Adapting to the New Automotive World

Adapting to Change

Automotive Trends

Honda’s Trends

Supplier Impact

Honda’s Approach

Investment

Process

Path Forward

Schedule

Honda’s Recommendations

Honda’s Requests
Supplier Impact

Honda N.A. Production Increase
- Suppliers adding capacity
- Increased capital investment

Honda’s Model Mix Increase
- Lower Volumes for Niche vehicles
- Increased changeovers

Continuing Challenge: How to further improve our competitiveness and grow market share?
Improve Throughput Efficiency

Best Tooling Layout
Process Efficiencies
Aluminum Alloy Molds
Background Direction

- January 2005 – Request from Larry Jutte and Koki Hirashima to evaluate low volume tooling
- Tooling for these programs has greater unit impact and can adversely affect program viability
- Investigate best method to control cost while maintaining Honda quality standards
- Timing coincides with design events for ZQ (Acura RDX) and WQ (07 CRV) programs
Why Aluminum Alloy?

- High strength alloys originally developed for aircraft are suitable for most mold applications
- Toolmakers: Faster machining and shorter lead times
- Molders: Shorter processing times, less part distortion due to better heat dissipation (3x faster than steel)
- Honda: Parts which meet quality expectations while achieving lower investment $
Approach for Aluminum Alloy

- Met with key Aluminum Alloy Material Suppliers
- Concluded that Honda should begin working with its suppliers to build Aluminum Alloy Tools. (ZQ/WQ)
- Honda decided to build 2 sets of Tools and pay for the backup Steel Tool
  - Purpose: Evaluate Tool build efficiencies and Process Cycle time improvement while protecting our Suppliers and Honda plants from downtime concerns.
- Monitor Tool Maintenance and durability concerns
- Honda paid for 3rd Party Testing to validate Material composition, Mechanical properties, abrasion resistance and compression strength.
- Honda paid for Texture plaque development to further understand Aluminum Alloy texture capabilities as well as repair methods.
- Based on Low Volume Results, began focusing on High Volume applications to validate AL Alloy durability.
How does surface hardness compare to steel?

- Surfaces can be hard anodized or plated to increase wear characteristics if required.
Tensile and Yield Strength Data

![Graph showing tensile and yield strength data for various alloys.](image)

- **Alloy**
  - Japan Material
  - Alumold
  - QC10
  - Steel

- **Properties**
  - Tensile (ksi) 12"
  - Yield (ksi) 12"

- **Materials**
  - Kn50
  - ~5083
  - 2024
  - ~2219
  - 6061
  - 7075
  - Kn750
  - ~7050
  - 7085
  - P20

Legend:
- Blue diamond: Tensile (ksi) 12"
- Pink square: Yield (ksi) 12"
Can the mold be crushed by too much pressure?

*Compressive strength for 2PX RR tray mold

- **Unit stress** = load/area
- **Projection area of mold** = 46 x 74 = 3404 in²
- **Projection area of part** = 955 in²
- **Contact area** = 3404 - 955 = 2449 in²
- **Stress** (2500 ton press) = 5,000,000 / 2449 = 2,041.65 psi
- **Tensile strength of 7050 alloy**
  - Clamping Stress is only 2.6 % of the AL Alloy Tensile Strength
Will Aluminum Alloy handle high Injection Pressure without failure?

- Compressive strength of alloy – 77,600 psi
- Maximum injection pressure at the front of the screw (regardless of machine size) – 33,000 psi
- Percentage –
  \[
  \frac{33,000}{77,600} = 42.5\% \text{ of maximum at highest possible pressure}
  \]
Low Volume Trials
ZQ & WQ Models

Honda purchased backup Steel tools to protect Suppliers and Honda Production
ZQ Mold Distribution Percentages
By Number of Molds

Initial Focus is PP based on the Largest Percentage of the Total Application, however other part materials will be considered for future application.
77345 STKA (ZQ Model)
COVER, AS UNDER

Part Characteristics

- Polypropylene Part
- IP Underside
- Light Texture
- No Slides or Lifters
  - 3 lifters removed at D1-1

Toolmaker
Rapid Die

Core Side of Al alloy Mold (No Action)

Holes for ST support pillars
77210/15 SWAA (WQ Model)
LID, INST R/L SIDE

Multiple Actions added at Tool Go timing

Part Characteristics
- Polypropylene Part
- IP Side Covers
- Leather Texture
- Has Action (Lifters)
  - 6 lifters to 14 at Tool Go
Low Volume Trial Results
Tool L/T Comparison of Mold Builds

P20 Steel vs Aluminum Alloy

Tool Lead Time

<table>
<thead>
<tr>
<th>Weeks</th>
<th>77345 STKA</th>
<th>77210 SWAA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17 ST</td>
<td>16 ST</td>
</tr>
<tr>
<td></td>
<td>13 AL</td>
<td>15 AL</td>
</tr>
</tbody>
</table>

STKA 77345

SWAA 77210

Legend:
- ST: Steel
- AL: Aluminum Alloy
Investment Result for ZQ / WQ Tools

Investment Comparison
ZQ Undercover (P20 vs AL Alloy)

Investment Comparison
WQ IP Side Covers (P20 vs AL Alloy)

Investment Savings when comparing Steel Mold –vs- Aluminum Alloy Mold
Cycle Time Comparison of Mold Builds
P20 Steel vs Aluminum Alloy

- Part Temp in deg F
  ST – 110 vs AL - 87

- Part Temp in deg F
  ST – 106 vs AL - 88

Cycle Time Savings when comparing Steel Mold –vs- Aluminum Alloy Mold
3rd Party Testing
METALLURGICAL AND MECHANICAL EVALUATION OF MOLD METALS

1.0 INTRODUCTION

A set of five materials were evaluated through various tests in an effort to identify differences in metallurgical and mechanical characteristics. The evaluation incorporated the following tests:

- Chemical analysis (Employing Glow Discharge Optical Emission Spectrometry)
- Mechanical Testing (ASTM E8)
- Rockwell Hardness Measurements (ASTM E18)
- Brinell Hardness Measurements (ASTM E10)
- Abrasion Resistance (Employing linear abrasion methodology)
- Cyclic Compression Testing (Employing surface to surface contact at 5000psi through 10,000 cycles)
- Surface roughness and scanning electron microscopy of compression specimens before and after testing.

Sample material identification was as follows:

- Alumold
- Aluminum
- P-20
- Hokotol
- QC-10

2.0 Summary of Observations

Evaluation of the five alloys revealed that the “P-20” alloy was by far the hardest, strongest and most abrasion resistant material, as would be expected considering it to be a steel alloy, while the other materials were aluminum alloys. With respect to the aluminum alloys, it would appear the “Hokotol” and “Alumold” exhibited the best overall physical characteristics, while the “QC-10” was a close runner-up. The “Aluminum” material was significantly softer and less resistant to abrasion when compared with any of the other alloys represented in this report.

The cyclic compression testing stress of 5000 psi over 10,000 cycles did not appear to significantly alter the surface texture of any of the alloy samples, suggesting that any of these materials could withstand loading of this nature. However, if loading or the number of cycles was increased significantly, it would be expected that the life expectancy of these alloys would best be represented by their mechanical properties.

The following is a presentation of our observations.

3.0 TEST METHODOLOGY AND RESULTS

3.1 Chemical Analysis / Glow Discharge Spectrometry

The GDS-850A Atomic Emission Spectrometer can simultaneously analyze forty-one different wavelengths with the support of special features including:

- A Grimm-type 4 mm glow discharge source.
- A 0.75 m direct-reading spectrometer with a 1800 & 3600 groove holographic gratings and Wavelength range of 119-800 nm with the dual spectrometer option installed.
- Window - driven software interfaced with a LECO 486 base computer.

The GDS-850A provides accurate elemental compositions from depths of tens of nanometers to one hundred micrometers. It performs rapid, routine surface analyses on conductive materials. Results are presented in Table 1.

<table>
<thead>
<tr>
<th>Element</th>
<th>Aluminum</th>
<th>Alumold</th>
<th>Hokotol</th>
<th>QC-10</th>
<th>P-20</th>
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<tr>
<td>C</td>
<td>0.01</td>
<td>0.02</td>
<td>0.01</td>
<td>&lt;0.01</td>
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<tr>
<td>Cr</td>
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<td>0.01</td>
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<td>Ca</td>
<td>2.79</td>
<td>2.13</td>
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<td>Fe</td>
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<td>Mg</td>
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<td>P</td>
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<td>S</td>
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<td>Si</td>
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<td>Zn</td>
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<td>6.20</td>
<td>6.18</td>
<td>8.47</td>
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3.2 Mechanical Testing

Tensile testing was conducted on each sample using the Instron 4208 Universal Testing Machine. Samples were extracted from the long axis of each material test block and prepared in accordance with "ASTM E8, Figure 9, Specimen Type #4" (See Appendix 1). Results are summarized in Table 2 and stress vs strain curves are illustrated in Figure 1.

<table>
<thead>
<tr>
<th>Mechanical Properties</th>
<th>Aluminum</th>
<th>Alumold</th>
<th>Hokotel</th>
<th>QC-10</th>
<th>P-20</th>
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</thead>
<tbody>
<tr>
<td>Tensile (psi)</td>
<td>38700</td>
<td>80900</td>
<td>82900</td>
<td>73300</td>
<td>136500</td>
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<tr>
<td>Yield (psi)</td>
<td>21300</td>
<td>75800</td>
<td>77000</td>
<td>66700</td>
<td>118700</td>
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<td>Elongation (%)</td>
<td>6</td>
<td>12.5</td>
<td>10.5</td>
<td>9</td>
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</table>

3.3 Hardness Measurements

**Rockwell Hardness**

Hardness measurements were taken from each sample employing Rockwell measurement techniques (ASTM E18) and Brinell techniques (ASTM E10). The Rockwell "B" technique employs a standard load of 100 kgf to a 1/16" inch diameter ball and records the extent of indentation into the test specimen, which in turn may be correlated to the strength and wear resistance of that material. This measurement technique is sensitive to variation in metallurgical composition, and is best suited to wrought / homogeneous alloys. Measurements were recorded from each material, with the average presented in Table 3.

**Brinell Hardness**

The Brinell hardness technique employs the standard ASTM E10, in which a 500kgf load is directly applied to the test sample through a 10mm diameter tungsten carbide ball. Hardness measurements are based on the resultant impression. This technique provides reliable hardness characteristics covering the bulk metallurgical properties, thus, is less sensitive to hardness variations associated with microstructural constituents. Measurements are presented in Table 3.

<table>
<thead>
<tr>
<th>Brinell Hardness (HB)</th>
<th>Aluminum</th>
<th>Alumold</th>
<th>Hokotel</th>
<th>QC-10</th>
<th>P-20</th>
</tr>
</thead>
<tbody>
<tr>
<td>76</td>
<td>165</td>
<td>164</td>
<td>140</td>
<td>289</td>
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<table>
<thead>
<tr>
<th>Rockwell Hardness</th>
<th>Aluminum</th>
<th>Alumold</th>
<th>Hokotel</th>
<th>QC-10</th>
<th>P-20</th>
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</thead>
<tbody>
<tr>
<td>39.1 HRB</td>
<td>91.1 HRB</td>
<td>89.4 HRB</td>
<td>81.8 HRB</td>
<td>24.7 HRC</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1. Compiled stress strain curves for the five alloys.
3.4 Abrasion Resistance

An abrasion resistance testing technique was specifically developed for Unique Tool and Gauge in an effort to qualify material loss characteristics associated with rubbing contact.

Each sample was machined to a 5" x 1.5" x 0.35" platen, weighed then placed longitudinally on the test platform. A hardened steel abrasion block with a contact width of 0.25" x 0.10" was placed in contact with the test platen and load vertically to 250gf. The test platen was then cycled longitudinally through a length of 3.5 inches at a rate of 30 cycles per minute for a total of 5000 cycles. After cycle completion, the final weight was measured and weight loss determined. The surface topography was then evaluated using the scanning electron microscope. The five platen are illustrated in Figure 2, and the surface characteristics associated with the abrasion are illustrated in Figures 3 through to 7. Results are presented in Table 4.

<table>
<thead>
<tr>
<th>Table 4. Abrasion Resistance Material Loss (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Wt</td>
</tr>
<tr>
<td>Aluminum</td>
</tr>
<tr>
<td>Alumold</td>
</tr>
<tr>
<td>Hokotol</td>
</tr>
<tr>
<td>QC-10</td>
</tr>
<tr>
<td>P-20</td>
</tr>
</tbody>
</table>

3.5 Cyclic Compression Testing

Cyclic compression testing was conducted on cylindrical specimens prepared from each alloy in an effort to simulate the nature of contact damage which may be associated with real-life mold closure. Matching cylindrical specimens of 1.0" diameter were prepared from each alloy and surface finished with a 250 grit emery paper. The surfaces were measured for roughness (Ra) using the Mitutoyo Surftest 201 surface roughness tester. Surface texture was also recorded with the JEOL JSM-5600 scanning electron microscope.

The compression test incorporated a servo-hydraulic test frame and a holding jig specifically developed and tested for this cyclic compression test procedure (Figure 8). The test involved the compression of the matching specimen to a stress of 5400 psi at a closure rate of 1" per minute, then held at closure for a period of 30 seconds for a total 100,000 cycles. Upon completion of testing, each sample was then re-measured for surface roughness and examined with the scanning electron microscope. Surface roughness data, test specimens and surface images are presented in Table 5 and Figures 8 to 14 respectively.

<table>
<thead>
<tr>
<th>Table 5. Compression Sample Surface Roughness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Roughness (Ra μm)</td>
</tr>
<tr>
<td>Face &quot;A&quot; Before Test</td>
</tr>
<tr>
<td>Face &quot;A&quot; After Test</td>
</tr>
<tr>
<td>Face &quot;B&quot; Before Test</td>
</tr>
<tr>
<td>Face &quot;B&quot; After Test</td>
</tr>
</tbody>
</table>

Figure 8. Compression frame and test jig fixture employed in the test of the five alloys. The arrows highlight the location of the test specimen.
In Conclusion from 3rd Party Testing

- P20 was the hardest, strongest and most abrasion resistance considering it was Steel as compared to the other 4 AL Alloys.

- All AL Alloys exhibited increased hardness, strength and abrasion resistance, which confirmed the data provided by the AL Alloy suppliers.

- Cyclic Compression testing showed that all materials could withstand loading of this nature. Higher cycling would provide further understanding of full life expectancy.
Aluminum Alloy Repair & Texturing
Tool Shop and Honda Verified

Mechanical Freeze Plug Repair and Peened Plug

Freeze Plug  Peened Plug

Freeze Plug  Peened Plug

Mechanical Freeze Plug performed best
Porosity on 5000 series rod was worse than 2000 series and 4000 series performing the best.
Honda R&D activity for Texture Evaluation and Repair Methods
Texturing Result of Aluminum Alloys (Honda 390 Grain)

Texturing Result was successful for each AL Alloy. Repair Results varied by each Alloy. (See Samples)
Texturing Result of Aluminum Alloys
(Honda 402 Grain)

Texturing Result was successful for each AL Alloy. Repair Results varied by each Alloy. (See Samples)
## Texturing and Repair Results

<table>
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<tr>
<th>Evaluation Item</th>
<th>2XXX Series</th>
<th>7XXX Series</th>
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<tr>
<td></td>
<td>Cast M1</td>
<td>Alumold QC10</td>
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<tr>
<td>Texturing</td>
<td><img src="#" alt="Green" /></td>
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<tr>
<td>Repairability (As compared to Steel)</td>
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<td><img src="#" alt="Yellow" /></td>
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<tr>
<td>Welding Repair</td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Yellow" /></td>
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<tr>
<td>Freeze Plug</td>
<td><img src="#" alt="Green" /></td>
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<tr>
<td>H390 Grain</td>
<td><img src="#" alt="Green" /></td>
<td><img src="#" alt="Yellow" /></td>
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<tr>
<td>Welding Repair</td>
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<tr>
<td>Freeze Plug</td>
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<tr>
<td>Non-Grain</td>
<td><img src="#" alt="Green" /></td>
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*Working with Material Vendors to improve Weldability for 7XXX series Alloy*
High Volume Trial & Results
08 Accord Tools for AL Alloy Application

<table>
<thead>
<tr>
<th>Toolmaker</th>
<th>Part Name</th>
<th>PPA</th>
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<tbody>
<tr>
<td>Unique</td>
<td>Rear Tray</td>
<td>Capacity Plus, JS Parts</td>
</tr>
<tr>
<td>Rapid</td>
<td>Engine Under Cover</td>
<td>Capacity Plus</td>
</tr>
<tr>
<td>Unique</td>
<td>Cowl Side Assy</td>
<td>Capacity Plus</td>
</tr>
</tbody>
</table>
Tool L/T Comparison of Mold Build

Tool Lead Time
2PX Rear Tray

Tool Lead Time Savings when comparing Steel Mold –vs- Aluminum Alloy Mold
Investment Comparison
2PX Rear Tray (P20 vs AL Alloy)

Investment Savings when comparing Steel Mold –vs- Aluminum Alloy Mold
Cycle Time Comparison of Mold Builds
2PX Rear Tray (P20 vs AL Alloy)

Part Temp in deg F
ST – 130 vs AL - 100

Cycle Time Savings when comparing Steel Mold –vs- Aluminum Alloy Mold
Benefits of Aluminum Alloy

- Investment Savings through machining efficiency
- Process Cost Savings due to improved Thermal conductivity (Reduced Cycle Time)
- Reduce number of molds and injection machines required to mold parts
- Different grades of Aluminum can be applied based on Program Volume
- Lower Injection and Clamp Pressure as compared to a Steel Tool
Path Forward and Challenges

- Maintenance & tool life monitoring
- Introduce 2xxx series for low volume programs
- Combine 2xxx (cavity) & 7xxx (core) alloys for low to medium volume models
- Continue improving toolmakers skill sets (Cutting Tool Technology)
- Companies with Al alloy texture and repair capabilities
- Purchasing agreements/contracts with Al alloy suppliers & distributors
- Strengthen In-house & supplier knowledge
### Total AL Alloy Activity to date (14 tools total)

<table>
<thead>
<tr>
<th>program</th>
<th>part #</th>
<th>model</th>
<th>description</th>
<th>comments</th>
<th># shots</th>
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<tbody>
<tr>
<td>06 Acura RDX</td>
<td>77345</td>
<td>STKA</td>
<td>AS Undercover</td>
<td>pilot program, P20 backup</td>
<td>44,728 - 21 Dec 07</td>
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<tr>
<td>06 CR-V</td>
<td>77210/15</td>
<td>SWAA</td>
<td>Instr side cover R/L</td>
<td>pilot program, P20 backup</td>
<td>76,730 - 08 Jan 08</td>
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<td>06 MDX</td>
<td>71502</td>
<td>STXA</td>
<td>RR Bpr Skid Garnish-China</td>
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<td>?</td>
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<td>RR Tray</td>
<td>Al alloy primary tool, P20 capacity tool</td>
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<td>Engine Undercover</td>
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<td>Tube Assy air intake</td>
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<td>RR Bpr Skid Garn-Russia</td>
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<td>08.5 Pilot</td>
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<td>09 Acura TL</td>
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<td>Personal watercraft</td>
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<td>HW5A</td>
<td>RR Grip</td>
<td>low volume power sport product</td>
<td>15,000/yr</td>
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**Schedule**

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<th>EGA involvement</th>
<th>T/C and EGA will visit Suppliers and Tool makers for additional Know-How</th>
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<tbody>
<tr>
<td>ZQ</td>
<td>1mold 1 year low vol evaluation</td>
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<tr>
<td>WQ</td>
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<td>JZ</td>
<td>1mold 6 mo hi vol evaluation</td>
</tr>
<tr>
<td>2PX</td>
<td>3 molds 1 year hi vol evaluation</td>
</tr>
<tr>
<td>2HP</td>
<td>1+ molds EG bumper mold + T/C tools</td>
</tr>
<tr>
<td>2FC</td>
<td>Tool GO</td>
</tr>
<tr>
<td>cancelled</td>
<td></td>
</tr>
<tr>
<td>2NX</td>
<td>Tool GO</td>
</tr>
<tr>
<td>2AX</td>
<td>Tool GO</td>
</tr>
<tr>
<td>011 Civic, Odyssey</td>
<td>Tool GO</td>
</tr>
</tbody>
</table>

**Tool Center Activity**

- ZQ/WQ
- 2PX
- Apply for 2PM
- Maintenance and Tool Durability
- Confirm Toolmaker List
- Confirm Texture Co. Capability
- On-Going based on New Model Activity by Plant
- Utilize Alcoa, Alcan & Corus to provide Tech. Support

**Texture Company Activity**

- On-Going based on New Model Activity by Supplier
- In-House Knowledge
- Tool Maker Identification
- 3rd Material Supplier
- Supplier Ed./ Support System

**In-House Knowledge**

- On-Going based on New Model Activity by Plant
- Tool Maker Identification
- 3rd Material Supplier
- Supplier Ed./ Support System
Adapting to the New Automotive World

Adapting to Change → Automotive Trends

Honda’s Trends

Supplier Impact

Honda’s Approach

Investment

Process

Path Forward

Schedule

Honda’s Recommendations

Honda’s Requests
## Honda Recommendations

### Investment & Process Cost Savings Matrix

<table>
<thead>
<tr>
<th>Material</th>
<th>Current Tools</th>
<th>Multi-Cavity Tools</th>
<th>Family Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>H13/S7</td>
<td>115</td>
<td>100</td>
<td>155</td>
</tr>
<tr>
<td>P20/S55C</td>
<td>100</td>
<td>100</td>
<td>140</td>
</tr>
<tr>
<td>4130/SD18</td>
<td>92</td>
<td>100</td>
<td>132</td>
</tr>
<tr>
<td>AL Alloy</td>
<td>90</td>
<td>80</td>
<td>130</td>
</tr>
<tr>
<td>Alpase M1</td>
<td>85</td>
<td>80</td>
<td>125</td>
</tr>
<tr>
<td>Comments</td>
<td>Example: 1 Single Cavity Tool</td>
<td>Example: 1 Cavity to 2 Cavity</td>
<td>Example: 2 Tools 1 Cavity to 1 tool 2 cavity family</td>
</tr>
</tbody>
</table>

Increasing the use of AL Alloy, Multi-Cavity and Family Tools improves the overall Throughput efficiency.
Honda Recommendations

Model Shot Life by Tool Material

- P20/S55C Steel
- 4130/SD18 Soft Steel
- 7000 Series AL Alloy
- M1 & 7000 Series Hybrid
- M1 Cast

No. of Shots

- 100,000
- 500,000
- 1,000,000
- 1,500,000
- 2,000,000
- 2,500,000
- 3,000,000
## Honda Requests

### New Model Schedule & Targets

<table>
<thead>
<tr>
<th>Model</th>
<th>Target</th>
<th>Actual</th>
<th>Toolmaker</th>
<th>Part Name</th>
<th>Part Characteristics</th>
<th>Risk</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZQ</td>
<td>1</td>
<td>1</td>
<td>Rapid</td>
<td>Passenger Under Cover</td>
<td>Low visibility, light texture, No Action</td>
<td>L</td>
<td>Backup Steel Tool</td>
</tr>
<tr>
<td>WQ</td>
<td>1</td>
<td>1</td>
<td>Unique</td>
<td>IP Side Covers</td>
<td>Med visibility, leather texture, multiple action</td>
<td>L</td>
<td>Backup Steel Tool</td>
</tr>
<tr>
<td>2PV</td>
<td>6</td>
<td>3</td>
<td>Rapid</td>
<td>Engine Under Cover</td>
<td>Low visibility, No texture, Functional, Some action</td>
<td>L</td>
<td>Capacity Plus Tool: 2nd Tool needs to run around 20% to meet capacity. If trouble, then Japan Supply.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rapid</td>
<td>Cowl Side Assy</td>
<td>Low visibility, Light texture, Some action</td>
<td>L</td>
<td>Capacity Plus Tool, however upon investigation with supplier 1 tool could make production</td>
</tr>
<tr>
<td>2HP</td>
<td>3</td>
<td>1</td>
<td>Rapid</td>
<td>Strg Joint Cover</td>
<td>low visibility, functional</td>
<td>M/H</td>
<td>First Al only, no ST backup</td>
</tr>
<tr>
<td>2FC</td>
<td>5</td>
<td>3</td>
<td>Co-Mgmt</td>
<td>Hood Strike Garn Udr Cvr Flr Assy</td>
<td>interior/exterior, low visibility, no texture</td>
<td>M</td>
<td>EGA bumper fascia for Low Volume model (China Export)</td>
</tr>
<tr>
<td>cancelled</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>interior/exterior, low visibility, no texture</td>
<td>L</td>
<td>low volume M/P</td>
</tr>
<tr>
<td>2AX</td>
<td>50%</td>
<td></td>
<td></td>
<td></td>
<td>interior/exterior, low/med/hi visibility</td>
<td>M/H</td>
<td>low volume M/P</td>
</tr>
<tr>
<td>2NX</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
<td>interior/exterior, low/med/hi visibility</td>
<td>M/H</td>
<td>medium volume M/P</td>
</tr>
<tr>
<td>011 Civic, Odyssey</td>
<td>30% of unit</td>
<td></td>
<td></td>
<td></td>
<td>interior/exterior, med / hi visibility, textured</td>
<td>M/H</td>
<td>two years of M/P data minimizes risk</td>
</tr>
</tbody>
</table>
Honda Requests

**New Model Planning**
- Best Tool Material for Production Volume
- Best Tool Layout
- Best Process Cost

Develop a Comprehensive Tool Strategy to include alternative materials and sourcing locations.
In Conclusion - A little food for thought ....

“Every injection molder who intends to stay in business must continually ask himself, ’What must I do to run as fast and efficiently as possible and still meet the customer’s quality requirements?’”

- Moldmaking Technology Magazine, quoting an article published in 1988