Agenda

1. Orchard Concept
2. Safety Technology Activities
3. Environmental Technology Activities
4. Technologies Being Presented Today
1. Orchard Concept

I. Harvest Plan
- Performance & Functions which exceed customer’s expectation
- Timing of release

II. Seeding & Growth
- To specify technologies to be developed for Harvest
- To formulate development schemes Organizational Structure, Partnership, Continuous improvement after introduction

III. Soil Enrichment
- To cultivate continuously R&D competencies for Harvest Plan and Seeding & Growth
- To promote foundational research for future Harvest Plans
Performance & Functions which exceed customer’s expectation

To specify technologies to be developed for Harvest

To formulate development schemes

Organizational Structure, Partnership, Continuous improvement after introduction

To cultivate continuously R&D competencies for Harvest Plan and Seeding & Growth

To promote foundational research for future Harvest Plans

Orchard Concept: Purpose of Advanced Technology Briefing

- To introduce technologies to be commercialized within the next 2-3 years

- To introduce fundamental technologies which support product commercialization, and the realization of Nissan’s mid & long term vision

Nissan's Four Strategic Technology Fields

For each field, technology development will be based on a defined target (Vision 2015) and detailed roadmap

Safety  Life on Board  Dynamic Performance  Environment  Quality, Cost
Nissan's Four Strategic Technology Fields

Nissan's Core Technology Values:

*Trusted Driving Pleasure*

- Quality, Cost
- Safety
- Environment
- Dynamic Performance
- Life on Board

Featured technologies

- Today's focus will be on Nissan's advanced Safety and Environmental technologies
- Dynamic Performance, Life on Board activities will be introduced at a different timing by the end FY2007
2. Safety Technology Activities

**Nissan's Safety Vision (Vision2015)**

Reduce fatalities and serious injuries involving Nissan vehicles:

- Reduce to half of 1995 rate by 2015
- Ultimate goal is to reduce to substantially zero

![Graph showing reduction in fatalities and serious injuries](image)
Safety Technology Activities

Safety Shield – The Vehicle That Helps Protect People

The vehicles activates various barriers to help the driver, passengers and other road users avoid danger from normal driving conditions through post accident conditions.

- Risk has not yet appeared
- Risk has appeared
- Crash may occur
- Crash is unavoidable
- Crash - Post Crash

Safety Technology Activities

(Technologies being presented today)

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- Around View Monitor (AVM)
- Distance Control Assist System (DCA)
- Lane Departure Prevention (LDP)
- Pop Up Engine Hood
- Low Friction Seat Belt
**Safety Shield : Around View Monitor (AVM)**

- To be introduced on the ELGRAND in Japan from autumn 2007
- By displaying an image of the vehicle from above, the driver can easily parallel park and park the car

![Monitor display (example)](image)

Images taken with 4 high-resolution cameras are converted to display a bird’s-eye image

Sonars set in 4 corners

**Technology being presented today**

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**Safety Shield : Distance Control Assist System (DCA)**

- To be launched on the FUGA in Japan from winter 2007
- Supports the driver to maintain a safe distance by moving the gas pedal upwards to assist to switch to the brake pedal

![Diagram of DCA system](image)

Radar sensors used to measure the distance and relative speed with the preceding vehicle

- When the vehicle is coming close to preceding vehicle, the gas pedal is released
- When the driver release the gas pedal, the system applies the brakes

**Technology being presented today**
Safety Shield:
**Lane Departure Prevention (LDP)**
- To be launched on the Infiniti EX in U.S. from winter 2007
- The system detects the vehicle when it is unintentionally departing the lane, assists the vehicle to return between the lane markers, and supports the driver to stay inside the lane.

![System control](image)

**Warning!**
Detects and issues warnings when the vehicle is departing the lane, and independently controls the brake pressure of each wheel to assist the vehicle direction.

Technology being presented today

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Safety Shield:
**Pop Up Engine Hood**
- To be launched on SKYLINE COUPE in Japan from fall 2007
- Helps minimize impact to the pedestrian's head by lifting the engine hood in the event of a collision. System achieves sporty styling while helping to protect pedestrians.

![Before and After](image)

When the G sensor on the bumper detects contact, which triggers the actuator to instantly lift the rear of engine hood.
Safety Shield:
Low Friction Seatbelt

- Introduced from the new X-TRAIL
- Easy to pull out and with less feeling of tightness when worn, the seatbelt comfort and usability is improved

A newly employed weaving method softens the seatbelt to reduce friction with the seatbelt anchor.

Reduction in pullout force
Pullout force: reduced by approximately 10%

Reduction in tightness
Tightness: reduced by approximately 20%

The Reality of Drunk Driving Accidents

- Although the number of fatal accidents caused by drunk driving is decreasing, the level remains high

Shift in number of fatal accidents caused by drunk driving (Domestic)

Japan: NPA Traffic Green Paper (Subject 1 fatal accidents)
## Concept Behind the Countermeasures

- Develop a wide range of technologies to help prevent drunk driving
- Actively apply technologies to remind and warn the driver
- Promote application of intervention technologies such as forced outage, in collaboration with the Japanese government and Japan Automobile Manufacturers Association

### Audience

<table>
<thead>
<tr>
<th>Ordinary driver</th>
<th>Repeat offenders</th>
<th>Alcoholics</th>
</tr>
</thead>
</table>

### Measure

<table>
<thead>
<tr>
<th>Remind</th>
<th>Warn</th>
<th>Forced outage</th>
</tr>
</thead>
</table>

### Technology development

#### Message

- Effective messages
- Display methods
- Drunk driving detection & warning
- Intervention of driving

<table>
<thead>
<tr>
<th>Message alerts on navigation system</th>
<th>Drunk driving prevention concept car</th>
<th>Alcohol interlock system tests</th>
</tr>
</thead>
</table>

Technologies being presented today:
- Alcohol detection
- Driving behavior
- State of driver
- Air conditioner activation
- Tightening of seatbelt
- Forced outage
- Automated notification
- Effective messages
- Display methods
- Alcohol interlock system tests

### Harvest Plan

- Soil Enrichment
- Seeding & Growth
- Message Alerts on Navigation System

** Introduced from June 2007
** Message alerts issued on CARWINGS navigation system (HDD) displays, to remind drivers not to drink and drive
** Raises awareness for safe driving, including prevention of drunk driving

#### Message displayed on navigation panel (daytime / night)

** Daytime (5:00-17:30)**

```
今日も安全運転でございます。

運転される方は安全な運転に努めてください。
実際の交通規則を守ってください。
```

** Evening (17:30-5:00)**

```
運転される方は安全な運転に努めてください。
実際の交通規則を守ってください。
```

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Drunk Driving Prevention Concept Car

- Technologies to detect the driver's state of sobriety are currently under development

- Detection from facial expression
- Alcohol Detection

- Detection from driving behavior

Alcohol Detection Technology being presented today

Alcohol Interlock System Test in Collaboration with Local Authorities

- Tests launched in July 2007
- System installed on daily-operating vehicles for drivers to monitor functionality and alcohol-detection reliability

Alcohol Interlock System

Partnership with local authorities

- Tochigi Prefecture (1 vehicle) / Kaminokawa town (2 vehicles)
- Fukuoka Prefecture, Kitakyushu city (2 vehicles)
- Atsugi city, Kanagawa Prefecture (3 vehicles)
3. Environmental Technology Activities

Nissan Green Program 2010

- Evolution of Engine & Transmission
  - DIG
  - VVEL
  - Clean Diesel
  - 3L car

- Electric Vehicle Technology
  - EV
  - FCV
  - Original HEV
  - Li-ion battery

- Integrated Approach with other sectors
  - SKY PROJECT
Gasoline engine: CO₂ emission reduction (-30%)
Diesel engine: Exhaust emissions reduction (-90%)

Gasoline Engine Technology
(Technologies being presented today)

VVEL (Variable Valve Event & Lift)
Ultra Low Precious Metal Catalyst
Gasoline Engine Technology: VVEL*1

- Introduced from the 2007 SKYLINE COUPE in Japan and U.S.
- Contributes to a 10% reduction in CO2 emissions, improves torque output by approximately 10%, and cleaner emissions
- Valve drive system which controls continuous valve event and lift

*1 Variable Valve Event and Lift

*2 This percentage improvement is measured by Nissan by comparing an engine with the VVEL system to an identical engine without it.

Gasoline Engine Technology: Ultra Low Precious Metal Catalyst

- To be introduced from FY2008
- Cleans emissions using ½ the amount of precious metals
- By employing advanced nano-technology, the clustering of precious metals caused by heat is prevented
Diesel Engine Technology: Clean Diesel (M9R)

- Introduced from the Europe QASHQAI in 2007
- Clean diesel engine (M9R) significantly reduces NOx and PM emissions level

Technology Items

- Common rail (1600 bars)
- Piezoelectric-controlled injectors
- DPF*
- Variable geometry turbocharger
- Balancer shaft

* DPF: Diesel Particulate Filter
Development of Future Clean Diesels

- Development of clean diesel engine technology to meet the even-more severe emissions regulations
- The highest emissions regulations level Nissan has currently achieved, is the most severe U.S Tier2Bin5 level

In 2003, Nissan realized the first diesel passenger vehicle in the world to clear U.S. Tier2Bin5 emissions standards.
Presently, 90% reduction in HC and 70% reduction in NOx has been achieved in relation to Tier2Bin5.

3 technologies that support SULEV*

- Improvement in combustion technology
  MK combustion concept reduces NOx and particulate matter, without increasing HC emissions and fuel consumption
- Newly developed HC-NOx trap catalyst
  Improves NOx conversion efficiency using trapped HC
- Advanced engine control realizes a highly efficient catalyst as well as combustion improvement

* The state of California's standard
Electric-powered Vehicle Technologies

- Motor, Inverter, and Battery technologies are common in all electric powered vehicles
- Battery technology has a large impact on the vehicle performance, cost and cabin space

### HEV

- Inverter
- Motor
- Battery

### FCV

- Inverter
- Motor
- Battery

### EV

- Inverter
- Motor
- Battery

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**Features of Laminated Li-ion Battery (1)**

<table>
<thead>
<tr>
<th>High performance</th>
<th>Compact packaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Twice the power</td>
<td>Half the size*</td>
</tr>
</tbody>
</table>

- **High performance**: Twice the power
  - conventional type
  - laminated type
  - 2x power

- **Compact packaging**: Half the size*
  - conventional type
  - laminated type
  - half size

* Compared under the same power
Features of Laminated Li-ion Battery (2)

- 3 features of battery technology to secure high stability

(1) Mn-type Li-ion battery
   By using stable crystal structure, spinel Mn-type as electrode material, the battery can hold stability even under abnormal heat

(2) Application of laminated structure
   Using laminated structure which holds high cooling performance, temperature rising can be controlled

(3) Cell control
   Individual control of cell charge-discharge condition helps to control variance between cells, and maintain stable performance

4. Technologies Being Presented Today
Environmental technologies
- VVEL (Variable Valve Event & Lift)
- Ultra Low Precious Metal Catalyst
- Clean Diesel Engine (M9R)
  launched on Europe X-TRAIL
- SULEV Level
  Clean Diesel Engine

Safety technologies
- Around View Monitor (AVM)
- Distance Control Assist System (DCA)
- Lane Departure Prevention (LDP)
- Pop Up Engine Hood
- Low Friction Seatbelt
- Drunk Driving Prevention Concept Car

Battery will be introduced by the end of the year

Thank you