

# Anti Friction Treatment

- Increase in Durability
- Decrease in Noise
- Energy Saving



**HORIZON 2020**

**MOBILITY FOR GROWTH**

**PROJECT PROPOSAL**

**RAY TECHNIQUES LTD.**

**NANODIAMOND TECHNOLOGIES**



# Research Background

Ray Techniques Ltd. (RT) is a private Israeli company established in 2009 and engaged in nanodiamond (ND) technologies:

- Proprietary technology for producing ND powder of high quality by laser treatment of multicomponent hydrocarbon target
- Know-how for ND surface modification and disaggregation in various media
- Design novel highly efficient ND-based products for polishing & lubricating
- Excellent results of testing ND antifriction technology for motor bearings 2QTY Kaydon; 180ARO were obtained by **Acuitas GmbH (Switzerland)**

Manufacturer of antifriction compound	Coulomb friction coefficient	Viscous friction coefficient
Klüber Lubrication München	3.50	0.07
Ray Techniques Ltd.	1.15	0.003

RT established

- contacts with academic groups engaged in tribology (Prof. Izhak Etsion, Technion, Haifa; Prof. Lev Rapoport, HIT, Holon)
- IP protection: patent application, PPA

# Objective

- **The Problem:** insufficient energy conversion efficiency of modern vehicles caused by high friction losses

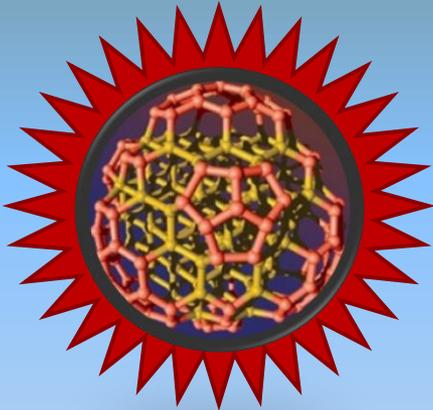


- **The goal:** high increase in the efficiency by significant decrease in friction in engines, transmissions, bearings
  - **Low friction coefficient < 0.01**
  - Considerable increase in **wear resistance** & **durability of tools** (service life of friction pairs enhances by the factor of 3)
  - **Decrease in noise**
  - Possibility of transition to higher precision at the stage of design, reduction of tolerances and **increase in reliability** of mechanism
  - **Energy consumption reduction** by 10-15 %

# Proposed Technology

Running-in (finishing) and exploitation of using special ND lubricants

**Nanodiamond Antifriction Compounds** will increase the efficiency and prolong the service life of friction parts reducing energy consumption



- Diamond core (yellow) with average size of 4-5 nm and unique diamond properties including highest hardness and wear resistance – non-degradable nano-abrasive
- Graphene or OLC structure (pink) –lubricating effect
- Active surface shell of functional groups with unpaired electrons (crimson) – controlled surface chemistry enabling desired interaction with molecules of basic liquid

Fig. ND primary particle

NDs performance in lubricants:

- NDs act as abrasive perfectly polishing the surfaces and reducing the friction
- NDs introduce into friction surfaces and create diamond nano-layer providing superlative wear protection
- NDs act in lubricant as nano-bearings also reducing the friction