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*REDEFINING THE FUTURE OF
COMMERCIAL DRONES:*

*HIVE SYSTEMS AND
THE CHALLENGES AHEAD*





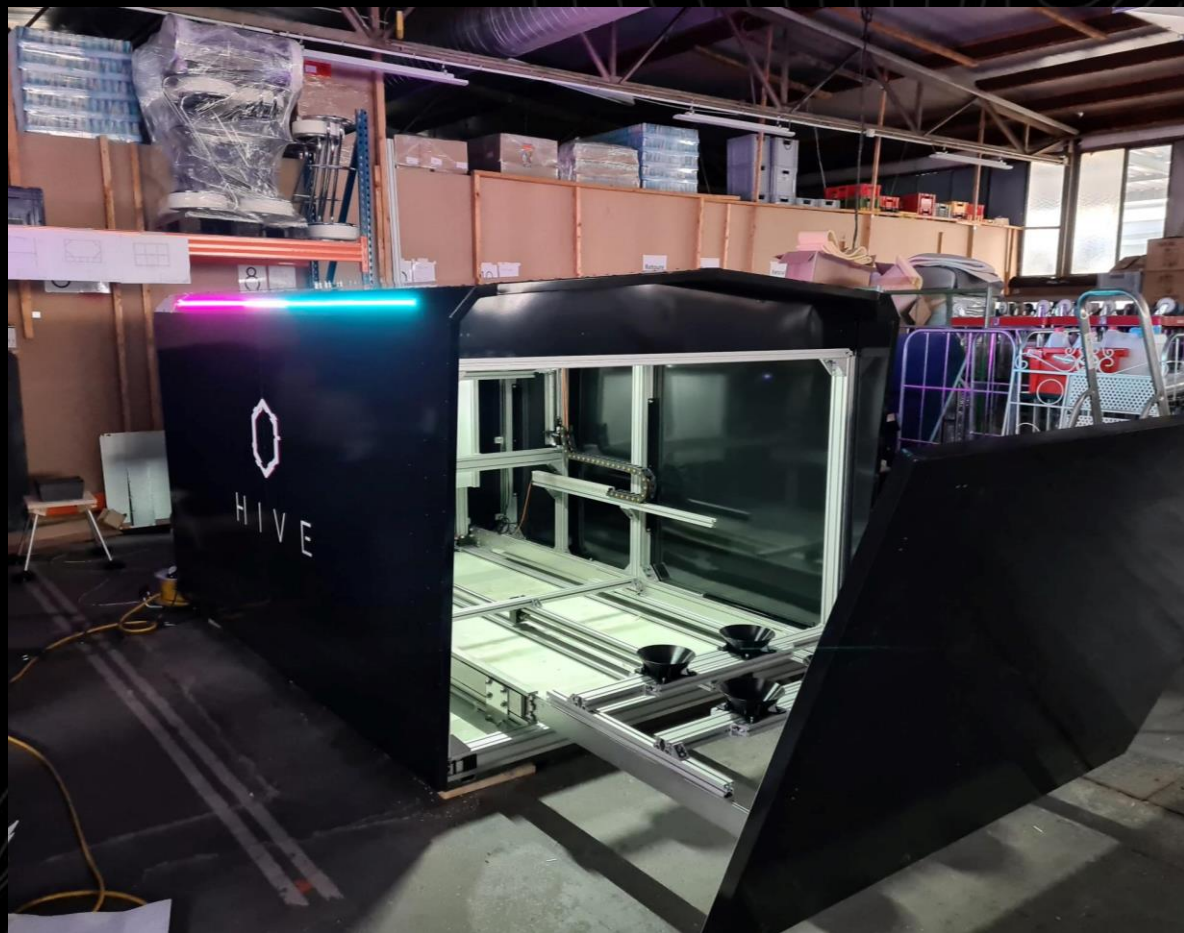
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THE PAST: HIVE

Systems

- *Previous business of founders was photogrammetry for German authorities*
- *Felt the need for automation to save costs and improve drone service availability*
- *Founded HIVE Systems with the idea to create a drone “dock” with battery changing abilities*
- *Moved away from big Asian drone manufacturers because of security concerns, settled on in-house developed drone battery kit*





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THE PAST: Challenges

- *Designing the battery changing mechanics and finding suitable, cost-efficient parts*
 - *Hiring expensive industrial designer, no CAD and PDM available*
- *Requiring a smart battery kit to fulfill the needs for an automated operation*
 - *No mechanical engineer yet due to small team, only FreeCad available*
- *Centring the drone after landing due to GPS inaccuracies*
 - *Outsourcing mechanical development to part supplier*
- *Decision to open drone port sideways, not from the top*
 - *Less complicated CAD design*



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THE PRESENT: HIVE Systems

- *Design change to 10ft shipping container*
- *Building and testing first iterations of own battery kit*
- *Building and testing a working prototype*
- *Application for BVLOS licence*
- *Detection of fire hazards for pioneer customer*
- *Team grown up to 6 employees and 2 students*
- *Specialized teams: ME, drone systems, Front End SW, ...*



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THE PRESENT: Flight Operation Challenges

- *GPS position → CAN integrated GPS modules*
- *Drone communication → 4G/5G cellular communication
add. to regular radio connection*
- *Video feed → Using cellular network*
- *User integration → Click '2 fly and extensive route
planning options*
- *Reliable mechanical components → Replacing 3D-prints
with metal parts and testing*
- *Wind resistance → See for yourself!*





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THE PRESENT: Challenges

- *CE-Marking for legal operation*
 - *Part-lists and drawings for the certification process*
- *Merging of CAD-files from old to new system*
 - *FeatureWorks helps restoring parametric models from imported STEP files*
- *Implementing useful meta data for all CAD items*
 - *Ability to create custom categories like supplier or 3D-print*
- *Transforming the existing “explorer” database to proper PLM*
 - *Fully equipped PLM system native to the CAD (SolidWorks)*
- *Modern CAD for fully digital workflow: 3D-modelling, GD&T, Drawings, CAM and Simulation*
 - *SolidWorks!*



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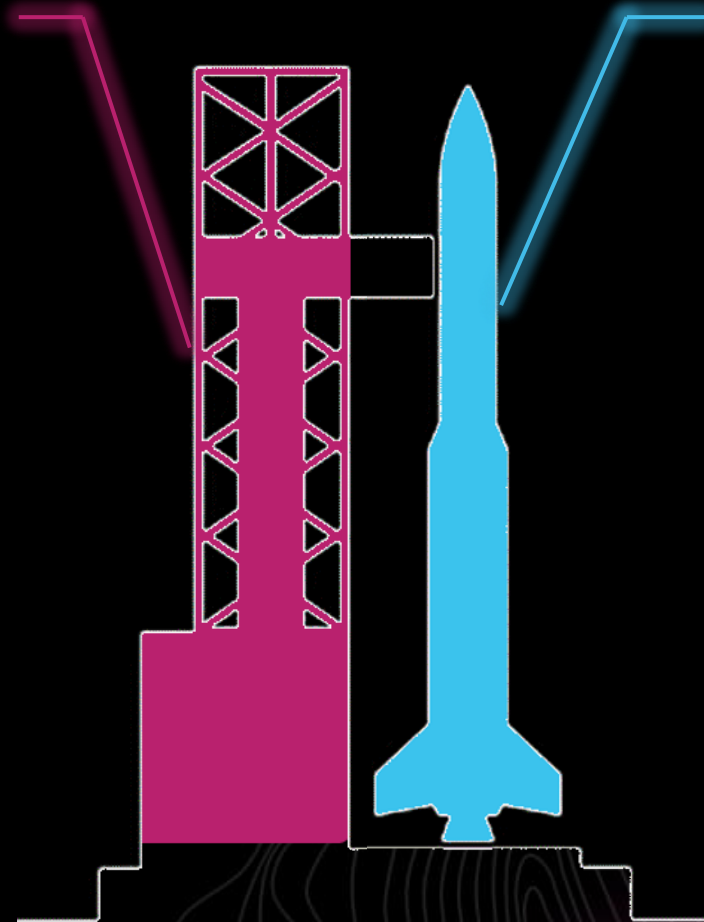
THE FUTURE: HIVE Systems

TODAY (2023)

HARDWARE & BASELAYER
SOFTWARE DEVELOPMENT

- HW & Basic SW development is an **initial requirement**
- High **security (failsafe) standards have to be met** before advanced SW development can take off.
- HIVE production is **easily scalable** due to its modular, assembly only design
- The **preliminary development** is already **mostly finished**

**BUILDING
THE BASE**



TOMORROW (2024+)

ADVANCED SOFTWARE
DEVELOPMENT

- Advanced software development is the **core business model** of HIVE
- **Customers buy data, not drones** (i.e., security data, fire hazard detection data, geoanalytical data)
- **SW development** for specific use cases & customers will become the main driver for both R&D and value creation

**LAUNCHING
THE BUSINESS**



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THE FUTURE: Challenges

- *Designing drones in-house*
 - *Fluid simulation, generative design, surface modelling*
- *Scalability for increased production demand*
 - *CAD & PLM independent of user number*
- *Large teams in different locations, simultaneous working on the same assembly*
 - *Full Cloud availability*
- *Avoiding late-stage PLM transfer thus saving costs*
 - *Easy-to-use, early PLM integration*
- *Future-proof*
 - *DS integrating new features as early as possible*
- *Tablet compatible for fully digital workflow*
 - *Full access to 3DPlay, drawings and part-lists in the workshop or in the field*



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LIVE-DEMO

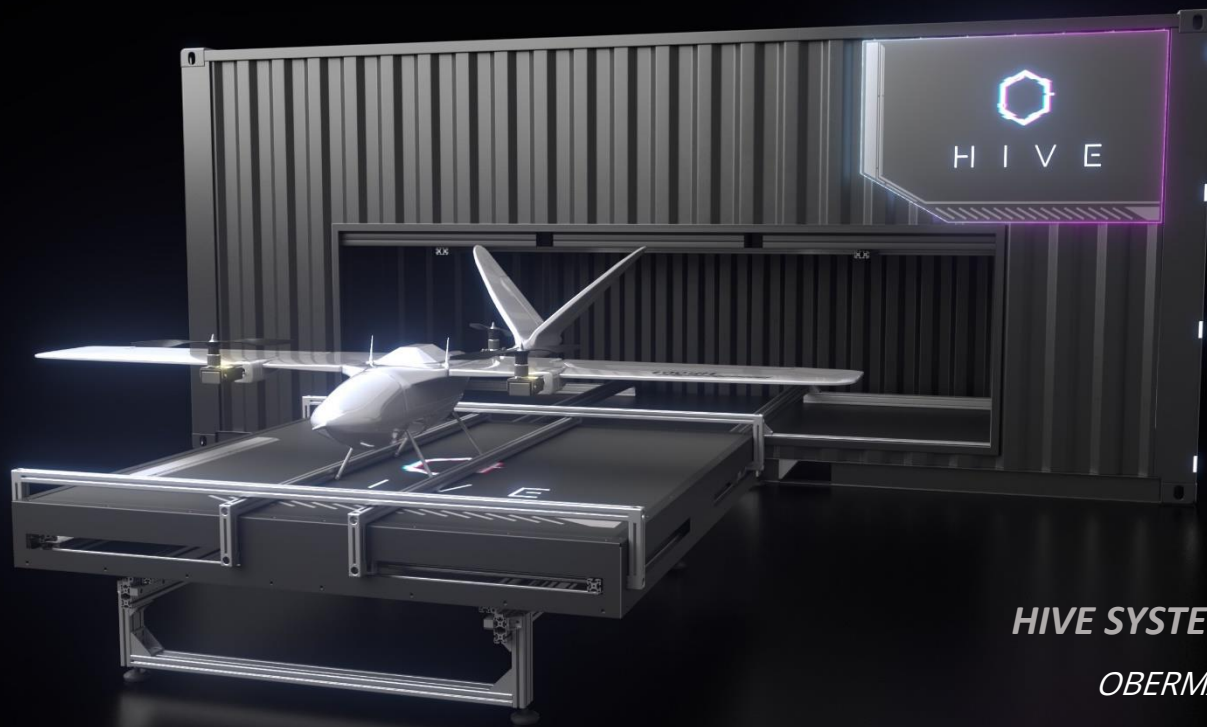
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