



An Engineer's Perspective: Industry vs Labs vs University

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Typical Ampegon/Customer Relationships:

Customer	Positives	Negatives
Universities	<ul style="list-style-type: none"> • Smaller projects with fewer technical demands • Able to coordinate closely on project development • More freedom for purchasing decisions 	<ul style="list-style-type: none"> • Small, time-limited project funding • Little scope for preventative maintenance or running costs • Low price = choice between low specs OR low quality • Typically few dedicated support staff – reliance on research students • Each system is typically one-off (= expensive!)
National / International Labs	<ul style="list-style-type: none"> • Initial investment funding typically good • Draws upon international academic expertise • Able to coordinate closely on project development • Demanding specifications drive development • Able to form long term relationships • Greater production volumes possible 	<ul style="list-style-type: none"> • Demanding specifications for flexibility AND performance • Reliant upon public funding, and subject to political will • Long/Complex procurement process to safeguard public funds • Reliability demands conflict performance demands • Unfamiliar with implications of «small changes» midway through design process (esp. price!)
Industry	<ul style="list-style-type: none"> • Well funded • Typically required for single purpose/application • Simplified, rapid decision making process • «Blackbox» philosophy. (I don't care <i>how</i> it works, as long as it works right!) • Focus upon quality and reliability over price 	<ul style="list-style-type: none"> • Reliability is <i>absolutely critical</i> • IPR/NDAs/Patents prevent sharing of information • Funding may be suddenly removed according to economic conditions

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RF Amplifier for University of Frankfurt:

- Ampegon delivered a 175 MHz, 250 kW, CW/Pulsed for «FRANZ» RFQ cavity development project.
- One-off system meant development project was significant proportion of cost.
- Excellent cooperation through design stage and skilled technicians for installation.
- We understand that the system is regularly mothballed.
- No anticipated funding available for spare-parts and servicing in future.



RF Amplifiers for PSI Short Pulse Klystron Modulators and Solid State RF Amplifiers

- Ampegon has been working with PSI to develop the new standard of short pulse C-band (5.7 GHz) modulators with pulses **< 4 μ s** delivering **50 MW pulses!**
- Large project: PSI plans to acquire 26x additional systems following assessment of prototype.
- Long term (2012 – 2014) relationship to develop and deliver 500 MHz, 65 kW solid state RF amplifier.
- Demanding specifications driving developments forward. Our technology partnership continues.



Medical Applications: Heavy Ion Cancer Therapy

Numerous particle accelerators ordered by [sensitive] for proton/heavy ion cancer therapy centres internationally.

Each system is identical, and optimised for continuous operation within defined limits.

Ampegon scope of supply (per accelerator)

- A 250 kW RF amplifier system for the RFQ-LINAC, a 1400 kW RF amplifier system for the drift tube LINAC, a 4 kW RF amplifier system for the debuncher and an RF amplitude and phase regulation system (digital)
- [Redacted: Additional details subject to non-disclosure agreement]
- No new systems planned following reassessment of commercial situation.
- Existing systems continue to make use of spare parts service



Ampegon's Perfect Customer!

- Has a defined project with fixed aims and secured funding.
- Understands the need for positive cashflow in business. Able to pay significant downpayment for 18 month project.
- Able to form long term relationship based on previous experience.
- Realises that *cheaper* isn't necessarily *best value*.
- Understands that one-off production of high quality, high performance, flexible system, to be delivered quickly will be **EXPENSIVE!**
- Requires development of a prototype that becomes a standard product, enabling economies of scale in production. Standardized products can be made more efficiently.
- Develops new uses for the same technology, providing new customers
- Has a five-year plan, insulated from political/economic turbulence
- Needs aftersales support/spares for next 20 years
- Understands that companies **MUST** make a profit to survive and invest in future developments.
- Has HQ 5km away...next to a beach.



Thank you!



Transmission
Systems



Antenna
Systems



Scientific
Applications



Green
Technologies