Tractor Industry in India – Present and Future
Indian Agriculture – Vital Sector of Indian Economy
AGRICULTURAL DEVELOPMENT

**Pre Green Revolution**
**(Before 1960’s)**
- Boost in the productivity growth of coarse grains and pulses per unit of land

**Green Revolution**
**(Mid 60’s to Mid 80’s)**
- Expansion of arable area and rapid growth in productivity of wheat and rice
- Expansion of agricultural research
- Establishment of national infrastructure

**Post Green Revolution**
**(mid 80’s to 2000)**
- Continued growth in productivity through intensification of chemical and labor
- Expansion of area under maize, cotton, sugarcane and oil seeds
India - in the 4th stage of agricultural transformation

- Further diversification of cropping patterns from low value to high value crops such as fruits, vegetables, flowers and other horticultural crops for domestic consumption, processing and export
- Regaining Agricultural Dynamism a key goal of 11th Five Year Plan
- Aiming to Achieve the sustained growth rate of 4 - 5%
- Improvement in Farm mechanization
INDIAN AGRICULTURE SECTOR

- Key sector of Indian Economy
- Contributes 25% of GDP of the country
- 13% of India’s Exports
- Second largest producer of rice & wheat in the world
- Largest producer of pulses
- Fourth largest producer of coarse grains
- Second largest producer of vegetables, groundnuts & fruits
- Current average growth rate: 2.2%
AGRICULTURE SECTOR – GLOBAL SCENARIO

The international league table

Value Added (US$ million)

Value Added (% of Total)

Source: World Development Indicators
• Raising productivity & Rapid diversification in agricultural sector

• Total proportion of work force involved in agriculture to reduce from 56% to 40%

• Growth rate to reach 4-5 % from current average growth rate of 2.2%

• Agricultural based energy policy to focus on production of fuel oil & biomass power – could generate lucrative alternate markets for farm produce while reducing the country’s dependence on imported fuels

• Accelerated acquisition of technology capabilities to raise productivity in agriculture, industry & services

• Sectoral composition of GDP to drop from 28% to 6% in 2020
NEED FOR FARM MECHANISATION

Farm mechanization

- Reduction in work force
- Increasing productivity
- Achieving sustained growth rate of 4-5%
- Agriculture based Energy policy
Indian Tractor Industry – Current Status
Indian Tractor Industry

• Largest in the world
• $1/3^{rd}$ of Global production
• Positive Growth (CAGR) of 10% for last 4 decades
Industry Status

• CAGR of 19.5% in last 3 years.

• 2,92,908 tractor sale in nos. in 05-06

• Government focus on 4 % growth in Agricultural GDP
Comparing agricultural GDP with tractor sales

Source: Central Statistical Organisation and CRIS INFAC
Industry Status

- Next 5 years expected to have CAGR of 5 to 7% (2010-11)
- Domestic industry to reach a level of 3,50,000 tractors per annum by 2010-11
Domestic
Exports

- Gaining acceptance in International Markets

- Exports grew by 55% CAGR in last 3 years. At 28,118 (2005-06)

- Major markets are USA, SAARC countries, Turkey, Malaysia and parts of Eastern Europe.

- Export to reach a level of 60,000 tractors per annum by 2010-11.
Exports
Total (Domestic + Exports)
## Major Players

<table>
<thead>
<tr>
<th>MAJOR TRACTOR MANUFACTURERS</th>
<th>SALES IN NOS. FOR 2005-06</th>
<th>MARKET SHARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAHINDRA &amp; MAHINDRA</td>
<td>85028</td>
<td>29.0%</td>
</tr>
<tr>
<td>TAFE (MASSEY FERGUSON &amp; EICHER)</td>
<td>66667</td>
<td>22.8%</td>
</tr>
<tr>
<td>INTERNATIONAL TRACTORS LTD (SONALIKA)</td>
<td>32017</td>
<td>10.9%</td>
</tr>
<tr>
<td>PUNJAB TRACTORS LTD</td>
<td>31396</td>
<td>10.7%</td>
</tr>
<tr>
<td>ESCORTS</td>
<td>28297</td>
<td>9.7%</td>
</tr>
<tr>
<td>JOHN DEERE</td>
<td>19951</td>
<td>6.8%</td>
</tr>
<tr>
<td>NEW HOLLAND INDIA (CNH)</td>
<td>13214</td>
<td>4.5%</td>
</tr>
<tr>
<td>HMT</td>
<td>7900</td>
<td>2.7%</td>
</tr>
<tr>
<td>FORCE MOTORS</td>
<td>4461</td>
<td>1.5%</td>
</tr>
<tr>
<td>MAHINDRA GUJARAT TRACTORS LTD</td>
<td>2749</td>
<td>0.9%</td>
</tr>
<tr>
<td>VST (MITSUBISHI)</td>
<td>1228</td>
<td>0.4%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>292908</td>
<td>100%</td>
</tr>
</tbody>
</table>
## Manufacturer wise sales

<table>
<thead>
<tr>
<th>Major Tractor Manufacturers</th>
<th>Sales in Nos. Apr'06 - Sep'06</th>
<th>Sales in Nos. Apr'05 - Sep'05</th>
<th>Growth over Last Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahindra &amp; Mahindra</td>
<td>50922.00</td>
<td>39371.00</td>
<td>29.3%</td>
</tr>
<tr>
<td>TAFE (Massey Ferguson &amp; Eicher)</td>
<td>38391.00</td>
<td>28323.00</td>
<td>35.5%</td>
</tr>
<tr>
<td>International Tractors Ltd (Sonalika)</td>
<td>17090.00</td>
<td>13879.00</td>
<td>23.1%</td>
</tr>
<tr>
<td>Punjab Tractors Ltd</td>
<td>15217.00</td>
<td>14667.00</td>
<td>3.7%</td>
</tr>
<tr>
<td>Escorts</td>
<td>24864.00</td>
<td>9053.00</td>
<td>174.6%</td>
</tr>
<tr>
<td>John Deere</td>
<td>8730.00</td>
<td>10398.00</td>
<td>-16.0%</td>
</tr>
<tr>
<td>New Holland India (CNH)</td>
<td>8203.00</td>
<td>5875.00</td>
<td>39.6%</td>
</tr>
<tr>
<td>HMT</td>
<td>2351.00</td>
<td>3016.00</td>
<td>-22.0%</td>
</tr>
<tr>
<td>Force Motors</td>
<td>1904.00</td>
<td>1790.00</td>
<td>6.4%</td>
</tr>
<tr>
<td>Mahindra Gujarat Tractors Ltd</td>
<td>1213.00</td>
<td>1192.00</td>
<td>1.8%</td>
</tr>
<tr>
<td>Others</td>
<td>3750.00</td>
<td>1800.00</td>
<td>108.3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>172635.00</strong></td>
<td><strong>129364.00</strong></td>
<td><strong>33.4%</strong></td>
</tr>
</tbody>
</table>
HP Segment-wise

31-40 Hp

41-50 Hp

21-30 Hp

> 51 Hp

F-00  F-01  F-02  F-03  F-04  F-05  F-06
2,64,790 Tractors excluding exports
# HP WISE SEGMENT AND TRACTOR FEATURES

<table>
<thead>
<tr>
<th>TRACTOR CATEGORY &lt; 30 HP</th>
<th>AGGREGATE</th>
<th>PARAMETER</th>
<th>CURRENT FEATURES</th>
<th>FUTURISTIC FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGINE</td>
<td>No. of Cylinders</td>
<td>1-3</td>
<td>2-3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emission</td>
<td>TREMIII</td>
<td>Euro IIIA or higher</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vibration &amp; Noise control</td>
<td>Less Focus</td>
<td>High focus due to regulatory requirements</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SFC improvement</td>
<td>High Focus</td>
<td>Even higher focus due to higher diesel prices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Air cleaner</td>
<td>Wet</td>
<td>Wet</td>
<td></td>
</tr>
<tr>
<td>HYDRAULICS</td>
<td>Basic specs</td>
<td>ADDC</td>
<td>ADDC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TT applications</td>
<td>No std. Fitment provided</td>
<td>QRC fitment Multiple outlet points for hydraulic usage</td>
<td></td>
</tr>
<tr>
<td>TRANSMISSION</td>
<td>Clutch</td>
<td>91/4&quot; - 10&quot; Dry</td>
<td>11-12&quot; Dry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brakes</td>
<td>6.5&quot;x3.5&quot; Dry</td>
<td>7&quot;x4&quot; Dry</td>
<td></td>
</tr>
<tr>
<td>TRACTORS</td>
<td>Ergonomics</td>
<td>Less Focus on operator comfort</td>
<td>High focus of operator control</td>
<td></td>
</tr>
</tbody>
</table>
# HP WISE SEGMENT AND TRACTOR FEATURES

## AGGREGATE

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>CURRENT FEATURES</th>
<th>FUTURISTIC FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Cylinders</td>
<td>3</td>
<td>3-4</td>
</tr>
<tr>
<td>Emission</td>
<td>TREMIII</td>
<td>Euro IIIA or higher</td>
</tr>
<tr>
<td>Vibration &amp; Noise control</td>
<td>Less Focus</td>
<td>High focus due to regulatory requirements</td>
</tr>
<tr>
<td>SFC improvement</td>
<td>High Focus</td>
<td>Even higher focus due to higher diesel prices</td>
</tr>
<tr>
<td>Aircleaner</td>
<td>Wet</td>
<td>Wet</td>
</tr>
</tbody>
</table>

## ENGINE

- **Basic specs**: ADDC
- **Liftomatic**: Not given
- **Jerk Sensing feature**: do
- **TT applications**: No std. Fitment provided
- **Hydraulics Type**: Sliding
- **Gear shift**: Centre shift
- **Brakes**: 6.5"x3.5" Dry
- **Steering**: Mechanical
- **Ergonomics**: Less Focus on operator comfort

## HYDRAULICS

- **Basic specs**: ADDC
- **Liftomatic**: Not given
- **Jerk Sensing feature**: do
- **TT applications**: No std. Fitment provided
- **Hydraulics Type**: Sliding
- **Gear shift**: Centre shift
- **Brakes**: 6.5"x3.5" Dry
- **Steering**: Mechanical

## TRANSMISSION

- **Type**: Sliding
- **Gear shift**: Centre shift
- **Brakes**: 6.5"x3.5" Dry
- **Steering**: Mechanical
- **Ergonomics**: Less Focus on operator comfort
- **Steering**: Mechanical

## TRACTORS

- **Type**: Sliding
- **Gear shift**: Centre shift
- **Brakes**: 6.5"x3.5" Dry
- **Steering**: Mechanical
- **Ergonomics**: Less Focus on operator comfort
<table>
<thead>
<tr>
<th>AGGREGATE</th>
<th>PARAMETER</th>
<th>CURRENT FEATURES</th>
<th>FUTURISTIC FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGINE</td>
<td>No. of Cylinders</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Emission</td>
<td>TREM III</td>
<td>Euro IIIA or higher</td>
</tr>
<tr>
<td></td>
<td>Vibration &amp; Noise control</td>
<td>Less Focus</td>
<td>High focus due to regulatory requirements</td>
</tr>
<tr>
<td></td>
<td>SFC improvement</td>
<td>High Focus</td>
<td>Even higher focus due to higher diesel prices</td>
</tr>
<tr>
<td></td>
<td>Aircleaner</td>
<td>Wet</td>
<td>Dry</td>
</tr>
<tr>
<td></td>
<td>Turbo Charger</td>
<td>NA</td>
<td>To be offered as feature</td>
</tr>
<tr>
<td>HYDRAULICS</td>
<td>Basic specs</td>
<td>ADDC</td>
<td>ADDC</td>
</tr>
<tr>
<td></td>
<td>Liftomatic</td>
<td>Not given</td>
<td>To be offered as feature</td>
</tr>
<tr>
<td></td>
<td>Jerk Sensing feature</td>
<td>Selectively given</td>
<td>For jerk free operation</td>
</tr>
</tbody>
</table>
|           | TT applications            | No std. Fitment provided| QRC fitment
|           |                           |                  | Multiple outlet points for hydraulic usage |
|           | Volvomatic                 | Not given        | To be offered as feature |
|           | Electrohydraulic system    | Not given        | To be offered as feature |
| TRANSMISSION | Type                     | Sliding          | syncromesh          |
|           | Gear shift                 | Centre shift     | Side shift          |
|           | Clutch                     | Single/Dual      | Dual                |
|           | Brakes                     | 6.5”x3.5”/7”x4”  | 7”x4”               |
|           | Type                       | Dry              | Wet                 |
|           | Torque converter           | NA               | To be given as a feature for off high way applications |
| TRACTORS  | Ergonomics                 | Less Focus on operator comfort | High focus of operator control |
|           | Steering                   | Mechanical       | Power               |
|           | Cabin                      | NA               | Cabin with/without AC |
Current trends in farm mechanization

- Increased Haulage / Non agricultural Application
- Secondary mechanization
- Farmers with low land holding (2-4 acres) buying tractors
- Tractor exchange increasing
Drivers of tractor growth

- Primary Demand - Agricultural Growth
- Secondary Demand - Haulage
- Expansion / Extension of land - has not increased for last 20 years but is an immediate need
- Water resources - growth only through exploration of ground water
Drivers of tractor growth (Contd.)

- National policy on Water Resources
  - Interlinking of rivers – Major projects being undertaken by Government of India

- Value addition in farming
  - Maximize Yield
  - Shift from low to high value added crops
Drivers of tractor growth (Contd.)

- Attract Educated Youth
  - ROI in farming to improve
  - Integration to world commodity trading
  - Increased mechanization

- Credit / Money availability
  - Low rates of interest

- Banks as Catalyst
  - “India One” loan policy
  - Proactive to avoid NPA’s
Farm credit disbursements and y-o-y growth

Figure 4

Source: CRIS INFAC
Indian Tractor Industry – Future Trends
INDIAN AUTO POLICY – KEY FEATURES

- Fully Liberalized, de-licensed Industry with 100% Foreign Direct Investment Permitted
- Progressively Reducing Fiscal Burden
- Fiscal Incentives for R&D Expenditure
- Tightening Safety and Performance Regulations
- Export Promotion, Encouragement to Brand India

*Policy Aims to (i) Establish a Globally Competitive Automotive Industry in India (ii) Double its contribution to the economy by 2010 and (iii) Make India global hub of automotive manufacturing.*
Automotive Mission Plan 2016

- USD 145 Billion turnover by 2016.
- 10% contribution to GDP
- 25 Million additional employment.
- Focused action plan on -
  - Demand Creation, brand building & infrastructure
  - International Trade
  - Competitiveness in Manufacturing and Technology
  - Human Resource Development
  - Environment & Safety
Goals of Automotive Mission Plan 2016

- Employment (Mn): 40
- Exports (USD Bn): 45
- Turnover (USD Bn): 145
- Investment (USD Bn): 52

Values By 2016
## Tractor Testing Facility at CFMT &TI, Budni

<table>
<thead>
<tr>
<th>S.no</th>
<th>Test facility</th>
<th>Test equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>PTO</strong></td>
<td>Fully Air Conditioned Chamber for PTO test.</td>
</tr>
<tr>
<td></td>
<td><strong>PTO Dynamometers</strong></td>
<td>1. Eddy Current Dynamo Fuchino Make (Japan) - Capacity 700 KW</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Hydraulic Shenck Make Germany Dynamometer -- Capacity 1100 KW</td>
</tr>
<tr>
<td>2</td>
<td><strong>Hydraulic</strong></td>
<td>1. Manual Hyd rig</td>
</tr>
<tr>
<td>3</td>
<td><strong>Drawbar</strong></td>
<td>Automatic Load Car, Equipped with 5th Wheel, Dynamometer, Load Sensor, Generator, Software for Calculation of Pull &amp; power</td>
</tr>
<tr>
<td>4</td>
<td><strong>Steering Effort</strong></td>
<td>Oval Shaped Cemented Test Track 0.6 Km</td>
</tr>
<tr>
<td>5</td>
<td><strong>Brake</strong></td>
<td>Automatic Brake Effort Measurement System equipped with Wheel &amp; software to measure deceleration, force, speed &amp; distance traveled with print out.</td>
</tr>
<tr>
<td>6</td>
<td><strong>Vibration</strong></td>
<td>1. Mechanical Vibration measurement System for Displacement measurement</td>
</tr>
<tr>
<td>7</td>
<td><strong>Noise</strong></td>
<td>1. Noise Meter Bruel &amp; Kajer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Cygnet Sound Level meter 2021</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Automatic Anemometer for Wind Velocity</td>
</tr>
<tr>
<td>8</td>
<td><strong>Others</strong></td>
<td>1. Ramp, 12°, 15°, 18° for Air cleaner &amp; parking Brake testing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Roller Test bed for Water Ingress testing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Weighing Bridge for Tractor Reactions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Generator -- one set</td>
</tr>
<tr>
<td>9</td>
<td><strong>Haulage</strong></td>
<td>4 km metallic test track</td>
</tr>
<tr>
<td>10</td>
<td><strong>Emission</strong></td>
<td>AVL Emission Lab -- Complete (Under Commissioning)</td>
</tr>
</tbody>
</table>
National automotive testing and R&D infrastructure project (NATRIP) is India’s first comprehensive initiative to equip India with state-of-the-art automotive testing, homologation and pre-competitive/generic R&D Infrastructure to meet national requirements up to 2015.
Key Benefits of NATRIP

• Creation of infrastructure to enable the Government to introduce global Vehicular Safety, Emission and Performance standards

• Encouraging larger value addition within the country leading to higher sectoral contribution to economy by way of revenues and employment.

• Facilitating development and mass production of high technology driven, affordable and globally acceptable Automotive products

• De-bottlenecking exports of Automotive products
CHALLENGES FOR TRACTOR INDUSTRY.....
BUYING CAPACITY

Transfer of average age of tractor buyer from the age group of above 40 to young people

- Increasing demands
- Higher expectations on comfort levels
- Importance for styling and appearance
- Better finish (Paint finish like cars)
- Importance for brand identities
- Fuel economy
- Awareness about latest technologies
- Likes on new models
- Higher life – resale value
NEW PRODUCT DEVELOPMENT

- Rapid prototyping – Component development
- Engine Performance - Power train research & development
- Styling – Availability of latest software and technologies
- Accelerated testing techniques reduce the development lead time to help industry to introduce new models in shorter periods
NEW REGULATIONS

Emission Regulations in near future
Bharat TREM IV/ EURO 3/ US TIER 3

- Homologation test facilities
- Dedicated Engine development test cells and research labs
- Accelerated durability test rigs
- Engine performance improvement
NEW REGULATIONS

NOISE/ SAFETY/ OTHER REGULATIONS

• NVH Center of Excellence
  - Availability of Anechoic chambers
  - Quiet rooms for subsystem level development
  - Latest software tools for NVH
  - Specialized Test tracks

• Center of Excellence for passive safety
  - Roll over testing
  - Crash testing (if needed)
  - ROPS Testing

• Various Gradients
• Various braking surfaces
• Vehicle dynamics
More Focus on agriculture based energy policy in near future
Production of fuel oil & biomass power
Lucrative alternate markets for farm produce
Reduces the country’s dependence on imported fuels
Alternate energy development – most important agenda for Power train research & development
The recent developments in application of Electronics in Agricultural Tractors like GPS and Auto Cruise systems, etc have helped farmers in great way
MULTIPLE GROWTH IS ACHIEVED IN THE TRACTOR EXPORT TO VARIOUS COUNTRIES

- Testing as per various climatic conditions – one of the challenge for export of tractors – would be addressed by NATRIP Centers
- Testing and Certification as per OECD
- NATRIP would represent INDIA in the technical committees world wide
- Expert team to coordinate with standardization
- Cooperation with other test agencies world wide
- Advanced homologation labs to test as per regulations up 2015
• The Indian Tractor Industry is the largest in the world.
• CAGR of 10% in the last 4 decades.
• Expected to grow at a CAGR of 5-7% to reach a level of 410000 tractors per year by 2010.
• Main drivers of growth of tractor industry are Agricultural growth, increase in allied uses of tractors, primarily haulage and Credit and Money availability.
• Excellent Tractor testing facility is already available in India at CFMT & TI, Budni.
• A project named NATRIP is underway which is country’s first comprehensive initiative to equip it with state-of-the-art automotive testing, homologation and pre-competitive/generic R&D Infrastructure to meet national and international requirements.

• NATRIP is also planning to work with UNAPCAEM in close association in future.