flange shear stress	SF_flange_shea	1.0

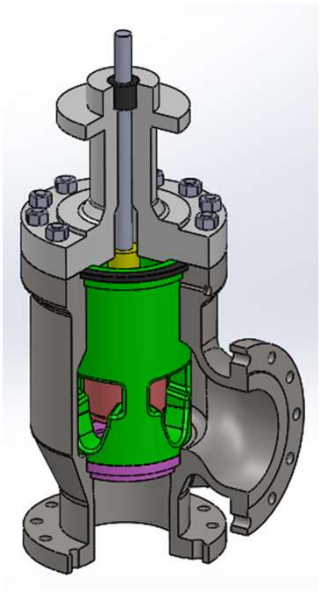
DS Plug Design

Safety Factor - Plate Shear Stress	SF_plate_shear	4.4
Safety Factor - pilot plate compressive stres	SF_pp_comp	7.2









Product Family Design using Design Calculation Sheet

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Objective : Design of complete family of product range from 02” to 12” and selecting suitable actuators

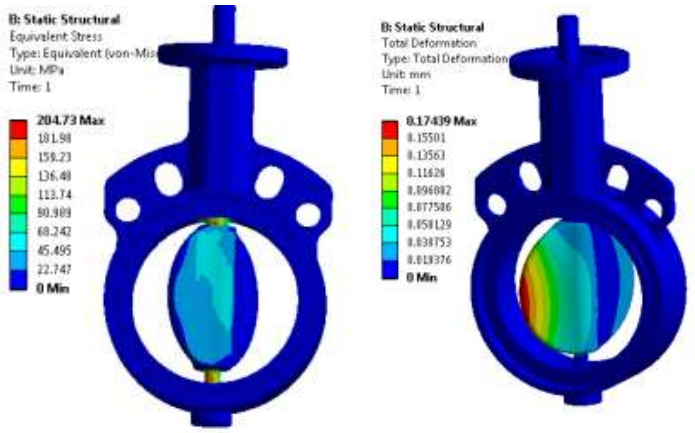
Approach :

- ✓ Design calculations for Cv & pressure related parts
- ✓ Validating the design calculations using FEA Analysis
- ✓ Deriving the data from Design calculation sheet
- ✓ CAD modelling as per design sheet
- ✓ GA drawing with BOM
- ✓ Manufacturing drawing with GD&T

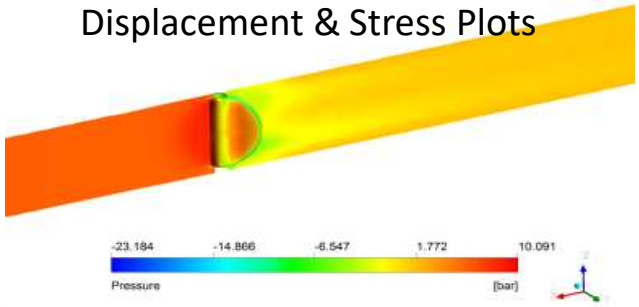
Achievements

- ✓ Design calculations are done as per the standards
- ✓ 02”to 12” valves with Class 150 & 300 are designed
- ✓ CAD automation is done for some simple parts

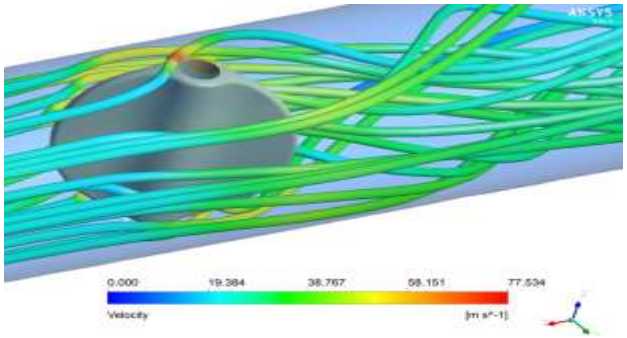
Product: Butterfly Valve



Displacement & Stress Plots



Pressure Plot



Velocity Streamlines

11	Materials Table					
12	Body_Matl	Bonnet_Matl, Segment Ring Matl	Stem_Matl		Segment_ Ring_Matl	Allowable _Stress_ Ambient
13	-					
14	C12A	F91	Inconel 718		A105	20000
15	WC6	F11	Inconel 718		F11	17100
16	WC9	F22	Inconel 718		F22	17100
17	WCB	A105	A476 410		F91	24300
18					Grade410	40241
19						
20	**Material Table Allowable Stress**					
21	Temp index	Mat'l Index	1	2	3	4
22	Material		-20	100	150	200
23	Temp index		1	2	3	4
24	A476 410	3	20	20	20	20
26	A476 410	5	26.2	26.2	26.2	26.2
27	Sa-320 B8	Tensile stress	75	75	73	71

Instructions: add inputs from Circor Select. For designing the valve standards, select valve and ANSI class, and then iterat
actuator sizes available to ensure safety factors are acceptable.

Valve Size	Dvalve	4	inches
Valve Ansi Class	ANSI	2500	-

Body Material	Matl	WCB	-
Actuator Piston Area	Ap_act	133	square inch
Actuator Design Pressure	Pd_act	100	psi
Actuator Design Thrust	Td_act	13300	pounds

Note: fixed at 100 psi maximum.
$T_{d\_act} = P_{d\_act} \times A_{p\_act}$

Outputs - Safety Factors from BCV Design Standard

DS Pressure Seal Bonnet

Safety Factor of gasket at MAWP	SFgkt_MAWP	1.6
Safety Factor segment ring (ambient)	SF_sr	1.1
Safety Factor Segment Ring compressive st	SF_sr_c	1.1

DS Stem Design

Safety Factor - stem tensile and compressive stress	SFstemtensile	1.0
Safety Factor - thread shear stress	SFstmthread	1.8
Safety Factor - thread tensile stress	SFstmthread	1.0
Safety Factor - buckling stress	SFbuckling	1.4
Safety Factor - flange shear stress	SF_flange_shea	1.2

Product Optimization (Value Engineering)

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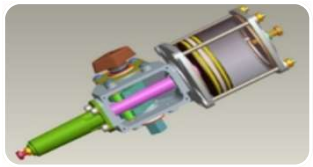
We have executed various projects in different domains and services. We will be intend to share the very specific case study as per your requirement. We will be happy share the relevant case study and our approach to the project

Re-Engineering Of Actuator

Indian Exporter

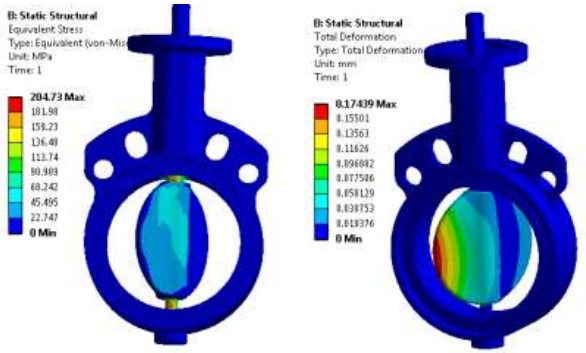
Reverse Engineering → VAVE Engineering → Final Product


Butter-Fly Valve

GMBH Company

- ✓ CAE Analysis
- ✓ Design Validation
- ✓ Design Optimization



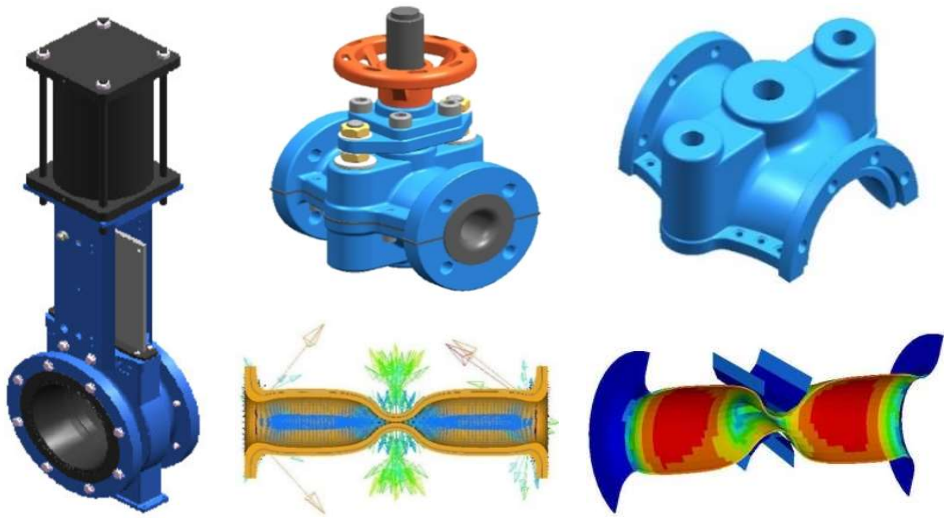
Design, Development and Prototyping

UK Based Valve Manufacturing Company

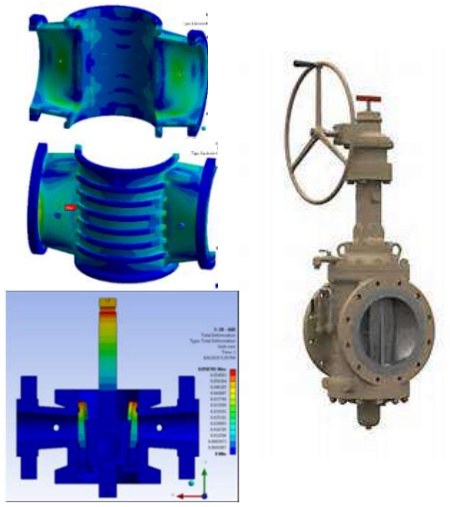
Indian Valve Company

Project Scope:

- ✓ Product Design
- ✓ CAE Analysis
- ✓ CFD Analysis
- ✓ Design Optimization
- ✓ Product Detailing
- ✓ Assembly Drawing
- ✓ Bill Of Material
- ✓ Detail 2D drawing



Knife Gate Valve **Pinch Valve**



Plug Valve

Design & Development of Product Family from Sample

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KEY RESPONSIBILITIES

Design and Development of complete range of Actuators from the samples (03 sizes) 006 SA; 025SR; 036 DA

Key Success Factor :

- Final Product Cost for US customer
- Performance at par with sample
- Weight of the product in comparison

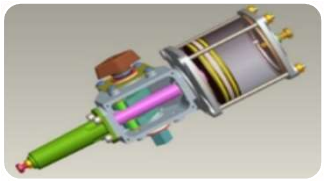
Critical To Quality :

- Force v/s Deflection curve
- Sealing life of Plunger / Sealing elements
- Casting quality and consistency

Phase : 1 Reverse Engineering

- Reverse Engineering of samples
- Design Calculations & design verification
- Material verification of critical parts and seals

Phase : 2 Cost Optimization



- Structural analysis and weight optimization
  - Redesign of Scotch yoke assembly.
  - Redesign of Piston and flanges.
  - Replaced steel barrel with FRP tube
  - Replaced CI Piston head with LM 25 aluminum
- Virtual Validation / CAE analysis
- DFMEA, DFM and DFA
- Fatigue analysis to validate the final design.

Phase : 3 Design Complete Range Of product

- Compete range of actuator design with optimized approach
- Standardization of accessories & bought out items
- Design of pattern and tools

RANGE OF PRODUCTS DESIGNED	Single Acting	Single Acting Spring Return	Double Acting
	006 SA	006 SR	006 DA
	015 SA	015 SR	015 DA
	025 SA	025 SR	025 DA
	036 SA	036 SR	036 DA
	050 SA	050 SR	050 DA
	060 SA	060 SR	060 DA
	072 SA	072 SR	072 DA
	100 SA	100 SR	100 DA

Achievement:

1. 25% cost reduction on existing calculated should cost
2. 33 to 40% weight reduction (Cost of export is reduced)
3. Designed the complete family of products (above table)
4. accessories & fitments are standardized (Inventory)
5. Complete accountability & ownership of product design

Reverse Engineering and Design Optimization

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Objective : Reverse Engineering of Boiler feed pump which is due for replacement in field to wet part wear out

Approach :

1. Scanning of parts using Faro-Arm to achieve cloud points
2. 3D modelling of all the components including impeller and volute liner
3. Design correction to achieve the original efficiency of the pump
4. Development drawing of volute liner and Impeller
5. Detailing of all the components

Japan Based Pump manufacturing Company











Performance validation & optimization by Thermal simulation

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Objectives:

To perform the CFD thermal validation of steam conditioning valve & to optimize the performance by reducing temperature distribution.

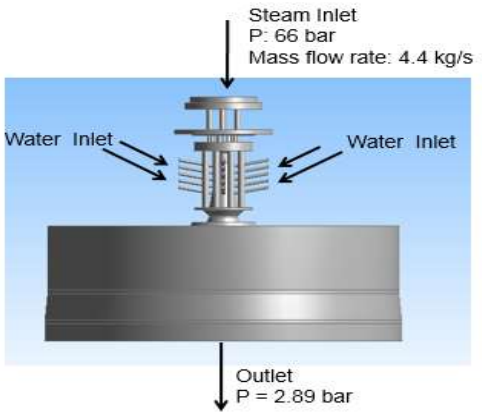
Challenges:

- The attaining the desired flow rate & pressure at the water inlet is considered as the functional purpose.
- The atomisation of water will be achieved only at the operating pressure range, hence the shock waves are considered to be avoided.

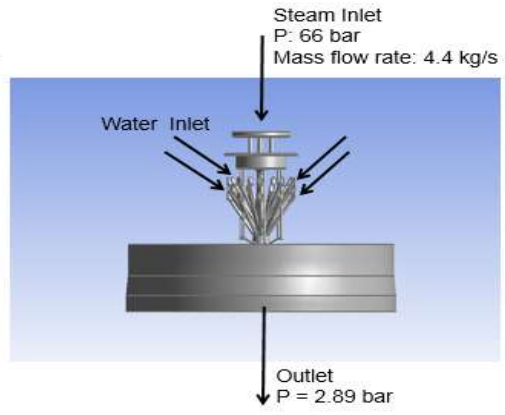
Our Value Addition:

- The optimum pressure range for the steam conditioning valve to operate efficiently is identified and suggested.
- The number of nozzles to achieve the functional purpose is optimized.
- The water injection (inlet) diameter is optimized to operate the valve at maximum efficiency.

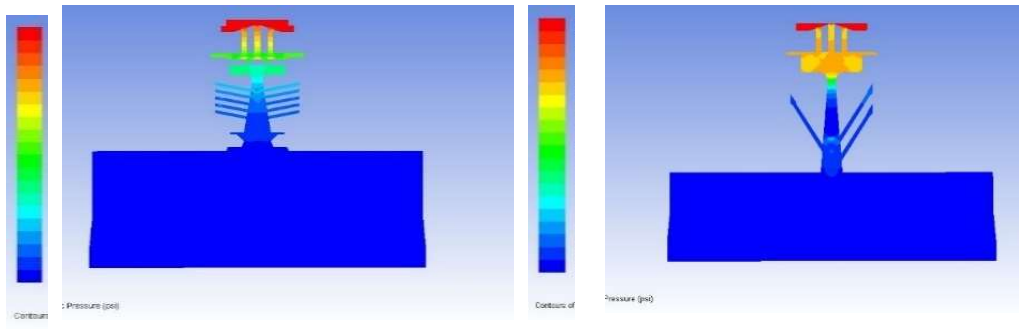
Initial Design



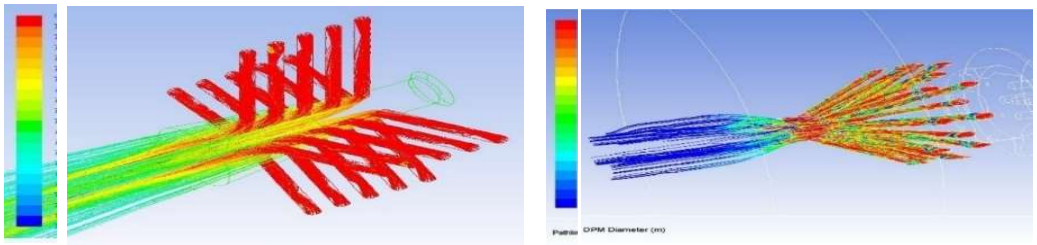
Optimized Design



Pressure Distribution



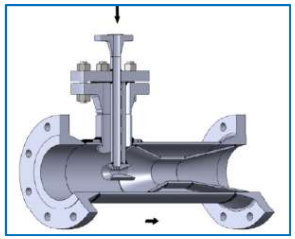
DPM Study



Indian Valve Supplier to NTPC

Trouble shooting of Field failure of Nozzle Valve

Objective : Analyze the field failure of De super-heater Valve and Provide the solution.



Challenges:

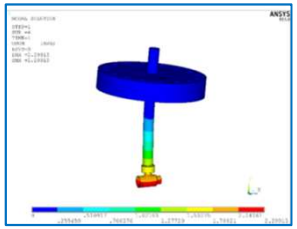
- The Nozzle had continuous failure at site
- Nozzle was getting detached from the assembly.

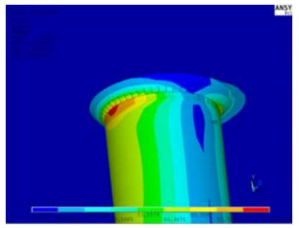
Approach :

1. Visualization and Analysis of Valve failure at site
2. Behavioral Analysis using FEA
   - Structural Feasibility analysis when it is exposed to high temperature of 530ºC under the influence of steam passing over it and Water is flushed @ high pressure @ two stages
   - Primary Load (Pressure loads)
   - Combined load (Pressure + Temperature loads)
3. Optimizing FEA methodology fine-tuning the inputs to achieve reach the field failure condition
4. Working on various options to solve the problem
5. Validating the results using FEA methodology
6. Final solution provided
7. Validation thru physical proto (Customer end)

Nozzle detached

Cracks observed



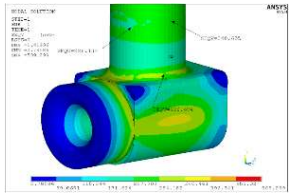


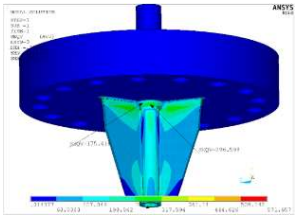
Problem is reflecting in the analysis

Achievements:

- Successful solution to the problem using virtual analysis
- Verified and redesigned other variants for same problem

Indian Valve Supplier to NTPC





Final optimized solution
(Virtual Validation images)

Business Models:

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We partner with our customers thru various business models according to their convenience.

Often R&D / Design need a single piece at a preferred speed. Exactly, that is our vision.

Single piece MoQ

It is a piece of thought, Not everyone can do it.
Skilled, creative, motivated, smart are chosen

If an Idea flashes, we make it to a design;
If there is a design, we make it to a product

100% Security to your Designs & Ideas

We use creativity over investing in the permanent tools. Budget be spent to try more design.

- Dedicated, Quick turn around facility to speed up your time to market
- Innovative Options to save tooling cost
- Skilled People – Scientific approach – Rapid delivery
- Focus on Form, Fit and Function
- Lean paper work for quick dispatch.

Other Business Models

1. Projects based Model
2. T&M Model
3. Combined Model

Unique Model for R&D Project : Single piece MoQ

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- Skilled, creative, motivated and smart are chosen

Resource Engagement Model

- The team will exclusively working for a client as an extension of the client engineering team
- Flex team supports the customer for additional workload as and when required

Project Based Model

- This model is suitable where the project scope is well-defined and unchanging with reasonable stand-alone.
- Resources are flexible and limited to the project schedule

Offshore Development Center

- Dedicated setup viz. Computers and resources being managed by Customer directly / Indirectly
- The core team is exclusively working for a client as an extension of the client engineering team

We use creativity over investing in the permanent tools. Budget be spent to try more design.

Call: +91 80 9866 9007 **www.adisonflow.com** **e-Mail: contact@adisonflow.com**

Contact Details

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Our USP's

- ***Enable our customers to lower their Engineering operational costs***
- ***Enable Our Customers to Accelerate Product Development Life Cycle.***
- ***Enable our customers improve their response time to their customers.***

We have executed various projects in different domains and services. We will be intend to share the very specific case study as per your requirement. We will be happy share the relevant case study and our approach to the project

We will be happy to work with you for better future. Please feel free connect us for additional and specific information about your expectation.

Contact Person:

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Thank You

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