# SUCCESSFUL PRODUCTION LEAK TESTING

## A Process For Selecting and Implementing The Optimum Leak Test Method

LACO TECHNOLOGIES


OUTLINE
WHAT DEFINES SUCCESS?
IMPROVING YOUR CHANCES OF SUCCESS
REVIEW ELEMENTS OF SUCCESS
LACO TECHNOLOGIES

# WHAT DEFINES SUCCESS?

# SUCCESS = "GREAT WORK"


"Great Work Makes a Difference People Love."

(O.C. Tanner Institute)

LACO TECHNOLOGIES

# A CUSTOMER "LOVES" WHEN . . .

Supplier Meets Deadlines

Can Trust the System

System Meets Production Rates

Down Time Is Minimal

Support is Timely

Maintenance is Easy

Can Sleep At Night

Peace of Mind

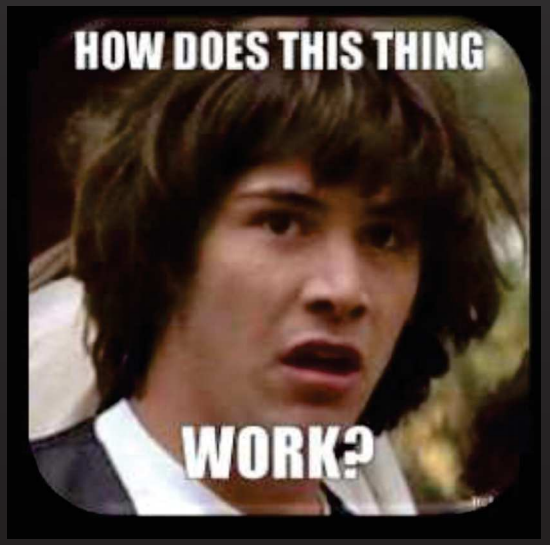
LACO TECHNOLOGIES

# A CUSTOMER IS NOT FEELING THE "LOVE"...

"The System Is Too Slow."

"Not What I Thought I Bought."


"I Don't Understand How It Works."



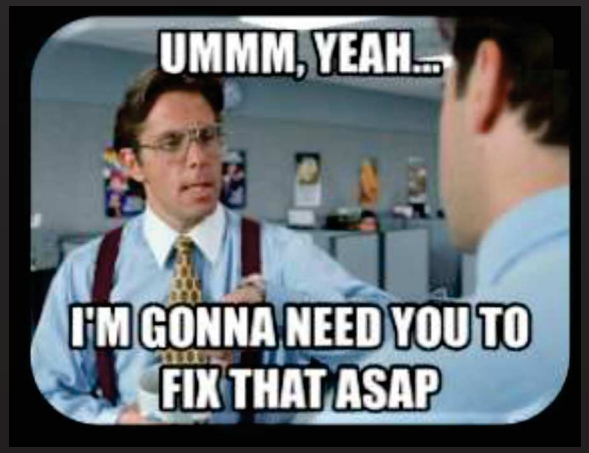

"Customer Support Sucks."

LACO TECHNOLOGIES

# A CUSTOMER IS NOT FEELING THE "LOVE"...

"IS MY TOOLING LEAKING?"

"THE SYSTEM IS ALWAYS DOWN."




"IS IT CATCHING MY LEAKY PART?"


LACO TECHNOLOGIES

# WHY THE FRUSTRATION?

Poor Communication Of Requirements And Expectations

Incomplete Application Information

Failure To Test Sample Parts

Inexperienced Supplier

Inferior Leak Testing Method

Poorly Designed Equipment

Ineffective Customer Training

LACO TECHNOLOGIES

# SUCCESSFUL IMPLEMENTATION STARTS WITH. . .

Partnership Between Customer And Supplier


Effective Communication

LACO TECHNOLOGIES

# A PROCESS TO HELP ENSURE SUCCESSFUL IMPLEMENTATION

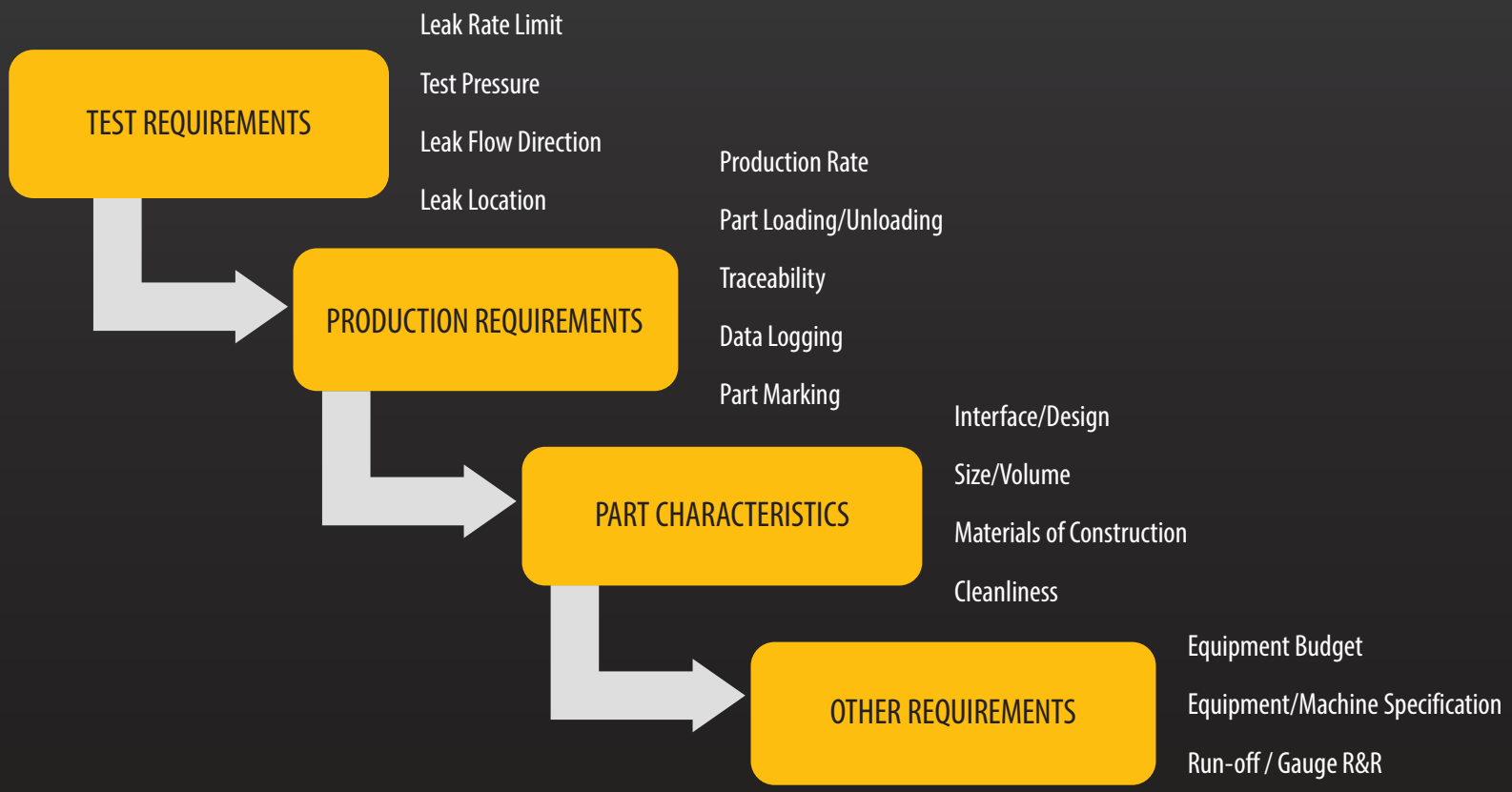
LACO TECHNOLOGIES

# PROCESS OVERVIEW


LACO TECHNOLOGIES

DEFINE REQUIREMENTS & PART CHARACTERISTICS

# STEP 1: DEFINE REQUIREMENTS AND PART CHARACTERISTICS




LACO TECHNOLOGIES

# DEFINING LEAK TEST REQUIREMENTS – THE REJECT LIMIT

An Engineering Drawing Or Specification (Historical Requirement)

From Your Customer

Industry Standard Specifications Or Criteria

Engineering Calculations

Based On Knowledge Of Similar Products

Leak Rate Specifications Of A Competitor

Empirical Laboratory Testing

Data From Warranty Returns

Experience Of Leak Test Supplier

For more details download PDF here:


LACO TECHNOLOGIES

DEFINE REQUIREMENTS & PART CHARACTERISTICS

# STEP 1: DEFINE REQUIREMENTS AND PART CHARACTERISTICS

## TEST REQUIREMENTS

- Leak Rate Limit
- Test Pressure
- Leak Flow Direction
- Leak Location

## PRODUCTION REQUIREMENTS

- Production Rate
- Part Loading/Unloading
- Traceability
- Data Logging
- Part Marking

## PART CHARACTERISTICS

- Interface/Design
- Size/Volume
- Materials of Construction
- Cleanliness

## OTHER REQUIREMENTS

- Equipment Budget
- Equipment/Machine Specification
- Run-off / Gauge R&R
- Ongoing Process Validation

For PDF of RFP App Note Click Here:

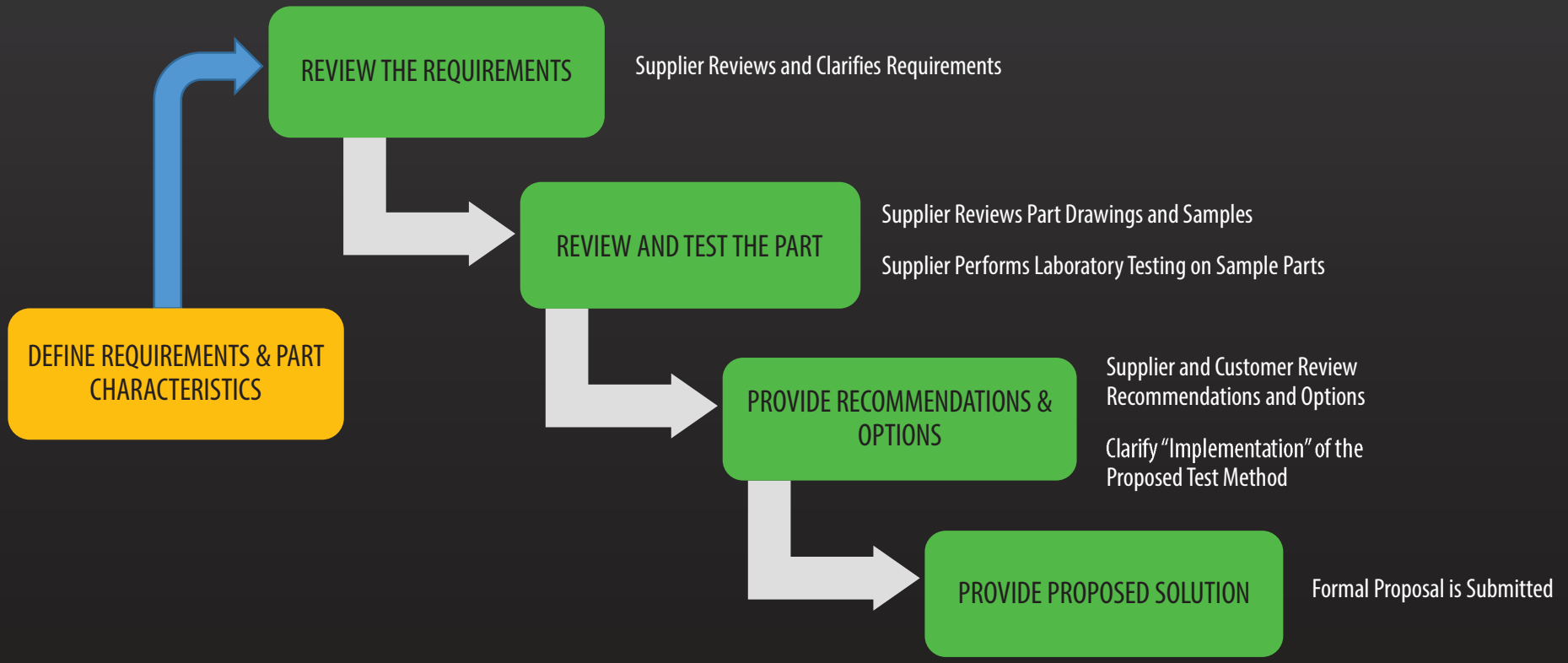

LACO TECHNOLOGIES

# PROCESS OVERVIEW


LACO TECHNOLOGIES

SELECT THE LEAK TEST METHOD

# STEP 2: SELECT THE LEAK TEST METHOD




LACO TECHNOLOGIES

# EVALUATION AND TESTING OF SAMPLE PARTS

Preliminary testing can influence:

- Selection of the Test Method
- Ultimate Design of the Leak Test System

Example:  Brake System Actuator

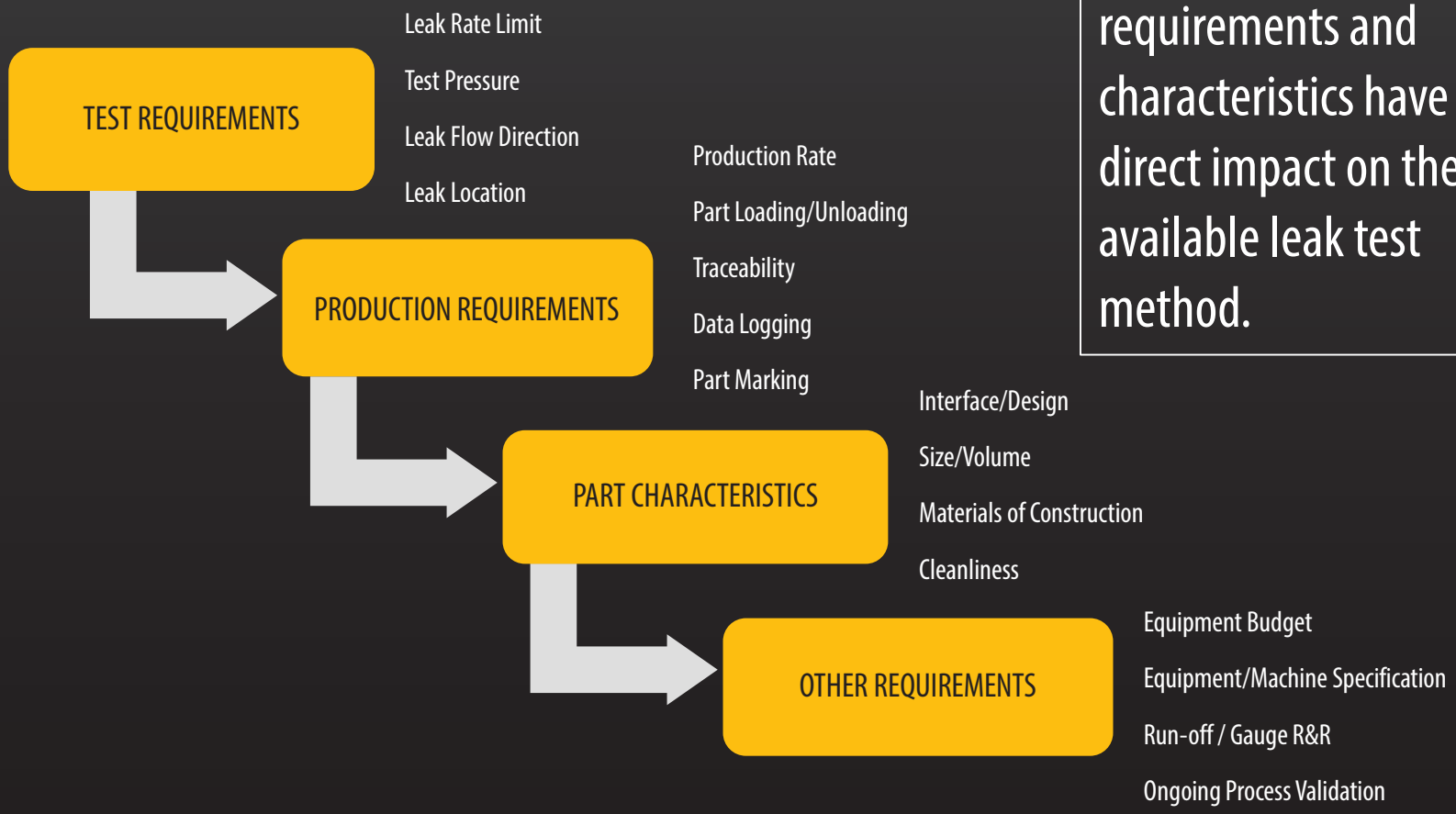
- Alignment issues
- Helium permeation issues

LACO TECHNOLOGIES

# COMMON PRODUCTION LEAK TESTING METHODS


LACO TECHNOLOGIES

# SELECT TEST METHOD BY REQUIREMENTS




Many of these requirements and characteristics have a direct impact on the available leak test method.

LACO TECHNOLOGIES

TEST REQUIREMENTS

# METHOD SELECTION EXAMPLE: BY TEST REQUIREMENTS

| Method | Leak Rate Sensitivity (atmcc/sec) | | | | |
|---|---|---|---|---|---|
| | > 0.01 | 0.01 - 1e-4 | 1e-4 - 1e-6 | 1e-6 - 1e-8 | < 1e-8 |
| **Tracer Gas Leak Testing** | | | | | |
| Helium Sniffing - Manual | B | A | A | | |
| Helium Sniffing - Robotic | B | A | A | | |
| Helium Sniffing - Chamber/Clamshell | A | A | B | | |
| Hard Vacuum Helium - Bombed | | B | A | A | A |
| Hard Vacuum Helium - Prefilled | B | B | A | A | A |
| Hard Vacuum Helium - Gas Inside Part | | B | A | A | A |
| Hard Vacuum Helium - Gas Outside Part | | B | A | A | A |
| Helium Accumulation (Atm/Vac) | A | A | B | | |

A = Compatible
B = Possibly Compatible, but not Ideal
Blank = Not Compatible

LACO TECHNOLOGIES

TEST REQUIREMENTS

# METHOD SELECTION EXAMPLE: BY TEST REQUIREMENTS

| Method | Outside-In Flow | Inside-Out Flow | Operator Independent Result | Calibrate-able | Locate Leaks | Global Test |
|---|---|---|---|---|---|---|
| **Tracer Gas Leak Testing** | | | | | | |
| Helium Sniffing - Manual | | A | B | B | A | |
| Helium Sniffing - Robotic | | A | A | B | A | |
| Helium Sniffing - Chamber/Clamshell | | A | A | A | B | B |
| Hard Vacuum Helium - Bombed | B | A | A | A | | A |
| Hard Vacuum Helium - Prefilled | | A | A | A | | A |
| Hard Vacuum Helium - Gas Inside Part | | A | A | A | | A |
| Hard Vacuum Helium - Gas Outside Part | A | | A | A | B | A |
| Helium Accumulation (Atm/Vac) | | A | A | A | | A |

A = Compatible
B = Possibly Compatible, but not Ideal
Blank = Not Compatible

LACO TECHNOLOGIES

PRODUCTION REQUIREMENTS

# METHOD SELECTION EXAMPLE: BY PRODUCTION REQUIREMENTS

| Method | Capable of High Rates | Robotic Part Handling | ID Tracking | Data Logging | Auto Part Marking | Multiple Part Config. |
|---|---|---|---|---|---|---|
| **Tracer Gas Leak Testing** | | | | | | |
| Helium Sniffing - Manual | B | | B | B | B | A |
| Helium Sniffing - Robotic | B | B | A | A | A | A |
| Helium Sniffing - Chamber/Clamshell | A | A | A | A | A | B |
| Hard Vacuum Helium - Bombed | B | B | A | A | A | A |
| Hard Vacuum Helium - Prefilled | A | A | A | A | A | B |
| Hard Vacuum Helium - Gas Inside Part | A | A | A | A | A | B |
| Hard Vacuum Helium - Gas Outside Part | A | A | A | A | A | B |
| Helium Accumulation (Atm/Vac) | B | A | A | A | A | B |

A = Compatible
B = Possibly Compatible, but not Ideal
Blank = Not Compatible

LACO TECHNOLOGIES

PART CHARACTERISTICS

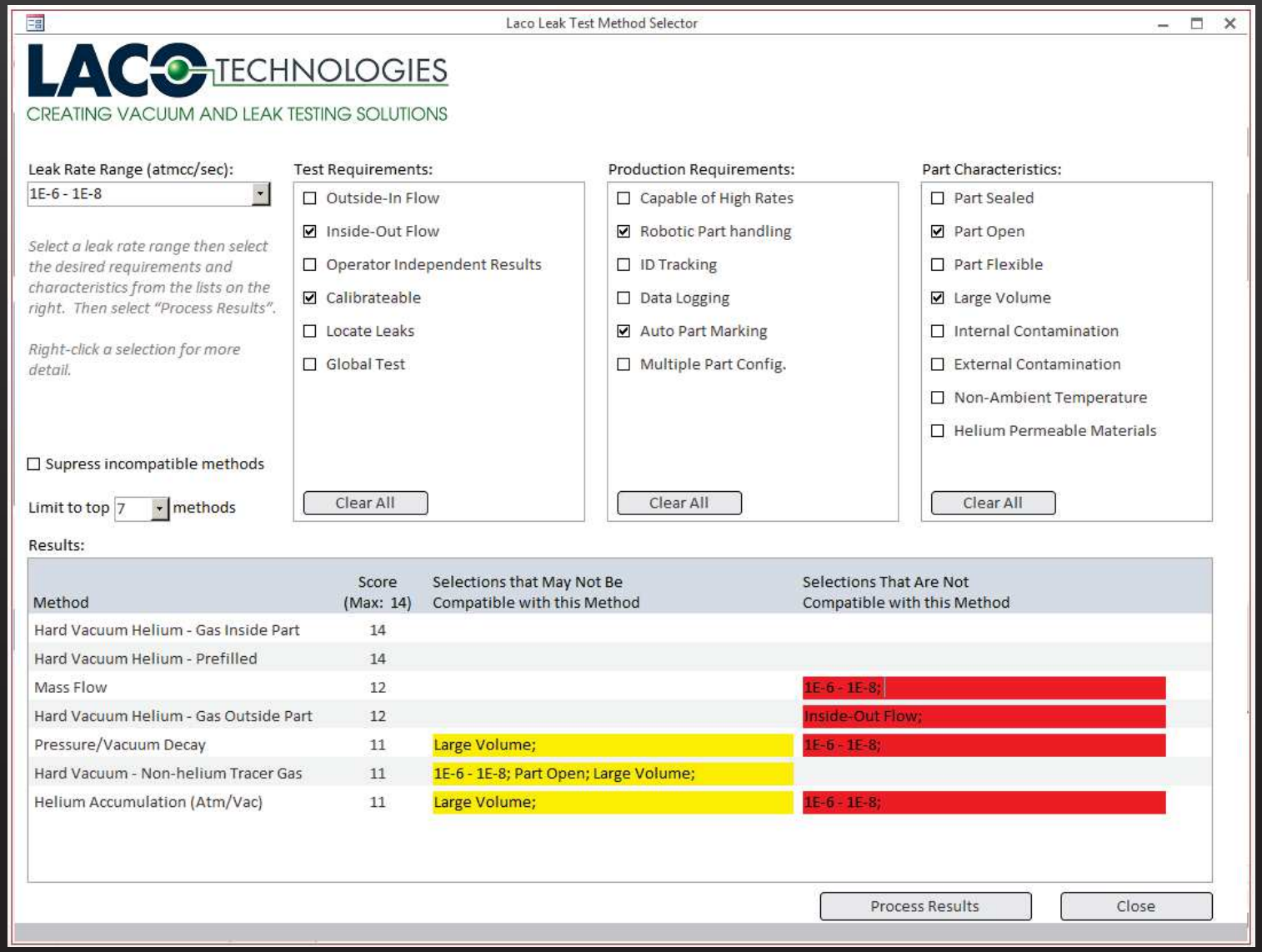
# METHOD SELECTION EXAMPLE: BY PART CHARACTERISTICS

| Method | Part Sealed | Part Open | Part Flexible | Large Volume | Internal Contamination | External Contamination | Non-Ambient Temp | Helium Perm. Materials |
|---|---|---|---|---|---|---|---|---|
| **Tracer Gas Leak Testing** | | | | | | | | |
| Helium Sniffing - Manual | | A | A | A | B | A | A | B |
| Helium Sniffing - Robotic | | A | A | A | B | A | A | B |
| Helium Sniffing - Chamber/Clamshell | | A | A | B | B | A | A | B |
| Hard Vacuum Helium - Bombed | A | | B | | B | B | A | |
| Hard Vacuum Helium - Prefilled | B | A | B | A | B | B | A | B |
| Hard Vacuum Helium - Gas Inside Part | | A | B | A | A | B | A | B |
| Hard Vacuum Helium - Gas Outside Part | | A | B | A | B | A | A | B |
| Helium Accumulation (Atm/Vac) | A | A | A | B | B | A | A | B |

A = Compatible
B = Possibly Compatible, but not Ideal
Blank = Not Compatible

LACO TECHNOLOGIES

# SELECT TEST METHOD USING SELECTION APP



# PROCESS OVERVIEW


LACO TECHNOLOGIES

SUPPLIER SELECTION

# STEP 3: SUPPLIER SELECTION

Experience

Range of test methods

Range of equipment options

References and reputation

Responsiveness, consulting, testing

Service and support network

Quality of key components

Quality system (ISO 9001)

Design methods (FMEA)

LACO TECHNOLOGIES

# CAN YOUR PROSPECTIVE SUPPLIER MEET YOUR CHALLENGES?

"My product must last 15 years in the field.

You have 10 seconds to leak test the product."

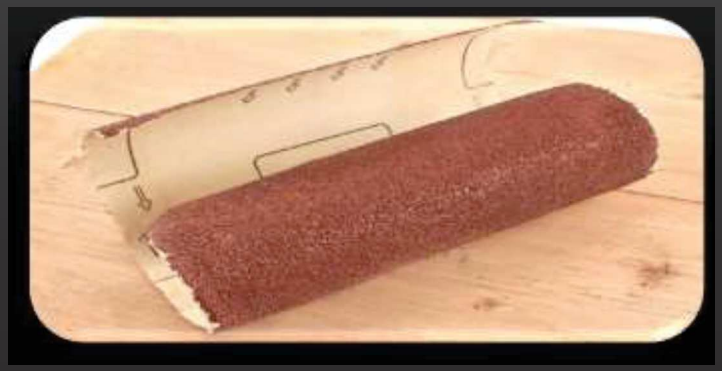
"Many of the leaks the system will be exposed to will be thousands of times larger than the ultimate sensitivity."

"There will be 20 different models tested on this system."

LACO TECHNOLOGIES

# CAN YOUR PROSPECTIVE SUPPLIER MEET YOUR CHALLENGES?

"I can't guarantee the surface quality of the seal interface."




"I need the system on the factory floor next month."

"The product may have residual water in it when arriving at the leak test station."

LACO TECHNOLOGIES

# PROCESS OVERVIEW


LACO TECHNOLOGIES

DESIGN & IMPLEMENT THE LEAK TEST PROCESS

# STEP 4: SYSTEM DESIGN, ASSEMBLY & TESTING PHASE

Review and approve design

Support supplier with additional sample parts

Factory Acceptance Testing (FAT) or “run-off”

LACO TECHNOLOGIES

DESIGN & IMPLEMENT THE LEAK TEST PROCESS

# STEP 4: SYSTEM DESIGN, ASSEMBLY & TESTING PHASE – AFTER THE SYSTEM SHIPS

- Onsite successful "run-off" (SAT)
- Training
- Support Strategy
  - Spare Parts & Consumables Strategy
  - Technical Support
  - Warranty and Non-Warranty Repairs
- Ongoing system validation

LACO TECHNOLOGIES

# EXAMPLE: AIR BAG INFLATOR LEAK TEST

Customer provided requirements, which we helped enhance.

- Tight leak rate limit
- High production rate

Hard vacuum helium leak test.

Sample parts are tested.

- Resolve part contamination issues
- Test high speed test concepts

Designed and built multi-chamber, robotic loaded system.

LACO TECHNOLOGIES

LACO TECHNOLOGIES

# EXAMPLE: MOBILE A/C & HEATER COILS

Customer was unhappy with current bubble testing method.

- Had a leak rate specification from his customer
- Wanted to eliminate water and oven drying step
- Worked together to define all requirements

Customer supplied sample parts for testing.

- Concerns over cycle time and internal residual contamination
- Developed concepts for leak test connector solution

Determined helium hard vacuum method.

Designed and built innovative dual chamber system.

LACO TECHNOLOGIES


LACO
TECHNOLOGIES

# REVIEW OF KEY ELEMENTS OF SUCCESS

LACO TECHNOLOGIES

# PROCESS OVERVIEW


LACO TECHNOLOGIES

# KEY ELEMENTS OF SUCCESS

Start with a clear set of requirements.  Use a prospective supplier to help, if needed. Clearly communicate requirements.

Work with prospective suppliers to evaluate sample parts and select the leak test method, if necessary.

Select an experienced and reputable leak testing equipment provider.

Stay involved in the design and build process.

Continue to insist on a thorough analysis and a systematic evaluation of your application, including testing of additional sample parts, if necessary.

Implement a clear and comprehensive system validation and run-off plan.

In partnership with your supplier, have a clear, long-term support plan.

LACO TECHNOLOGIES

# LEAK TEST EQUIPMENT SUPPLIERS WANT TO DO "GREAT WORK"

LACO TECHNOLOGIES

WE WANT TO MAKE -

"A DIFFERENCE THAT PEOPLE LOVE".

LACO TECHNOLOGIES