



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# 8D Problem Solving Process

## 8D Scope

- The 8D problem solving (Eight Disciplines) is an approach used to identify, correct and eliminate the reoccurrence of quality problems.
- It is structured into eight disciplines, emphasizing team synergy. The team as a whole is believed to be smarter than the sum of individuals.

# 8D Origins

- The U.S Government first used an 8D – like process during the second world war referring to it as Military standard 1520 (Corrective action and disposition system for nonconforming material).
- Ford Motor Company first documented the 8D method in 1987 in a course manual entitled “Team Oriented problem solving”.
- This course was written at the request of senior management of the power train organisation of the automaker, which was facing growing frustration at the same problems that were recurring year after year.



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# 8D Usage

- Major non conformances
- Customer complaints (Inc. Warranty)
- Supplier complaints
- Reoccurring issues

## 8D Purpose

- Required by the Customer
- Forms part of the Continuous Improvement process
- ISO 9001:2015 requirement (Clause 8.3)
- Is a systematic method to problem solving and reporting
- Provides an orderly team-oriented method for solving problems using facts rather than personal bias. Creative and permanent solutions usually require input from many activities.
- Applies to any problem or activity and assists in achieving effective communication between departments, which share a common objective.
- Requires documentation through Corrective Action Report.



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# 8D steps

D0 - Prepare for the 8D Process

D1 - Establish Team

D2 - Describe the Problem

D3 - Develop Interim Containment Actions

D4 - Define and Verify Root Cause and Escape Point

D5 - Choose and Verify Permanent Corrective Actions for Root Cause and Escape Point

D6 - Implement and Validate Permanent Corrective Actions

D7 - Prevent Recurrence

D8 - Recognise Team and Individual Contributions

# D1 Establish the team

- Assemble a cross functional team (with an effective leader) that have the knowledge, time, authority and skills to solve the problem and implement corrective actions
- Set the structure goals, roles, procedures and relationships to establish an effective team

## D2 Describe the problem

- A Problem Statement is a simple concise statement that identifies the object and the defect of a problem for which the cause is unknown
- Define the problem in measurable terms
- Specify the internal or external customer problem by describing it in specific quantifiable terms
- Who, What, When, Where, Why, How, How many (5 Why analysis)



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

## **D3 Implement and verify interim containment actions**

- Temporary fixes. Define and implement those Intermediate actions that will protect any Customer from the problem until permanent corrective action is implemented
- Material / Product locations; Raw Material, Semi-finished Goods (WIP), Finished Goods, At Customer, At Supplier, In transit (from Supplier or to Customer), Shipping and/or Receiving Dock, Materials on order (future shipments from Supplier)
- Verify the effectiveness of the containment actions with data



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

## D4 Identify and verify root causes

- Identify all potential causes that could explain why the problem occurred. Cause and Effect diagrams may be used.
- Note that two parallel types of root cause exist:
  - Root cause of event (the system that allowed for the event to occur)
  - Root cause of escape (the system that allowed for the event to escape without detection)



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# D4 What has Changed

- Problems appear because something has changed. The search for the root cause is a search for changes.
- Ask “What changes have occurred?”
  - What changes have occurred in the plant?
  - What new suppliers are being used?
  - Have any new operators been hired?
  - Has new material been used? A new batch?
  - Is the process capability the same as usual?
  - Was the weather unusual when the problem occurred?



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

## D4 Select Root Cause

- Interpret data and develop potential hypothesis
  - Many different ideas may exist as to what the true cause of a problem is
- Compare all hypothesis to is/is not data (investigation facts)
  - The true cause will have all facts either supporting the explanation of being unrelated
  - Any fact refuting a hypothesis means that either the fact is incorrect (bad data) or the hypothesis needs revision
- Continue research as needed
  - Verify/validate facts in question
  - Revise hypothesis or identify cause interactions.



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# D4 Root Cause Verification

- Through experimentation (or simulation), verify that the real root cause has been found. It should be possible to create and eliminate the problem by installing and removing the cause
- The true root cause should be able to explain all of the data and fact collected up to this time



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

## **D5 Choose and verify corrective actions**

- Confirm that the selected corrective action will resolve the problem for the customer and will not cause undesirable effects
- Define contingency actions, as necessary based on the potential severity of the side effects



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# D5 Choose and verify corrective actions

- Corrective action decision criteria is established through the decision making process
- Objectively evaluate each possible action against a predetermined decision criteria
- Prove that the corrective action (or combination of
- actions) will eliminate the problem
  - Conduct verification tests
  - Remove containment temporarily (Only normal production influences should be present)
- Establish indicators to ensure the defect is eliminated with high confidence



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# D6 Implement and validate permanent actions

- Choose ongoing controls to ensure that the root cause is eliminated
- Once in production, monitor the long term effects and implement additional controls and contingency actions as necessary



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

## D7 Prevent reoccurrence

- Identify and implement steps that need to be taken to prevent the same or a similar problem from occurring in the future
- Modify specifications, update training, review workflow, and improve management systems, operating systems, practices and procedures



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# D7 Prevent reoccurrence

- Sustain the gains for current improvements
  - Update procedures/documentation, training, fixtures,
  - error-proofing, etc.
- Similar problems within the same work area
  - Apply improvements to prevent similar problems from occurring
  - Use FMEA to help identify opportunities (e.g. multiple causes for a single failure mode/symptom)
- Same or Similar problem in another part of the organisation
  - Apply improvements to prevent future problems
  - Learn from prior mistakes/problems
  - Share the learning



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# D8 Congratulate the team

- Recognise the collective efforts of your team
- Publicise your achievements
- Share your knowledge and learning throughout the organisation



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# The Quality Tools

- The Quality Circle (Deming Cycle)
- Affinity Diagrams
- Cause and Effect
- Pareto Analysis
- Trend Charts
- Brainstorming
- *Use Cross Functional Teams*



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# Is / Is not Tool

- Establish:
  - what the problem **is**, and what it **is not** but **could be**
  - where the problem **is**, and where it **is not** but **could be**
  - when the problem **occurs**, and when it **does not** but **could**
  - how big the problem **is**, and how big it **is not** but **could be**



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# Cause and Effect (Fishbone Diagram)

- Developed to represent the relationship between all the possible causes for a specific effect
  - Manpower
  - Machines
  - Methods
  - Materials



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# Cause and Effect (Fishbone Diagram)

- Push the causes back as much as is practically possible to ensure we reach the root cause. Ask as many “Why’s” as possible
- When examining each root cause, look for things that have changed, deviated from normal or patterns in order to identify the most likely cause
- The solution will not be effective if the real root cause is not identified



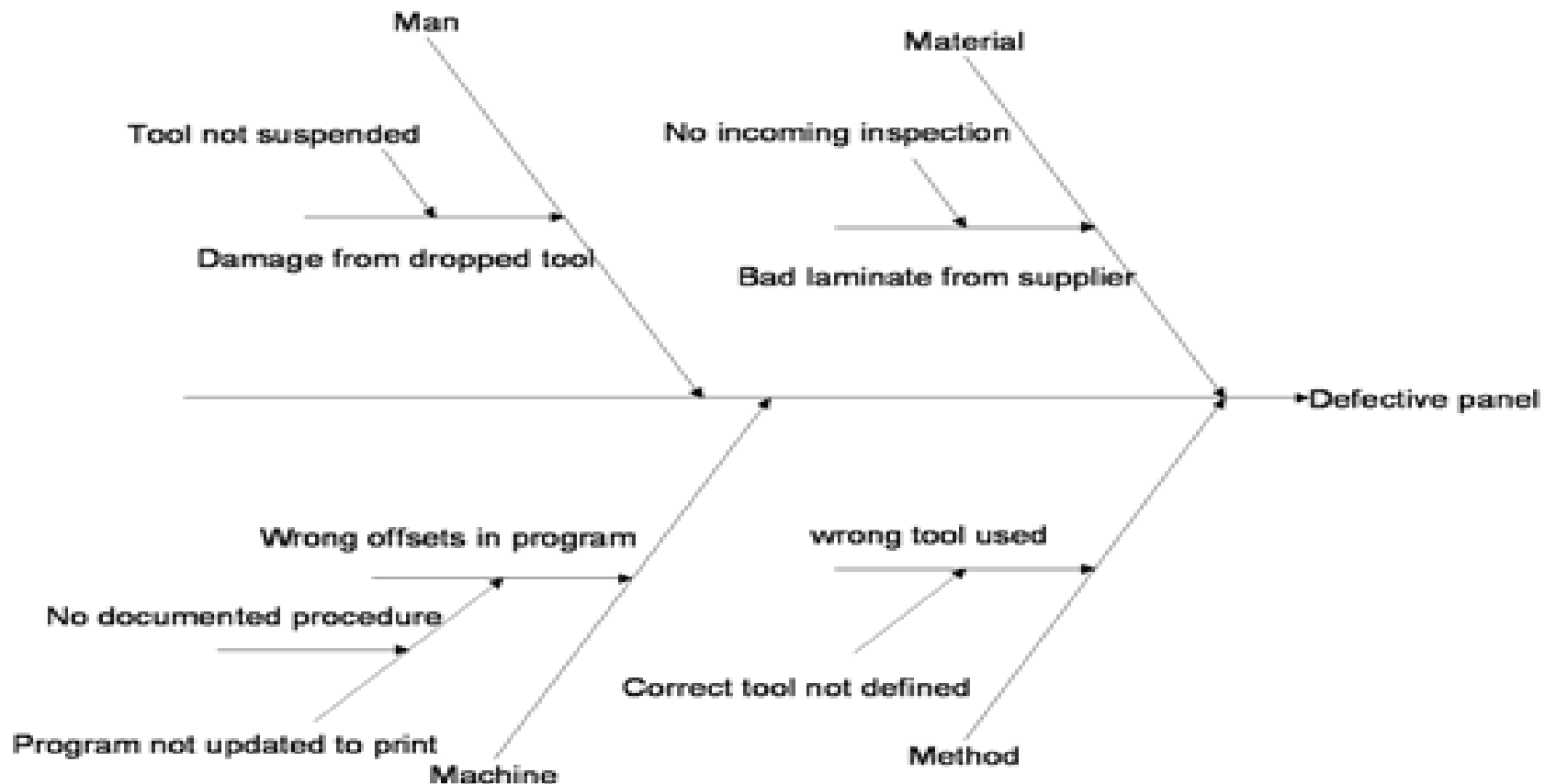
**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# Cause and Effect (Fishbone Diagram)





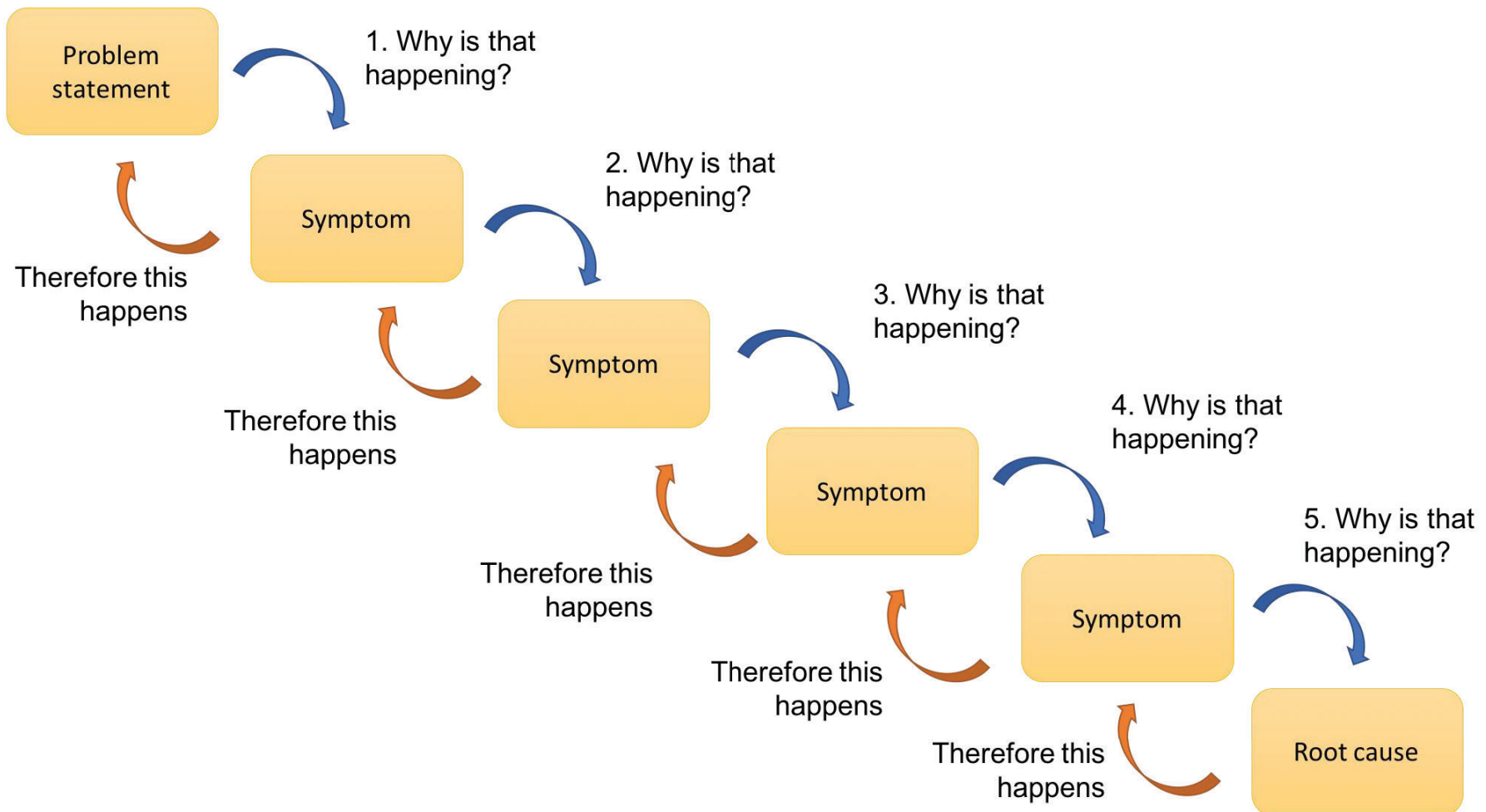
**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# The 5 Why's





**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

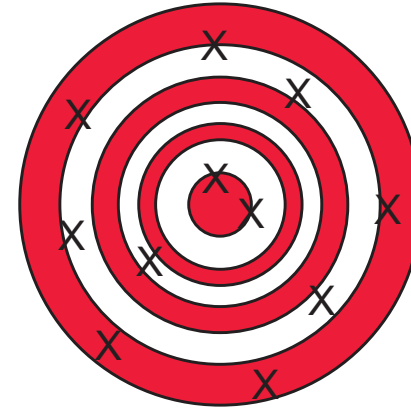
[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# Understanding problems

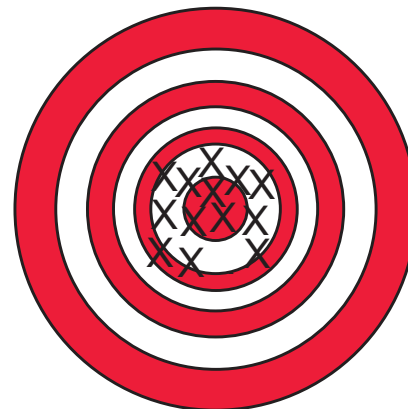
Off-Target



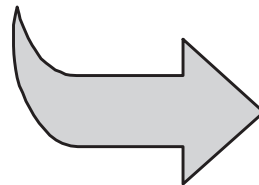
Variation



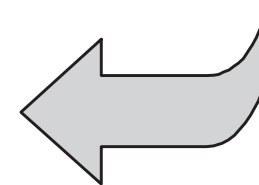
On-Target



*Center  
Process*



*Reduce  
Spread*





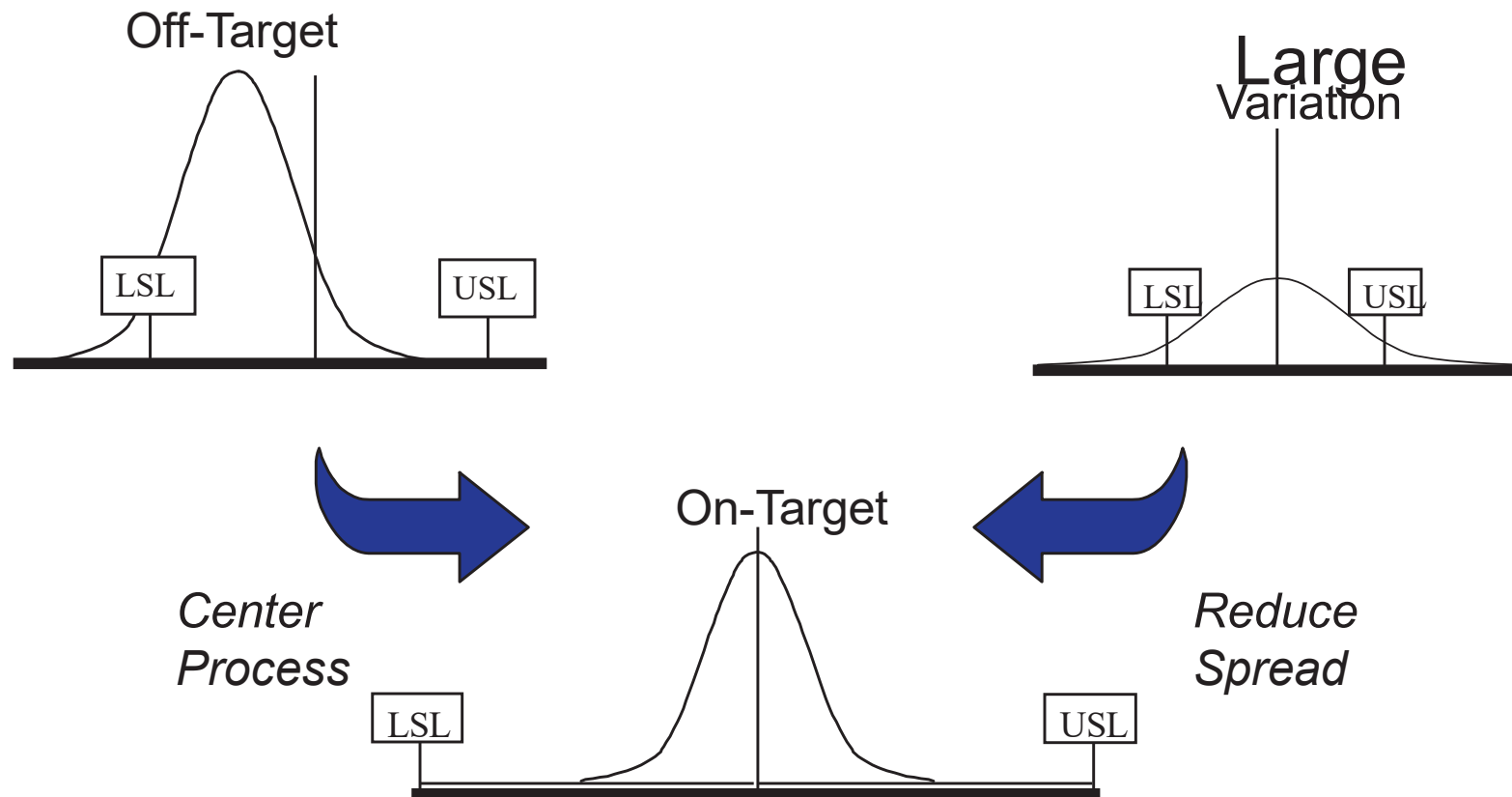
**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# Understanding problems



LSL = Lower spec limit

USL = Upper spec limit



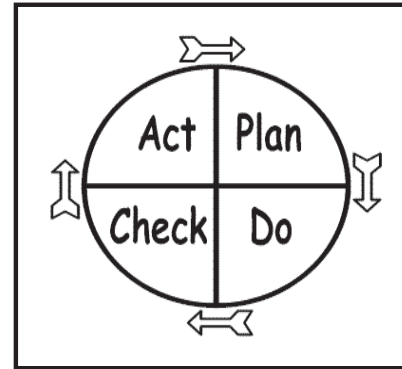
**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# The Quality Circle



- Plan: Define the system or process/ Access the current system or process/ Analyse the process, where has it gone wrong?
- Do: Try the improvements to see if they work. Test your theories / measure
- Check: Study the results, are they what you expected? If so make them permanent
- Act: Act to improve the process further, don't stop. Make the process better



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# The Quality Circle - Plan

- Develop plan for implementing specific actions
- What documentation needs to be updated?
  - Work instructions, Drawings, Control Plans, FMEAs, Computer programs, etc
- What people need to be retrained?
  - Operators, Inspectors, Engineers, other Support personnel
- What organisations need to be notified?
  - Internal departments, Suppliers, Customers
- What new problems are presented by changes and how will they be addressed?
  - FMEA, Risk Assessment, etc.
- Who owns each task and what is the targeted implementation date?
- How will progress be tracked?
- Develop contingency plans if problems are encountered
- When will containment actions be removed?



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# The Quality Circle - Do

- Execute the Plan
- Use existing control processes:
  - Document control
  - Engineering Change
  - Customer notification
  - Supply Chain processes
  - Training processes
- Identify the effective date of changes

# The Quality Circle - Check

- Review process to ensure things are working according to Plan
  - Track progress and determine resources needed to meet commitment dates
  - Review performance results to ensure improvements are being realised
  - Review costs to ensure financial impacts are in line with expectations
  - Ensure that no unintended consequences are happening (quality, efficiency, safety, etc)



**DAVIS AIRCRAFT PRODUCTS CO., INC.**

Executive Office & Plant

1150 Walnut Avenue ■ P. O. Box 525 ■ Bohemia, New York 11716-0525 ■ 631-563-1500 ■ 631-563-1117

[www.DavisAircraftProducts.com](http://www.DavisAircraftProducts.com)

# The Quality Circle - Act

- Make necessary adjustments as needed
- Reapply containment actions if problems still present and revise corrective actions (back to problem solving and “Plan” phase)
- Deploy resources in different way to get execution back on track
- Move on to next opportunity if everything is complete and achieving desired results