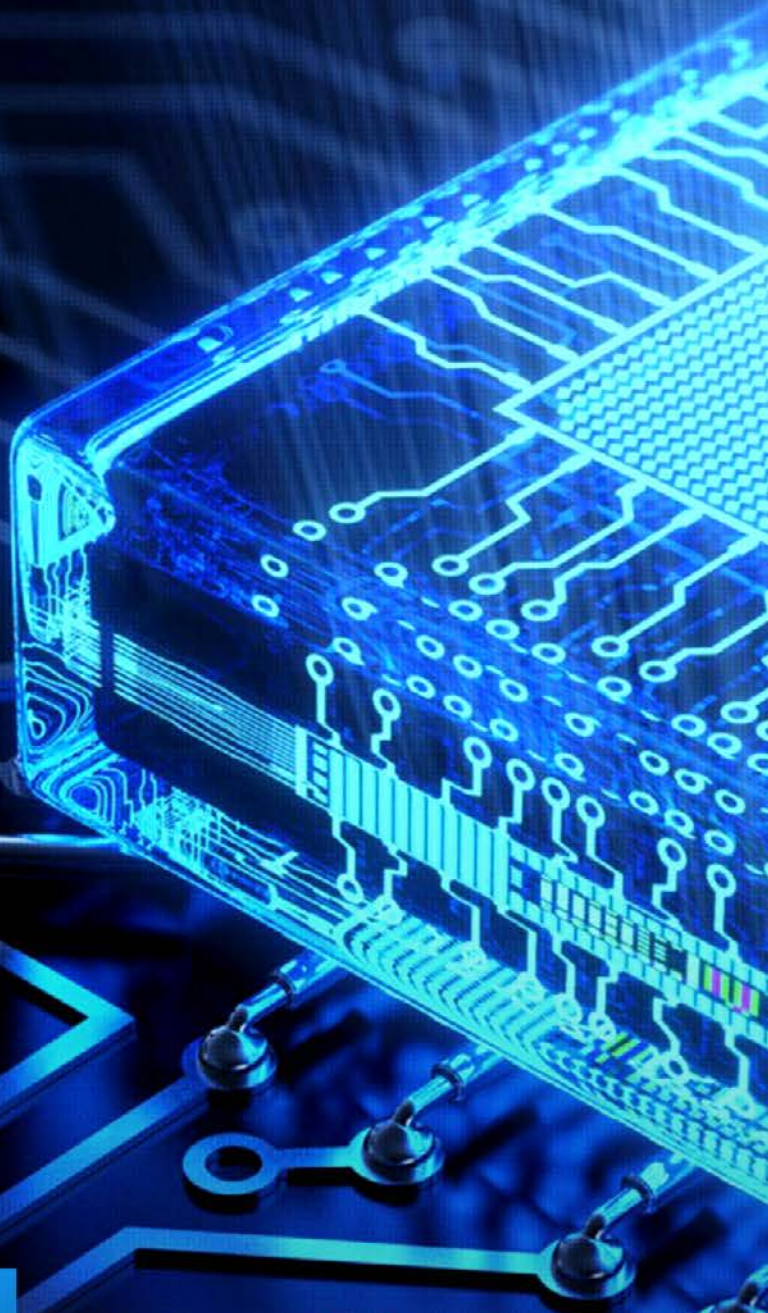




AIDL

**MODERN MOBILE
PRODUCTION OF ELECTRONICS**

VITIM — NEW ERA OF MODERN SOLUTIONS!

Electronics market is rapidly developing now. However, current mega factories, churning out same-type microchips in multimillion copies, focused on large business players only. Fast-growing market of a breakthrough product — new special-purpose devices and tools, manufactured by innovative startups and medium businesses, requires small batches of modern electronic chips (from a single-piece to dozens of thousands of numbers). Demands of this sector are more than 50% of entire electronics market nowadays as the researches report. Nevertheless, the market is not ready and capable of satisfying the demand for a one-off production of microcircuits and readymade IP-modules. The modern electronic industry has no any released technological solutions to settle similar tasks.

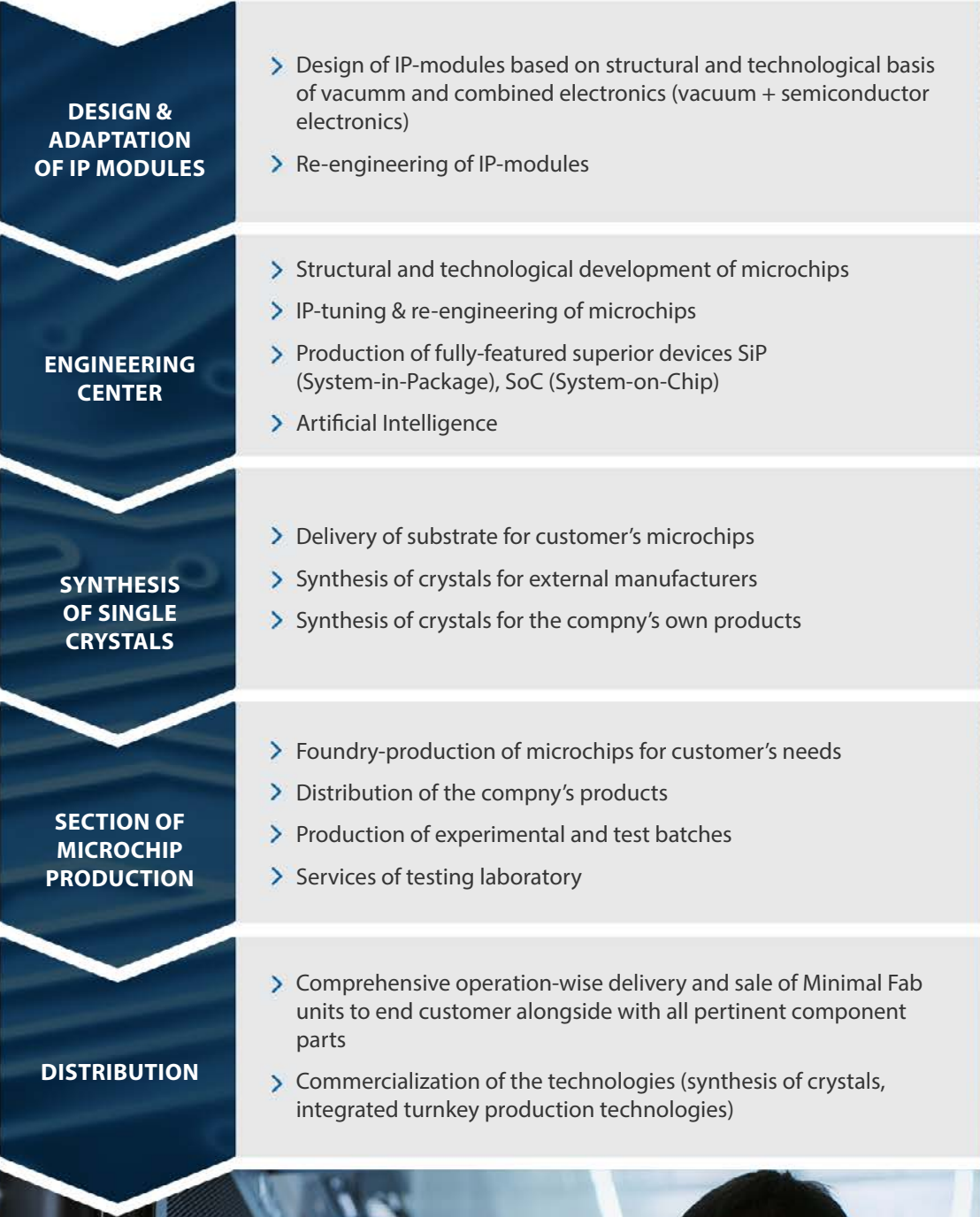
ADGEX VITIM established a unique laboratory of AIDL format (Agile Integrated Device Laboratory), representing the gold standard of the future of microelectronics. AIDL is the newest technological model, making the electronics “individual” and reducing the huge areas of modern production facilities to the size of small mini-laboratories. VITIM has divided all key intellectual and production chains of modern microelectronics, carried out full reengineering and concentrated each of the processes into the format of space-saving production unit. AIDL approach encapsulates engineering and scientific center, synthesis of ideal crystals technology and mobile modular production of highly-integrated microcircuits as well as “system-on-chip” & “system-on-crystal”.

Competitive strength of AIDL approach is capability to design IP-modules in a short space of time and make an “one-off” or limited numbers of microcircuit of any complexity in a matter of days.

COMPONENTS OF AIDL LAB

- Marketing center for market monitoring and coordination with customers
- Design-center for development of IP-modules under the design and technological basis of semiconductor and vacuum electronics
- Engineering center: engineering study division and technological sector
- A plot for single crystal growth, zone purification and polishing
- Microelectronic production based on Minimal Fab units (photolithography, coating of metals, dielectric layers, dry etching, liquid and thermal processing, tuning and packaging)
- Testing laboratory

AIDL MODEL FLOWCHART



“FOUNDRY” BUT NOT A “FAB”

MOBILE MICROELECTRONIC PRODUCTION

Minimal Fab includes all necessary technological processes for AIDL production — starting from preparation of wafers to packaging.

Minimal Fab is a set of space-saving high-tech units of 30 cm in width, capable of processing wafer with diameter of 0.5 inches and produce various chips in small and medium numbers. Each technological process of a chip production is fulfilled using different Minimal Fab unit. Processing time of a wafer on a single Minimal Fab unit takes no more than 60 secs. The units are interconnected with robot manipulator, carrying out transportation of wafers in hermetic containers “Minimal Shuttle”, obviating the need for sterile rooms, expediting overall production process and reducing the expenses.

The photolithography technology used in Minimal Fab units is based on maskless patterning method. No need to make artwork masks. Such method substantially shortens the time to prepare for production process, reduces the operational costs and makes it possible to responsively rectify mistakes and change a product’s topology.



Mobile laboratory-production complex of AIDL VITIM allows producing microelectronic tools under the technologies of CMOP, MEMS, NEMS, vacuum microelectronics and other advanced fields of electronics development.

COMPETITIVE ADVANTAGES OF AIDL-FOUNDRY



**TAILORED
APPROACH**



**SHORT
PRODUCTION TIME**



**ANY BATCH
TO ORDER**



**LOW
PRODUCTION COST**

NEW ARCHITECTURE OF ELECTRONIC DEVICES AND TOOLS

Technology of Vacuum Integrated Circuits (VIS) is based on fundamental researches and developments of field emission microtools. For more than 30 years of expertise our scientists have elaborated revolutionary structural and technological platform of vacuum integrated tools and devices based on new component basis "VIS". Such approach allows VITIM to design and produce microcircuits of the next generation, which will qualitatively excel all current semiconductor circuits in all major specifications.

Introduction of a new component base VIC changes the entire principle of the chips' operation, meaning that VITIM moves from a binary systems to intellectual matrices, built on the basis of neuromorphic architecture — the one similar to the human brain.

Human brain contains about 100 billion of neurons. Each of them is linked to thousands of identical cells, fulfilling relatively simple operations. Henceforth our brain represents factually perfect concurrent and analogue processing unit.

The most advanced computer, containing gigantic number of logic cells, can't be compared with human brain because of the way how the information is processed there. The information in our brain is treated like in multidimensional matrix, which comprises interconnected neurons with the data distributed and stored in the form of weight coefficient. In such neural networks operations of computation and commutation are combined together.



Production of intellectual matrices under the VIS technology will allow VITIM to produce an innovative supercomputer, which data exchange processes will be similar to neuron matrix of human brain. Implantation of such computers into microchips as well as application of a new component basis VIS will drastically improve characteristics of all produced electronic devices and greatly enhance their functions.

VIS TECHNOLOGY IS A TRANSITION TO A NEW ARCHITECTURE OF ELECTRONIC DEVICES AND TOOLS AS WELL AS CREATION OF FULLY-FEATURED ARTIFICIAL INTELLIGENCE SYSTEMS

SYNTHESIS OF SINGLE CRYSTALS

SINGLE CRYSTALS GROWTH PLOT OF ADGEX VITIM INCLUDES:

- 1 OWN SCIENTIFIC SCHOOL IN SINGLE CRYSTALS GROWTH FIELD
- 2 SYNTHESIS TECHNOLOGY OF SINGLE CRYSTALS "EXCEPTIONAL ENVIRONMENT"
- 3 UNIQUE GROWTH CHAMBERS FOR SINGLE CRYSTALS SYNTHESIS

Applicability of the crystals, grown under the technology "Exceptional Environment" excels all existed material engineering fields and simultaneously reveals new unexplored areas for their application.



"IDEAL" SINGLE CRYSTAL

Ultra-Perfect or "Ideal" single crystal is volumetric crystalline system with completely faceted crystallization frontline, free from defects with high transparency level.

"EXCEPTIONAL ENVIRONMENT" is based on the method of layerwise growth by means of creating perfect-suited natural environment. Unique chamber, specially designed for the technology allows growing structurally ideal single crystals with unparalleled weight-size parameters.



UNIQUE IN WEIGHT AND SIZE SCINTILLATING CRYSTAL ZnWO_4 GROWN UNDER THE TECHNOLOGY "EXCEPTIONAL ENVIROMENT". Length — 240 mm, diameter — 90 mm

COMPETITIVE STRENGTH OF THE TECHNOLOGY "EXCEPTIONAL ENVIRONMENT"

Parameters	The method "Exceptional Enviroment"	Other methods
Weight	20 kg	1 kg
Size of crystals diameter length	Up to 140 mm Up to 300 mm	Up to 50 mm Up to 150 mm
Dislocating density	not higher than 100 cm^2	10000 cm^2
Energy consumption of 1 chamber	5kW	30kW
Efficiency ratio of initial materials consumption	90%	40%

GROWING CHAMBERS

ATMOSPHERIC APPARATUS GENESIS-AIR

Atmosphere chamber
GENESIS-AIR is designed
for synthesis of oxide single
crystals in aerial enviroment
at atmospheric pressure and
temperature of max 1600°C



Possible crucible materials:
platinum

Operating temperature:
up to 1600°C

Power consumed:
5 kW

Diametr of crystals:
up to 160 mm

Temperature accuracy:
0,01°C

Weight accuracy:
min 20 mg

Weight of growing crystals:
up to 50 kg

Product yield:
up to 90%

**DELIVERY
OF READYMADE
SINGLE CRYSTALS
AND COMPONENTS**

SCINTILLATION CRYSTALS

$CdWO_4$, $ZnWO_4$, $Bi_4Ge_3O_{12}$, $PbWO_4$

ACOUSTO-OPTIC CRYSTALS

TeO_2 , $PbMoO_4$

NON-LINEAR OPTICAL CRYSTALS

$LiNbO_3$, $LiBO_3$, $KTiOPO_4$, BaB_2O_4 ,
 $RbTiOPO_4$

LASER CRYSTALS

$KGd(WO_4)_2:Nd$

FERROELECTRIC CRYSTALS

$SrBaNb_2O_6$,
 $(PbMg_{0.33}Nb_{0.67})_{1-x}(PbTiO_3)_x$

VACUUM APPARATUS GENESIS-BAR

Vacuum chamber
GENESIS-BAR is designed
for synthesis of single
crystals in vacuum or
gaseous enviroment
at atmospheric pressure and
temperature of max 2300°C



Possible crucible materials:
**platinum, iridium, quartz,
graphite, boron nitride,
silicone carbide, tungsten,
molybdenum, alundum**

Operating temperature:
up to 2300°C

Power consumed:
10 kW

Diametr of crystals:
up to 260 mm

Temperature accuracy:
0,01°C

Weight accuracy:
min 20 mg

Weight of growing crystals:
up to 100 kg

Product yield:
up to 90%

**DELIVERY
OF READYMADE
SINGLE CRYSTALS
AND COMPONENTS**

LEUCOSAPPHIRE CRYSTALS

Al_2O_3

LASER CRYSTALS

$Al_2O_3:Ti$, YVO_4 , $Gd_3Ga_5O_{12}$, $GdVO_4$,
 $Y_3Al_5O_{12}$, $YAlO_3$, $BeAlO_3$

SCINTILLATING CRYSTALS

$LuAlO_3$, Lu_2SiO_5 , $(Lu,Y)_2SiO_5$,
 Gd_2SiO_5 , $LaBr_3$, $CeBr_3$

FERROELECTRIC CRYSTALS

$LiTaO_3$, $KTaO_3$, $La_3Ga_5SiO_{14}$

OPTICAL ELECTRIC CRYSTALS

ZnO , Ga_2O_3 , $ZnSe$

SEMICONDUCTING CRYSTALS

Si , Ge , $CdTe$, InP , $ZnTe$, $GaAs$,
 $CdZnTe$, $CdMnTe$

NON-LINEAR OPTICAL CRYSTALS

$GaSe$

LUMINOPHORES

ZnS , Tb_2O_3 , Sc_2O_3

MICROCHIPS EXPRESS PRODUCTION

Microelectronics is not changed, it just became fully customized!



One week only is needed for ADGEX VITIM to design, produce and test for you an IP-module of any complexity under CMOP, MEMS, NEMS or VIS technologies on the basis of individually produced wafer from our own crystals. Production time of a standard chips is 1 day max.



Tailored approach

Engineering and reengineering of IP-modules



Short design time

Min production period — 1 day



Any batch to order

A "one-off", small or medium batches to order



Design is much cheaper

As compared to mega-foundries

SYNTHESIS OF IDEAL CRYSTALS

Owned technology of single crystal growth



The team of our high-qualified specialists, Following the tailored approach will grow any required number of ultra-perfect large single crystals under LTG Cz technology

CdWO ₄	Y ₃ Al ₅ O ₁₂	Ga ₂ O ₃	TeO ₂	ZnWO ₄
LiNbO ₃	BeAl ₂ O ₄	CdZnTe	CdTe	Ge



Melt crystallization

Low-gradient single crystals from melt



Short synthesis period

Synthesis of 1 crystal takes 7 days



High purity of crystals

Dislocating density is max 100 cm⁻²



Large single crystals

Diameter — up to 260 mm, height — up to 500 mm

