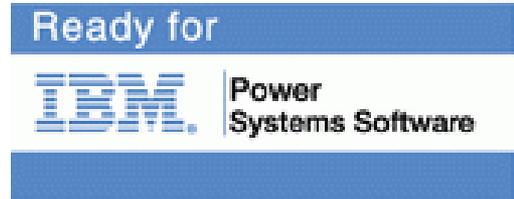# FIDESYS
Finite deformation system

The first Russian-developed next-generation software suite for structural analysis

Skolkovo

intel Software Partner

Microsoft BizSpark Startup

Ready for IBM Power Systems Software

Introduction

In the process of creating a new product or modifying an existing one it's always necessary to analyze possible outcomes of its interaction with environment during actual real-life use.

This problem is solved either by creating a prototype and subjecting it to different conditions of use or by utilizing specialized software for engineering simulation (CAE software)

Fidesys suite is the first Russian multi-purpose CAE software for high-end structural analysis. It will eclipse international competition in terms of accuracy and hardware efficiency, and for a number of tasks commonly faced by industrial designers it will be the only product available in the market capable of high-accuracy simulations.
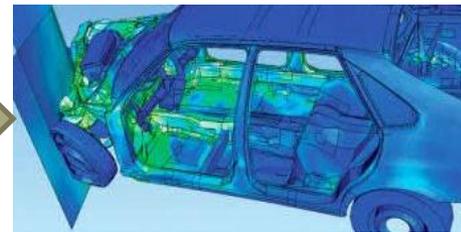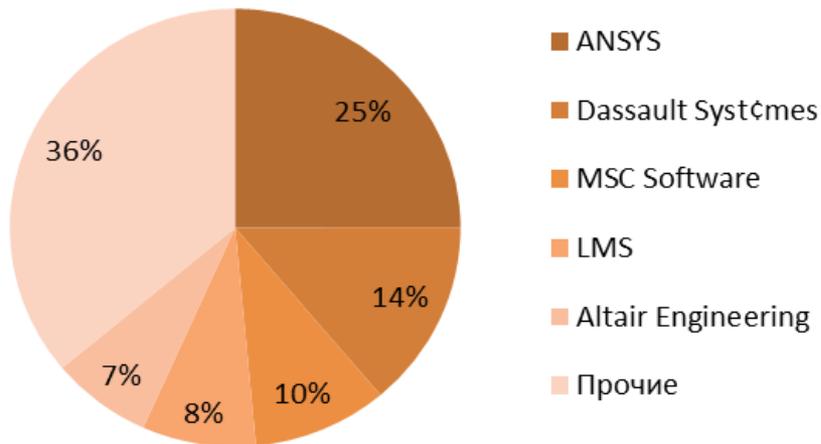
Existing market and competition

The main competitors of Fidesys are American and European developers of CAE packages, as well as players of a broader PLM (Product Lifecycle Management) market, whose product lines include CAE packages.

According to data disclosed by CIMData, a leading CAE market analysis agency, the compound average growth rate of the market in 2004-2008 exceeded 15%. In 2009, which was the year of financial crisis, the market contracted by only 6,4%. In 2010 the market once again expanded with 9% growth rate and reached the volume of $2,32 bln, exceeding the previous maximum level it reached in 2008 prior to the crisis.

MARKET SHARES OF MAIN PLAYERS ON CAE MARKET

- ANSYS — 25%
- Dassault Systèmes — 14%
- MSC Software — 10%
- LMS — 8%
- Altair Engineering — 7%
- Прочие — 36%

Source: CAD/CAE/CAM Observer #64

1. **ANSYS (www.ansys.com)**
Leadership is largely due to the purchase of specialized or successful products (companies): ICEM CFD Engineering (2000), CADOE, SA (2001), CFX Division of AEA Technology (2003), Century Dynamics (2005), Harvard Thermal Inc.(2005), Fluent Inc. (2006), Ansoft Corp. (2008), software which then gradually integrated into a single software system ANSYS. .

2. **Dassault Systemes (www.3ds.com)**
Global market leader in PLM. Annual income from the sale of CAE products is approximately $ 322.6 million. Headquarters of CAE unit is in Providence (Rhode Island, USA).

Advantages

Increased accuracy of calculations and simulations due to utilization of new scientifically approved methods.

More flexible and efficient use of hardware for calculations that dramatically decreases hardware requirements.
The software is developed in a way that allows running it on an ordinary PC, and in case this PC has a video card that supports CUDA (all of nVidia products do) technology, it will utilize it for calculation, speeding them up to 30x times. On the other hand, the software supports MPI (Supercomputer) architecture that allows smooth performance while calclulating super-large tasks (several million nodes in a mesh).

The ability to solve several types of tasks unavailable in competitors' software
(see the next slide).

Lower price of purchase and support for the clients (25-35% lower in top-featured version).

Advanced capabilities

- More precise estimation of nonlinear effects arising under finite strains and their redistribution;

- Ability to take into account a forced change of the solid's shape (structure's element) under large deformations and loading, origination of new surfaces in a loaded solid;

- Ability to take into account a change of material properties (including phase transitions in solids) under large deformations and loading, including calculations for nano-size templates;

- Taking into account modern views of constitutive equations;

- Ability to solve different types of coupled problems including the case of finite strains;

- Application of the newest calculus schemes of solving problems of mathematical physics, for example, a fully explicit spectral element method and discontinuous Galerkin method.

- Use of modern program libraries and tools which allow drastically simplify development and speed-up computational processes.

- Parallelization of computational processes. Use of shared memory systems. Massively-parallel systems. Calculations on clusters.

- Application of the newest technologies using additional PC resources, for example CUDA.

- Cloud computing support by means of SaaS Fidesys-online – a web-interface to CAE Fidesys allowing oad a model using a browser and carry out remote computation in a cloud.

Expected demand for the product

Due to the fact that engineering analysis must be performed while creating complex material product, the range of potential clients for the company is understandably wide.

The priority industries are the following:

• **automobile;**	
• **nanotechnology**	• **electronics;**
• **oil and gas**	• **telecommunications;**
• **aerospace**	• **civil and industrial construction;**
• **energy;**	• **chemical industry;**
• **engineering and construction;**	• **pharmaceutical;**
• **military and defense**	• **production of consumer goods;**
• **shipbuilding;**	

Features of Fidesys software are highly demanded in areas where large deformations and their *redistribution* must be taken into account in nonlinear strength and destruction mechanics and mechanics of phase transitions:

1. **As an application for traditional rubber-like materials and polymers (rubber and tire industry)**
2. **Biomaterials (use of biomaterials in medicine)**
3. **During designing of materials with properties that change under loading (development of new construction materials)**
4. **Nano-size crystalline templates (nano-particles, thin films and defectless domains nearby growing nano-size defects)**
5. **During solving research problems (universities, research laboratories)**

The Team

- **CEO of the Project**

Vladimir A. Levin, Doctor of physical and mathematical sciences, Professor of Moscow State University, Department of Mechanics and Mathematics, Computational Mechanics.

- **Head of R&D**

Valery Levitas, Doctor of physical and mathematical sciences, Doctor-Engineer habil. in Continuum Mechanics Schaefer 2050 Challenge Professor, Department of Mechanical Engineering and Department of Aerospace Engineering, Department of Material Science and Engineering (courtesy appointment), Iowa State University

- **CTO of the Project**

Anatoly V. Vershinin, Candidate of physical and mathematical sciences, Associate professor of Moscow State University, Department of Mechanics and Mathematics, Computational Mechanics.

- **Technology development team**

Group of graduates (3 PhDs under 28), PhD and masters students of Department of Mechanics and Mathematics of Moscow State University.

Currently, the team is geographically located in the Science Park of Moscow State University.

- **Independent Director of Business Development**

Arseny Tarasov, World-class expert in the field of corporate sales of complex software; ex-VP of Parametric Technology Corp, Worldwide Regional Director of the Year 2008; ex-Managing Director of Siemens Enterprise Communications Russia & CIS

- **Consulting professors**

9 professors (incl. 2 RAS corresponding members, full professor of the University of New Hampshire), 2 of them with full-time engagement.

Commercialization approaches

- **Sales of software suite and support services**

We plan to have three builds of software suite: Corporate, University and Research. The price for a corporate license is going to be 25-35% less than that of the main competitors. Service support will vary from 10% to 20% of the annual license costs, that does not exceed the fraction of the cost of service support of the main competitors (Ansys, SolidWorks, Nastran) (in %% of the cost of the license).

- **Delivering paid access to Web-based Cloud-computing SaaS version of the product**

At the current (starting) stage of the Project we are going to make a limited version of the software available via a SaaS framework for free in order to promote the company as well as receive early feedback from our customers. As the development progresses, we will make available a version with significantly more features for use via a paid subscription. On June 29, 2011 we launched a basic (stripped-down) version of the Fidesys Online, including only one processing core (Finite element method) and limited functionality.

- **Development of specialized custom industry-specific products for large corporations**

Companies operating in highly specialized industries (e.g. drilling equipment production) often require a customized approach to engineering simulation and thus require CAE software that will take into account the specifics of the industry.

When pre-alpha stage of development is completed, we will have at our disposal the resources that we need in order to develop such specialized software.

- **Performing engineering consulting, calculations and problem-solving.**

In some cases a customer lacks manpower or brainpower for fully utilizing the potential of a CAE solution it uses for design and simulations. In this case we are ready to offer a range of services concerning task formulation, developing a model, choosing of a solver, and modeling itself using Fidesys cores or other software. We can also write a small custom-made module that will solve a specific simulation problem for a client.

Project status

- **More than 30% of development completed**
  SaaS – 2Q2012, Alpha – 4Q2012, Beta – 1H2013

- **IP protected in Russia**.

- **Completed engineering consulting projects using our own software**: Rosatom, Sibur – Russian Tyres, Schlumberger.

- **Residents of Skolkovo Innovation Centre.**

- **Attracted Round A from a Russian business angel and Skolkovo fund (co-financing agreement) in August 2011:** approximately $1,1 mln for R&D.

- **Additional funding requirements:** $5 mln (Skolkovo co-financing agreement will provide additional $5 mln in grant money) in June 2012 for product development completion and international launch.