EXECUTIVE SUMMARY

Over £100 billion worth of beer are produced worldwide each year, nearly all of which is brewed by traditional techniques that haven’t changed for many years. As a result, the time to brew a batch of beer varies unpredictably, often from 8-12 days. A mere 1% reduction in the average batch time is worth almost £130 million in the UK alone, and industry experts estimate that an optimal control strategy would increase production by up to 20%.

The goal of reduced batch time variation has been identified as desirable in the past, but has also remained elusive because of the lack of tools appropriate for the task. In fact, market research indicates that many companies are unaware of the extent of the performance improvement available through the application of Advanced Process Control (APC) techniques. Specifically, Cambridge Performance Solutions (CPS) has identified a current market opportunity to undertake performance improvement using APC technology in batch fermentation industries.

MISSION STATEMENT

It is Cambridge Performance Solutions’ intention to become the leading provider of control solutions for batch fermentation industries. CPS will achieve this position by:

- developing the most technologically advanced techniques of fermentation control
- exceeding customer expectations through exemplary customer service

CAMBRIDGE PERFORMANCE SOLUTIONS: FERMCON

To address the needs of the brewing industry, CPS has developed FermCon, an equipment and software solution. FermCon optimises the batch fermentation process using advanced control to achieve:

- improved quality through compensation for variations in raw materials
- improved production planning through more regular batch times
- increased production through faster average batch times

Four UK brewers have been approached and are eager to take part in an initial Proof of Concept installation of the CPS system. Interviews have revealed that the potential gains generated by the CPS control system are directly in line with their goals.

---

1 Chris Boulton and David Quain, Brewing Yeast & Fermentation
THE MARKET
Brewing is an international business, with ‘the big four’ - Anheuser-Busch, SABMiller, InBev and Heineken - controlling 46% of the global beer market, worth £100 billion per year. The UK market alone, which is the second largest in the EU and the seventh in the world, generates sales totaling £12.8 billion per year. CPS has compiled a list of 62 UK brewers having appropriate production capacities, who together produce 58 million barrels of beer each year.

Market research reveals several key factors influencing the strategic marketing of CPS’ products and services, including brewery size, global presence, culture and geographic location. Our plan is to firmly establish our brand and reputation initially in the UK, before expanding to EU and overseas markets. We will achieve this goal by widely publicising the success of our four initial Proof of Concept implementations.

COMPETITIVE STRATEGY
CPS is strategically positioned to win major clients in the UK brewing market. Our success in attracting Proof of Concept work with four industry leaders demonstrates the value and timeliness of CPS’ products and services.

Although we do not believe that CPS has any competitors at present, it is very important that we maintain a watching brief on companies that may have the capability to enter the market sector. CPS will maintain its first-to-market advantage through:

- continued innovation in new batch fermentation industries, such as bioprocessing
- ongoing research into our unique nonlinear control techniques, in conjunction with our world-class University of Cambridge partners
- establishing and maintaining a first-class reputation for quality and service

FINANCIAL PLAN
The profit objective for each of the first two years is to cover costs, not to make significant profit. During this period the Proof of Concept projects will be implemented and the company’s forward financial targets can then be determined, based on the success of the Proof of Concept projects.

Applications have been made to three sources, each for £180,000 funding. In the first of these competitions, the DTI Technology Programme, out of 974 preliminary applicants, CPS has been selected as one of 160 finalist companies.
The growth of CPS in Year 3 and subsequently will be determined by the magnitude of benefits revealed by the Proof of Concept projects and by our success in communicating this to the brewing industry. CPS aims to set its prices so as to achieve a Gross Margin of at least 40%. Contractual interest at this stage from the brewing companies might be sufficient by itself to launch the second phase of CPS’ operations, though our expectations are that venture capital funding will be required at this stage, but not sooner.

**Exit Strategy** If the funding sought is granted, CPS will reach the start of Year 3 with no debtors and 100% owned within the company. At that stage, venture capital may be sought, in exchange for a share in company ownership.

An exit strategy for the VC company or for CPS’ owners is likely to involve the sale of CPS to a large Automation Company, such as AspenTech, one the brewing groups or a company such as The MathWorks, which is seeking to get into the chemical and biochemical process industry.

**MANAGEMENT TEAM**

CPS has assembled a world-class, highly experienced team of staff, consultants and advisors, allowing it to grow as the market opportunity is exposed.

On staff are several world renowned researchers in control operations, as well as a CEO who is highly experienced in managing control projects of this type in various industries. CPS can call on the expertise of consultants in both the chemical and pharmaceutical sectors and has a list of active advisors for all business and financial matters.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRODUCT AND INDUSTRY DESCRIPTION</td>
<td>1</td>
</tr>
<tr>
<td>COMPETITIVE ANALYSIS</td>
<td>8</td>
</tr>
<tr>
<td>MARKETING PLAN</td>
<td>12</td>
</tr>
<tr>
<td>OPERATIONS PLAN</td>
<td>17</td>
</tr>
<tr>
<td>FINANCIAL PLAN</td>
<td>19</td>
</tr>
<tr>
<td>MANAGEMENT TEAM</td>
<td>23</td>
</tr>
<tr>
<td>CPS INCOME STATEMENT: PROOF OF CONCEPT PHASE</td>
<td>26</td>
</tr>
<tr>
<td>CPS CASH FLOW STATEMENT: PROOF OF CONCEPT PHASE</td>
<td>27</td>
</tr>
</tbody>
</table>
PRODUCT AND INDUSTRY DESCRIPTION

The CPS fermentation control system increases production, improves quality and makes scheduling easier.

FermCon is an equipment and software solution that optimises the batch fermentation process.

The CPS fermentation control system FermCon reduces variations in batch times by adjusting the temperature and specific gravity profile at key points during the batch. The controller is implemented as an advisory system that tells the operator, well in advance, of required adjustments. Its advice is based on measurements of process parameters acquired either from lab analysis of samples taken by operators or from automated sensors.

FermCon consists of two parts: a data collection system, which may or may not be automated, and a computer running CPS’ proprietary software package. In the automated case, an installation will first require the fermenter to have various sensors installed and wired to an industry standard ‘SCADA’ system. This data is then routed to the CPS computer, which sits in the control room and advises the operator of appropriate actions to take.

Current practice is to follow a predetermined temperature and specific gravity profile for every batch, independently of variations in the raw ingredients or disturbances during the run. The CPS controller uses sophisticated new Advanced Process Control (APC) techniques to better regulate and optimise the fermentation process. These methods were developed over the last 15 years in the Control Group of the Cambridge University Engineering Department and in other research labs.

FermCon offers four unique selling points:
- flexibility, supports various sensor configurations
- closed-loop, compensates for variation during batch
- advisory, non-disruptive
- constraint satisfaction, guarantees flavour

In an extended onsite study at a Lion Nathan Brewery in New Zealand, CPS’ CEO has shown that APC technology can be used to model the batch fermentation of sugar, yeast and hops to make beer. With APC techniques, the model can then be used to reduce the variability of batch times. Initial work indicates significant potential for improvement.

Through extensive experience, brewers have developed a range of process con-
Most breweries go to considerable lengths to standardise the batch pitching, or starting, conditions, with a particular focus on yeast. Nevertheless the fact that yeast is a live biosubstance means that fermentation rates, determined to a large extent by yeast activity, will vary from batch to batch.

The study carried out at a Lion Nathan Brewery in New Zealand by CPS’ CEO shows that only small variations in the temperature and specific gravity profile are required to achieve much tighter specifications on batch times. In addition, this initial work at Lion Nathan has proven in an industrial setting that CPS’ process models are able, part way through the batch, to predict the concentrations of key species to the end of the batch with sufficient accuracy.

These models enable the application of nonlinear Advanced Process Control (APC) techniques, which determine the optimal temperature and specific gravity profile required to achieve the desired batch time. Most importantly, APC guarantees that the batch stays within temperature bounds set by the brewery, thus ensuring ‘good beer’.

This result allows CPS’ control system FermCon to reduce the variability in batch times while maintaining or improving the flavour of the beer.

These conditions are, of course, unique to each beer. Interviews with several leading brewers have made it clear that any control system that cannot ensure these constraints are satisfied would not be considered.

The principal benefit of APC over all other current approaches lies in its ability to guarantee that these constraints will not be violated and therefore ‘good beer’ will be brewed in every batch.

Four brewers have been approached and are eager to take part in an initial Proof of Concept (PoC) installation of the CPS system. Interviews have revealed that the potential gains generated by the CPS control system are directly in line with their goals. Each has as their primary purpose one of the three highlighted value adding features of the CPS system. In fact, two of the brewers approached were actively looking for a system that offers precisely the benefits of FermCon. This response indicates the timeliness of our proposal and the current lack of competition.
FermCon adds value for the brewer by:

- improving quality through compensation for variations in raw materials
- improving production planning through more regular batch times
- increasing production through faster average batch times

PROOF OF CONCEPT SITES

In the coming two years, reference implementations will be installed in each of the four breweries in the Proof of Concept project. Having already verified the process models in an industrial setting and the APC controller in simulation, the goal of this project is to quantify in practice the achievable:

- reduction in batch time variation
- increase in flavour consistency
- value of CPS’ controller to the brewer
- cost of installation in terms of time and sensing equipment
- amount of customisation required to the model and to the controller
- tradeoff between possible sensor configurations and performance improvements

Under CPS’ supervision, each brewery will purchase and install sensing equipment appropriate to their requirements. We expect that the breweries will have different sensing capabilities and methods, some of which will be automated and others manual, based on their respective economic considerations and the properties of their specific beers.

FermCon requires a customisation phase for every installation, thus enabling the system to accommodate different sensing configurations, biochemical properties and brewers’ performance goals. Further, the brewer’s knowledge of his beer must be incorporated, and each fermentation process has unique properties that must be modelled.

The four reference breweries have agreed to make available the necessary staff to take samples for fifteen batches. The equivalent monetary value of each brewer’s contribution is between £25,000 and £40,000. Eight of these batches will be used to tune the FermCon to their particular needs, and the remainder to more accurately quantify the benefits realised.

The four brewers were deliberately chosen to cover the full spectrum of company sizes, cultures, products and goals:

Molson Coors Brewing is one of the ten largest brewing companies in the world, with gross sales of $5.5 billion in 2004, most of which is from their extensive product line of lagers. They maintain their market share through a very progressive attitude towards production techniques and have as a primary use of the CPS
system the reduction of average fermentation time. There is a current drive toward automation at Molson Coors, which is well-timed with CPS' goals.

**Greene King Brewing Company** is a mid-sized, local company with a turnover of £552 million in 2004. The focus of the Greene King line is cask ales, brewed using traditional methods. For this reason, their brewery has no automation and the CPS product offers them the opportunity to learn more about the characteristics of their beers from the additional data that will be collected.

**Guinness** is a large company with a very distinctive product that is sold all over the world, for an annual turnover of £4.4 billion. The Guinness drinker differs from the average lager-man as he demands that his pint taste the same as it did 200 years ago. Consistency is a benefit that CPS will focus on while in Ireland.

**Wolverhampton & Dudley Breweries** is a mid-sized, local group of breweries with an annual turnover of £513 million. Wolverhampton and Dudley have recently won a contract to brew Bass beer and are working to reduce the variation in batch times so as to meet the scheduling terms of the contract.

After the completion of the Proof of Concept phase, CPS will have a proven system, ready to sell and install at customers' breweries.

**RELEVANT INDUSTRIES**

The initial target industry for Cambridge Performance Solutions is in beer brewing. However, there are many applications of the CPS fermentation control system in other areas of the food manufacturing industry as well as in the pharmaceuticals sector.

**Brewing:** The brewing industry is mature, with several large multi-national companies dominating the market in virtually every country. Recent trends have seen many mergers of large brewers in order to achieve production economies of scale. For instance, in 2004, Interbrew and AmBev merged to create InBev, which will control around 14% of the world market. Adolph Coors Co. and Molson merged to form Molson Coors Brewing this year to create the sixth largest brewer in the world. (Figure 1)

While sales are growing very quickly in China, the European and North American markets are seeing growth due only to population increases. This is in part the result of legislative restrictions and the increasing move towards wine and ready-to-drink (RTD) brands. To combat the flat market trends companies are increasingly competing on price and therefore on production efficiency.

In order to improve margins, brewers are moving more and more to high-tech solutions. In fact, interviews with Molson Coors Brewing have revealed an active
project that will investigate the possibility of seriously reducing production time of one of their lead brands, without the need to increase fermenter capacity. Molson Coors is very interested in the role that CPS can play in this project.

The development of the CPS fermentation control system is ideally timed to take full advantage of current trends in the brewing industry.

Bioprocessing and Pharmaceuticals: Discussions CPS has had with leading academic and industrial research and development personnel in the bioprocessing and pharmaceutical industries have centred on the question of where the big issues of the day lie in terms of operational improvements that the industries would like to see. By far the most common answer is that the variation in batch fermentation is the most difficult operational issue and that the prime focus these days is quality, quality, quality. This is precisely what CPS offers - improved control aimed at reducing variation in batch fermentation operations. One of the principal outcomes of this is less variation in finished product quality.

It is thus clear that CPS is very well positioned to enter this large and highly profitable, investment-oriented industry. The market opportunities appear to be extremely attractive, once CPS has established its approach with its initial work with the beer fermentation process.

RESEARCH AND DEVELOPMENT
CPS will stay ahead of the competition through continuous innovation. Research and development will be funded that will improve existing services and products as well as develop new approaches that will allow movement into new sectors. The positive outlook for future innovations adds considerable value.

Measurement Technology: Traditional brewery practice is to sample fermenters
manually and undertake laboratory-based chemical analysis. An online control system is most effective when automated measurements are made in real time. FermCon can be implemented whether or not key parameters are measured online, but performance will be best with online automated measurements.

In order to examine possible developments in brewery sensors, CPS approached the National Equipment Laboratories (NEL), who have a mandate to improve metrology in various sectors of the process industry. A project to examine this subject further is in its early stages and CPS is being kept closely in touch with developments. If this project establishes online measurement options for some of the key brewery parameters that are presently measured off-line, CPS' control systems will be able to offer even greater benefits.

**New Services and Products:** CPS will not be a one product company. While staying within core expertise, new approaches will be developed that will further penetrate the brewing industry and our fermentation control methods will be extended and adapted for use in the bioprocessing industry.

While fermentation is the central part of brewing, there are several other processes that would benefit from improved control. Of primary interest are the mash tun and wort kettle, which prepare the feed for the fermenter. As in the fermenter, these systems are currently run in open loop and quality varies, which is one reason that fermentation batch times currently fluctuate. Tighter control of these systems will further improve the benefit given by our fermentation control system. As CPS’ CEO has seen on many previous APC projects in other industries, close interaction with operations staff will reveal new aspects of the system that are suitable for CPS control.

CPS’ fermentation control expertise will be a stepping stone to building a complete Fermentation Management System. Additional process control modules, such as the above, will be designed as independent components, thus enabling the overall solution to be easily customised to meet the needs of each specific brewery client.

Many biological products are made in stages, with the output of several fermenters combining to become the input to the next. Due to the short shelf-life of these intermediate products, fluctuations in batch times cause scheduling difficulties for many pharmaceutical production lines. In the medium term, the techniques developed by CPS for use in the brewing industry will be adapted and extended for use in biprocessing.

**ALLIANCES**

CPS’ position as a technology provider to the brewing industry can be strengthened
by suitable choice of alliance partners:

- The importance of having access to online measurements has already been noted. Arising out of our interest in this at the beer fermenter, we have established an alliance with the National Engineering Laboratory in East Kilbride, who are proceeding to bring their experience of similar measurement issues in other industries to bear upon the beer fermentation process.

- We have also initiated a working relationship with the brewing industry’s RTO, Brewing Research International (BRI), because CPS can benefit from their knowledge of the European brewing industry and in return provide them with some understanding of what advanced control offers the industry.

- We also have plans to develop a close working relationship with The Mathworks (TMW), over their MATLAB software, which we will use for our fermenter control work. We hope to establish the right to run the latest versions of MATLAB on all our engineers’ PCs, in return for the business we will be bringing TMW.
COMPETITIVE ANALYSIS

CPS is the first company to identify and meet the business opportunity for improved performance in batch fermentation using advanced process control.

Given the experience and capability of its personnel with both process and control issues, and the strength of its advisory team, CPS is strongly placed to enter this market successfully. By the quality of our work and our relationships with our customers, we will develop this position and dominate the market.

KEY SKILLS AND RESOURCES

Key factors in CPS’ ability to consolidate the competitive advantage it already has, by being the first company to offer its services in this area, include its:

- highly trained personnel
- knowledge of and access to the best available APC technology
- early recognition of the market opportunity
- agility strategies to ensure CPS is at the forefront in its ability to provide what its customers want in the area of better batch fermentation control
- geographic location in relation to the UK and EU brewers

Personnel: Paul Austin has long experience of the process industries and has undertaken modeling projects for beer brewers over a number of years. He has an academic and industrial background in Advanced Process Control (APC), and first-hand experience applying this new technology in relatively conservative industry sectors, such as brewing.

Colin Jones has a deep knowledge of advanced control engineering and a strong interest in applying this in industry. The past year has seen Colin complete his PhD at the University of Cambridge in which he studied recent developments in APC. Alert to the opportunities and challenges facing a start up company, he also has a keen interest in entrepreneurship.

In Jan Maciejowski and Eric Kerrigan, CPS has access to APC research skills of the highest order, among the best in the world. Allied with the breadth and depth of the skills and experience of its Board of Advisors and its Consultants, CPS has the team to succeed in this new endeavour.

APC Technology: CPS intends to build its controllers using MATLAB software, which is widely known and respected, both for the power of its ability to model processes and to design model-based controllers. Through its connection to Jan Maciejowski and Eric Kerrigan, CPS also has access to particular segments of proprietary MATLAB code written within the Cambridge University Engineering Department.

Some of this software, particularly ap-
proaches to the optimisation of nonlinear dynamical systems, which will be developed as part of the R&D that CPS will commission from the CUED researchers, will provide us with a crucial advantage over any potential competitors. This advantage will help to ensure our control solutions meet the highest specifications of our customers and are unrivalled among possible potential competitors.

**Early recognition of opportunity:** We have the opportunity to implement APC technology in as many as four strategically chosen breweries over the next two years. We do not intend to give too much publicity to our activities outside the brewing industry during this period, so as not to alert our potential competition to the scale or nature of the market opportunity we have identified.

We plan to make a big success of our four initial Proof of Concept implementations and can then launch our business into a major growth phase, before other control companies have even begun to register the existence of this opportunity. If other companies do decide to compete with us, we can market ourselves as the only company with a successful track record and proceed quickly to move into other countries and other brewing groups.

**Agility:** The combination CPS offers of human resources and advanced technology will enable us to focus on our mission of becoming a customer driven company and to respond to each customer’s individual requirements in the control systems we implement.

Each CPS control system will be individually designed and installed by trained personnel. At least at present, this type of personalised service is only available from CPS. Our ability to customise what we offer to meet each customer’s particular constraints and operational requirements is highly valued in our target market. The close personal relationship that this manner of working generates between customers and CPS will be vital to our mission to “exceed customer expectations through exemplary consultative service.”

**Location:** Cambridge is an ideal location for CPS, for several reasons:

Firstly, a number of major breweries are within convenient driving distance from Cambridge.

Second, Cambridge’s close proximity to London Stansted airport gives ready and remarkably inexpensive access to other brewers, both in the UK and in the EU.

Thirdly, a couple of the leading brewing groups already have technology contracts with companies operating from the Cambridge Science Park, so the notion of turning to Cambridge for improved technology is already established in the industry. Closely related to this advantage
is the presence of the technical specialists available to CPS at Cambridge University.

Finally, there is a well known and well established mentality in Cambridge of science and technology innovation generating start up companies. In response to this, a number of other companies have been established whose services have been tailored to meet the needs of the diverse range of Cambridge start up companies. This of course makes it easier to establish a company like CPS in Cambridge.

COMPETITORS
Although we do not believe that CPS has any competitors at present, it is very important that we maintain a watching brief on companies that may have the capability to enter the market sector that we have identified.

Automation and Control Suppliers: There are several general automation and control companies world wide that offer APC solutions, but only one of them has the nonlinear tools that are required for the applications we aim to tackle. This company is Aspentech, for whom Paul Austin worked briefly as a Senior Consultant in their Cambridge Castle Park offices some years ago.

Aspentech has recently incorporated some nonlinear modelling capability into their modelling suite and they can also build nonlinear controllers from these models. Their focus in developing these tools has been the power industry, where a sizable market exists. There is every indication at present that Aspentech's resources will be concentrated on exposing this market opportunity, rather than on examining where else their new nonlinear tools could be applied.

Indeed, the experience and orientation of their engineers is almost exclusively focused on the chemical, oil and gas industry. Their understanding of the nature or magnitude of the opportunities in other process industry sectors is very limited, let alone in the brewing sector, which involves unfamiliar elements of biotechnological processing.

It is thus very unlikely at present that Aspentech's senior managers would consider moving into the brewing sector, while they have the power industry to engage with, which has much closer technological synergy with their chemical, oil and gas heritage.

Brewing Industry Initiatives: We know from our discussions with brewing companies that two significant UK brewers are involved in a DEFRA funded project with the Institute of Food Research in Norwich. The aim of the project is to investigate the potential for reducing variation in fermentation batch times by a Statistical Process Control approach, based on the measurements made at pitching
and the few lab samples taken as standard during the fermentation.

The intention is to see whether any correlations to batch times can be determined from this data. Although it is deemed unlikely that a competitive offering would appear as a result of this work, due to the reliance on current measurement methods and static models, any such result could be easily incorporated into CPS’ more comprehensive product. This would further enhance the improvement generated from the advanced nonlinear dynamic models and new measurements that drive FermCon.
MARKETING PLAN

CPS is focused on building strong relationships with key clients based on real performance enhancements.

**Year 1–2 Goals**

| **Market Education** | Provide information about the benefits offered by fermentation control to 62 target UK brewers. Give on-site presentations to the ten largest on the specific advantages of CPS’ control system. |
| **Product Demonstration** | Advertise the performance gains realised by CPS at the four Proof of Concept sites via trade shows, journals, site visits and the Brewing Research Institute. |
| **Behaviour Influencing** | Increase awareness of advanced control techniques applicable to fermentation and subsequently change the acceptance of current dated methods. CPS will convince brewers of its ability to help them reach their productivity and quality goals. |

**TARGET MARKET**

CPS has identified several key factors influencing the strategic marketing of its products and services. Under demographics, we find the size, global presence and maturity of potential client brewers to be of significance. Geographically, our plan is to firmly establish our brand and reputation initially in the UK, before expanding to EU and overseas markets. Finally, it is important not to ignore the psychographic aspects of brewing, which is at once a traditional and yet innovative industry.

**Demographics:** During its first two years, CPS will target the domestic market, beginning with the four Proof of Concept sites: Molson Coors Brewing, Greene King Brewing Company, Guinness, and Wolverhampton and Dudley Breweries. These four companies span the full range of production volumes that can best take advantage of CPS’ services.

CPS has compiled a list of 62 UK brewers having appropriate production capacities, who together produce 58 million barrels of beer each year. Marketing activities in years one and two will focus on educating and attracting these brewers. Micro-breweries and brewpubs will not be targeted initially, as the small size of their fermenters is likely to limit the potential economic benefits.

Years 3–5 will see CPS exploring the 1801 breweries in the EU by leveraging the work done in the UK. CPS will take advantage of the nature of brand licensing to penetrate this international market: Two of the four initial partners either directly own breweries in other countries or...
license their brands to be produced locally.

**Geographics:** Brewing is an international business, with ‘the big four’ - Anheuser-Busch, SABMiller, InBev and Heineken - controlling 46% of the global beer market, worth $200 billion per year. While the ownership of the brands is international, the brewing itself is often done under license in each country due to the three month shelf-life of beer.

**United Kingdom:** CPS will operate internationally, but will focus initially on the UK market, which is the second largest in the EU and the seventh in the world, totaling £12.8 billion of sales per year. There are 62 brewers in the UK that vary significantly in size, although the market is dominated by four brewers who together control a 75% share.

In the first two years of operations CPS will work with both extremes of the industry while installing reference systems: Molson Coors is the second largest brewer in the UK and their neighbours Wolverhampton and Dudley are among the smaller.

**European Union:** As can be seen from Figure 2, the EU beer market is dominated by Germany, which is the third largest producer in the world. Over 86 million barrels, with an equivalent sales value of approximately £44 billion, are brewed each year.

The last ten years have seen a trend of decreasing on-trade beer sales, while take home volume has risen. The price difference between these two product classes is significant, and has been growing in recent years, due to increased retail competition. In addition, the total volume of beer sales has remained essentially constant. Consequently, our target EU clients are strongly motivated to reduce production costs, making CPS’ product offering particularly timely.

Located in Cambridge, UK, CPS is well positioned geographically to serve the EU market, being only a few hours from most major European cities via discount airlines.

The longer term will see CPS moving to the US and China, who each produce 200 million barrels of beer per year and are twice the size of the next largest market, Germany.

**Psychographics:** Brewing is a very old craft, which has been done in essentially the same way for hundreds of years. As a result, there may be resistance to change at smaller breweries that make more traditional ales, due to concerns that introducing new methods may affect beer flavour. However, preliminary meetings with brewers in this class have generated excitement about the advantages offered

---

2 On-trade sales refer to beers sold in pubs and clubs, as opposed to take home sales from grocers.
Figure 2: EU Brewing Market
Volume of beer produced in millions of barrels (1 barrel approx. £500)
Source: ‘The Brewers of Europe’ 2004 Report
by the CPS system, once they were as-
sured that it would, if anything, make the
flavour more consistent.

► Both ‘traditional’ brewers approached
for the Proof of Concept phase signed
on as reference sites after a single
meeting.

The second class of target brewers for
CPS consists of the large multi-nationals.
These companies tend to brew lagers,
and as such have stated that they are
more concerned with production costs
than with maintaining a traditional flavour.
Interviews indicate that the industry lead-
ers are currently moving to more auto-
mated production and are therefore look-
ing for companies such as CPS to deliver
the benefits of modern sensing and con-
trol technologies.

POSITIONING
The CPS fermentation control system,
FermCon, is based on the most ad-
vanced technology available in the mar-
ketplace today. It is also currently the only
approach that can offer any significant
improvement to a brewer’s bottom line.
Therefore, CPS will be able to charge
a premium price for its state-of-the-art
products and services. Taking into con-
sideration the relatively small number of
target UK brewers, we have already ini-
tiated business relationships with several
key players.

The advantage of being the first to the
market, combined with a dedication to
continuous technological advancement
and market driven research, will keep
CPS ahead of the industry for years to
come.

MARKETING STRATEGY
Price: CPS’ services will be priced to
achieve a payback period of approxi-
mately eight months for our customers.
While we are confident that we will
be able to easily achieve at least a
40% Gross Margin, this cannot be ex-
actly quantified until near the end of the
Proof of Concept stage, at which time a
cost/benefits analysis can be performed
and a pricing strategy fixed.

A fraction of spare CPS capacity will be
spent on consultancy work, both with
brewery clients and in the pharmaceu-
ticals sector. Competitive rates will be
charged for these services.

Promotion: Three important features of
the target market will assist CPS in pro-
moting its new products and services:

► dominance of large multi-national
brewing companies

► cooperative culture within the brewing
community

► relatively small number of prospective
clients

CPS will take advantage of these fea-
tures in the following ways:
Word-of-mouth: The quality of CPS’ work will be readily communicated through word-of-mouth due to the nature of the marketplace. Strong relationships formed with local divisions may generate new business with other divisions in international markets.

The open culture of communication makes industry conferences effective forums for brewers to discuss new ideas and tools. In particular, the reference sites have been carefully chosen, as they are all active participants in these conferences and will help to promote CPS.

Initial progress on CPS’ fermentation control system was presented by CPS’ CEO at the 2001 Brewing Yeast Fermentation Performance Congress at Oxford Brookes University. Publicity from this event has led to several meetings with interested parties. Future such conferences will be a focus for CPS’ promotion.

Direct Marketing: Industrial marketing differs from traditional consumer marketing as it is an interactive and time intensive process with the goal of establishing a long-term relationship and reputation. The relatively small number of companies in the industry will allow CPS to begin conducting site-visits with a large fraction of the market in early years. In the first year, CPS plans to visit 10 of the 62 brewers in the UK.

Budget: The promotional budget for the first two years is comprised of:

- time and materials for ten site visits for two people
- preparation time and materials for two hundred information packets
- attendance at two trade shows for one person

In each of the first two years, we estimate that up to a further 20% of a man-year will be spent on marketing related activities, such as cold calls and follow-up discussions. Thus, the marketing expenditures are expected to be between 10% and 30% of projected cash inflows based on submitted grant applications.

The brewing industry is close-knit and word-of-mouth will play a large part in the acceptance of our technology. Our initial investment in educating the market about the benefits of fermentation control technologies will pay dividends in the long-term.
OPERATIONS PLAN

Quality and customer service are CPS’ highest priorities; we will “exceed customer expectations through exemplary consultative service”.

INSTALLATION AND CUSTOMISATION

The CPS fermentation control system involves a combination of engineering services and control software. Its installation proceeds in four phases:

- requirements specification
- interfacing and data acquisition
- controller design
- controller commissioning and operator training

Requirements Specification: System installation begins with initial on-site meetings, in which CPS will work together with the brewer to identify the unique properties of the brewery and of the beer in question. Specific operating constraints and customer priorities, such as improving quality, increasing production or reducing variation in batch times, are also established in this phase.

Based on cost/performance tradeoffs derived from experience, CPS will then advise the brewer of sensing equipment and methodologies (e.g., measurement frequency, automated or manual) that should be applied to achieve their goals. When the system specification is agreed, a contract is drafted with the brewer.

Interfacing and Data Acquisition: The second phase involves purchasing sensing equipment from suppliers and installing it in the brewery. While the equipment installation is managed by CPS, the work may be sub-contracted out to the instrument supplier.

We will install a bare un-customised CPS computer in the brewery control room early in the project and interface this to the sensing equipment. This equipment will then be used to record the measured process parameters during standard operations for an agreed number of batches.

Controller Design: Controller design requires modelling and simulation work done at the CPS offices. Modelling involves customising the CPS generic fermentation master-model to match data recorded at the customers’ brewery.

This master-model, and the knowledge of its design and customisation, is one of CPS’ core assets. It will derive from the Proof of Concept work and will undergo continuous improvement with each new contract.

Commissioning and Training: The final stage is controller commissioning. It includes installing the customised controller software on-site and testing it with live plant data, during which time any necessary fine-tuning is also undertaken.
In keeping with CPS’ mission of exceeding customer expectations, we believe that one of the most important aspects of an installation is operator training. Our customised, on-site service is unparalleled in the industry, where the standard consists of generic classroom-style lectures.

CUSTOMER SERVICE
With every CPS product will be sold a continuing maintenance contract that will include yearly tunings of the controller to ensure optimal performance and on-site operator training. This continued contact will ensure that we maintain a solid relationship with our customer base, thus generating ideas, innovations and other immeasurable intangibles.

The accumulation of the world brewing industry into a few multi-national companies means that CPS’ reputation for performance and high quality service is one of our primary assets. Further, word of mouth from local brewers to corporate headquarters will help CPS move into the international marketplace.

TIMELINE AND DECISION POINTS
The evolution of CPS will occur in two distinct phases. The first is the Proof of Concept phase that will last up to two years. During this phase, the four reference sites will be equipped with Ferm-Con. At the end of this phase CPS will have a fully developed system and quantified proof of its capabilities. From this vantage point, CPS can then decide on the scope and scale of its future operations, and thus enter the second phase of its development.

A critical decision to be made at the beginning of the second phase concerns the magnitude of venture capital or other funding that may be needed to enable the company to engage realistically with the opportunity it has exposed, ensuring it can exclude possible maverick competitors.

The factors that are currently unknown that will affect this decision are the size and capability of competition two years from now and the margins that CPS can achieve. Among other considerations, these margins are a function of the demonstrated performance and actual installation costs of FermCon, which will become evident through the Proof of Concept phase.

We envision three possible scenarios for continued growth beyond this decision point, which are detailed in the Financial Plan.
FINANCIAL PLAN

Year 1–2 Financial Goals
The profit objective for each of the first two years is to cover costs, not to make significant profit. During this period the Proof of Concept projects will be implemented and the company’s forward financial targets can then be determined, based on the success of the Proof of Concept projects.

Raise £150,000 equity
The plan is to use the time and materials commitment that the four Proof of Concept breweries have made, to generate a 1:1 subsidy from a UK Government technology funding scheme. Three schemes have been targeted:

- DTI Technology Programme. CPS has applied for £180,000 funding as part of a £360,000 project. From 974 preliminary applicants, the DTI has selected 160 companies to make a full application and CPS is one of these.
- CPS is applying for a DEFRA Link grant of similar magnitude to the DTI grant, available for developments in the food and bioprocessing industry.
- CPS also plans to apply for funds from a regional fund, Business Link.

Raise £50,000 working capital
CPS plans to raise £50,000 of working capital in one of more of three ways:

- Enter CPS’ Business Plan into the CU £50K competition
- Apply for funding available to start ups needing to do Proof of Concept work from which to launch their companies
- Seek Venture Capital or other funding in exchange for a small equity share of CPS

CPS offers consulting services and software, and hence we do not need large amounts of initial funding for equipment purchase. We need funding sufficient to employ our engineers during the Proof of Concept phase at our four brewery sites, to demonstrate the feasibility of what we propose and the magnitude of the benefits that result.

FINANCING

Year 1 and 2: For the Proof of Concept work we are applying for £200,000 of funding from various sources. In the event that we are unsuccessful in getting these funds in the next six months, we will
approach a suitable venture capital company for assistance, in exchange for an equity share in the company.

In its first two years, CPS will be paying the salaries of its engineers but not of its CEO. It will engage its researchers as funds permit. The control technology we presently have access to is sufficient to complete the Proof of Concept projects, so the research we propose could be delayed to Year 3, if funds do not allow it to be done before.

Year 3 and subsequently: The growth of CPS will be determined by the magnitude of benefits revealed by the Proof of Concept projects and by our success in communicating this to the brewing industry. Contractual interest at this stage from the brewing companies might be sufficient by itself to launch the second phase of CPS’ operations, though our expectations are that venture capital funding will be required at this stage. The tables below indicate that growth from within CPS will be relatively slow and that to increase significantly the level of CPS’ business will require a steep increase in our engineering manpower.

Return: Our target for the first and second year is to break even. For the third year onwards, CPS aims to set its prices so as to achieve a Gross Margin of at least 40%.

Exit Strategy: If the funding sought is granted, CPS will reach the start of Year 3 with no debtors and 100% owned within the company. At that stage, venture capital may be sought, in exchange for a share in company ownership.

Subsequently, CPS will require any shareholder wishing to sell shares to offer them for sale first to CPS’ Directors, at market value.

An exit strategy for the VC company or for CPS’ owners is likely to involve three possibilities for the sale of CPS:

- The MathWorks (TMW), the company providing MATLAB, the base software package that CPS will use, has been attempting to attract the commercial interest of the process industries for some years. TMW sells MATLAB and, in its Cambridge offices, it also uses the software for consulting project work. As CPS begins to generate license revenue for TMW, they may become interested in the size of the opportunity CPS is engaging with and a buy-out may become a possibility.

- One of the brewing groups we are working with may decide that they wish to secure the benefits CPS offers, for their group alone. This may lead to an interest in purchasing CPS, partly to prevent the brewing group’s competitors benefiting from CPS’ services.

If AspenTech begins to examine process
sectors beyond its traditional bases, and CPS has by then exposed an opportunity of sufficient magnitude to interest them, they may decide to buy CPS in order to acquire CPS’ brewing industry expertise and to marry this with their own software tools. AspenTech has a history of acquiring engineering expertise in this fashion in order to create an integrated line of business involving software and engineering services, a common pattern in the rest of their business.

CPS Income Statement (£) Years 3 - 5: Conservative Scenario
4/5/6.25 contracts in Yr 3/4/5, i.e., 25% growth each year

<table>
<thead>
<tr>
<th>Sales Forecast</th>
<th>Half Year 3</th>
<th>End of Yr 3</th>
<th>Half Year 4</th>
<th>End of Year 4</th>
<th>Half Year 5</th>
<th>End of Year 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project charge</td>
<td>75,000</td>
<td>150,000</td>
<td>150,000</td>
<td>187,500</td>
<td>187,500</td>
<td>234,375</td>
<td>234,375</td>
</tr>
<tr>
<td>Cost of goods sold (computer)</td>
<td>1,500</td>
<td>3,000</td>
<td>3,000</td>
<td>3,750</td>
<td>3,750</td>
<td>4,687</td>
<td>4,687</td>
</tr>
<tr>
<td><strong>Gross Profit</strong></td>
<td>147,000</td>
<td>147,000</td>
<td>183,750</td>
<td>183,750</td>
<td>229,687</td>
<td>229,687</td>
<td>1,120,875</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating Expenses</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Salary Principal Eng'</td>
<td>2,300</td>
<td>13,800</td>
<td>13,800</td>
<td>13,800</td>
<td>13,800</td>
<td>13,800</td>
<td>82,800</td>
</tr>
<tr>
<td>Monthly Salary Assistant Eng'</td>
<td>1,830</td>
<td>10,980</td>
<td>10,980</td>
<td>10,980</td>
<td>10,980</td>
<td>10,980</td>
<td>65,880</td>
</tr>
<tr>
<td>Monthly Salary Assistant Eng'</td>
<td>1,670</td>
<td></td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>50,100</td>
</tr>
<tr>
<td>Accountant's Monthly Fee</td>
<td>150</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>5,400</td>
</tr>
<tr>
<td>Monthly office rental</td>
<td>600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>3,600</td>
<td>21,600</td>
</tr>
<tr>
<td>Phones (monthly)</td>
<td>100</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>3,600</td>
</tr>
<tr>
<td>Insurance (monthly)</td>
<td>400</td>
<td>2,400</td>
<td>2,400</td>
<td>2,400</td>
<td>2,400</td>
<td>2,400</td>
<td>14,400</td>
</tr>
<tr>
<td>Onsite Travel &amp; Living (weekly)</td>
<td>625</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>22,500</td>
<td>22,500</td>
<td>112,500</td>
</tr>
<tr>
<td><strong>Total Operating Expenses</strong></td>
<td>47,280</td>
<td>47,280</td>
<td>47,280</td>
<td>64,800</td>
<td>64,800</td>
<td>64,800</td>
<td>336,240</td>
</tr>
</tbody>
</table>

| Net Income Before Taxes        | 99,720      | 99,720      | 136,470     | 118,950       | 164,887     | 164,887       | 784,635   |

CPS Income Statement (£) Years 3 - 5: Moderate Growth Scenario
4/6/9 contracts in Yr 3/4/5, i.e., 50% growth each year

<table>
<thead>
<tr>
<th>Sales Forecast</th>
<th>Half Year 3</th>
<th>End of Yr 3</th>
<th>Half Year 4</th>
<th>End of Year 4</th>
<th>Half Year 5</th>
<th>End of Year 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project charge</td>
<td>75,000</td>
<td>150,000</td>
<td>225,000</td>
<td>225,000</td>
<td>337,500</td>
<td>337,500</td>
<td>1,425,000</td>
</tr>
<tr>
<td>Cost of goods sold (computer)</td>
<td>1,500</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>28,500</td>
</tr>
<tr>
<td><strong>Gross Profit</strong></td>
<td>147,000</td>
<td>147,000</td>
<td>220,500</td>
<td>220,500</td>
<td>330,750</td>
<td>330,750</td>
<td>1,396,500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating Expenses</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Salary Principal Eng'</td>
<td>2,300</td>
<td>13,800</td>
<td>13,800</td>
<td>13,800</td>
<td>13,800</td>
<td>13,800</td>
<td>82,800</td>
</tr>
<tr>
<td>Monthly Salary Assistant Eng'</td>
<td>1,830</td>
<td>10,980</td>
<td>10,980</td>
<td>10,980</td>
<td>10,980</td>
<td>10,980</td>
<td>65,880</td>
</tr>
<tr>
<td>Monthly Salary Assistant Eng'</td>
<td>1,670</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>50,100</td>
</tr>
<tr>
<td>Accountant's Monthly Fee</td>
<td>150</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
<td>9,000</td>
</tr>
<tr>
<td>Monthly office rental</td>
<td>750</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>4,500</td>
<td>27,000</td>
</tr>
<tr>
<td>Phones (monthly)</td>
<td>125</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>750</td>
<td>4,500</td>
</tr>
<tr>
<td>Insurance (monthly)</td>
<td>400</td>
<td>2,400</td>
<td>2,400</td>
<td>2,400</td>
<td>2,400</td>
<td>2,400</td>
<td>14,400</td>
</tr>
<tr>
<td>Onsite Travel &amp; Living (weekly)</td>
<td>625</td>
<td>15,000</td>
<td>22,500</td>
<td>22,500</td>
<td>30,000</td>
<td>30,000</td>
<td>150,000</td>
</tr>
<tr>
<td><strong>Total Operating Expenses</strong></td>
<td>48,930</td>
<td>66,450</td>
<td>66,450</td>
<td>83,970</td>
<td>83,970</td>
<td>83,970</td>
<td>403,880</td>
</tr>
</tbody>
</table>

| Net Income Before Taxes        | 98,070      | 80,550      | 154,050     | 136,530       | 246,780     | 246,780       | 992,820   |
## CPS Income Statement (£) Years 3 - 5: High Growth Scenario

4/7/12 contracts in Yr 3/4/5, i.e., 75% growth each year

<table>
<thead>
<tr>
<th>Sales Forecast</th>
<th>Half Year 3</th>
<th>End of Yr 3</th>
<th>Half Year 4</th>
<th>End of Year 4</th>
<th>Half Year 5</th>
<th>End of Year 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project charge</td>
<td>75,000</td>
<td>150,000</td>
<td>150,000</td>
<td>262,500</td>
<td>262,500</td>
<td>450,000</td>
<td>450,000</td>
</tr>
<tr>
<td>Cost of goods sold (computer)</td>
<td>1,500</td>
<td>3,000</td>
<td>3,000</td>
<td>5,250</td>
<td>5,250</td>
<td>9,000</td>
<td>9,000</td>
</tr>
<tr>
<td><strong>Gross Profit</strong></td>
<td>147,000</td>
<td>147,000</td>
<td>257,250</td>
<td>257,250</td>
<td>441,000</td>
<td>441,000</td>
<td>1,690,500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating Expenses</th>
<th>Half Year 3</th>
<th>End of Yr 3</th>
<th>Half Year 4</th>
<th>End of Year 4</th>
<th>Half Year 5</th>
<th>End of Year 5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Salary Principal Eng'r</td>
<td>2,300</td>
<td>13,800</td>
<td>13,800</td>
<td>13,800</td>
<td>13,800</td>
<td>13,800</td>
<td>13,800</td>
</tr>
<tr>
<td>Monthly Salary Assistant Eng'r</td>
<td>1,830</td>
<td>10,980</td>
<td>10,980</td>
<td>10,980</td>
<td>10,980</td>
<td>10,980</td>
<td>10,980</td>
</tr>
<tr>
<td>Monthly Salary Assistant Eng'r</td>
<td>1,670</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
</tr>
<tr>
<td>Monthly Salary Assistant Eng'r</td>
<td>1,670</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
</tr>
<tr>
<td>Monthly Salary Assistant Eng'r</td>
<td>1,670</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
</tr>
<tr>
<td>Monthly Salary Assistant Eng'r</td>
<td>1,670</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
<td>10,020</td>
</tr>
<tr>
<td>Accountant's Monthly Fee</td>
<td>300</td>
<td>1,800</td>
<td>1,800</td>
<td>1,800</td>
<td>1,800</td>
<td>1,800</td>
<td>1,800</td>
</tr>
<tr>
<td>Monthly office rental</td>
<td>900</td>
<td>5,400</td>
<td>5,400</td>
<td>5,400</td>
<td>5,400</td>
<td>5,400</td>
<td>5,400</td>
</tr>
<tr>
<td>Phones (monthly)</td>
<td>150</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
</tr>
<tr>
<td>Insurance (monthly)</td>
<td>400</td>
<td>2,400</td>
<td>2,400</td>
<td>2,400</td>
<td>2,400</td>
<td>2,400</td>
<td>2,400</td>
</tr>
<tr>
<td>Onsite Travel &amp; Living (weekly)</td>
<td>625</td>
<td>15,000</td>
<td>22,500</td>
<td>30,000</td>
<td>37,500</td>
<td>45,000</td>
<td>45,000</td>
</tr>
<tr>
<td><strong>Total Operating Expenses</strong></td>
<td>50,280</td>
<td>67,800</td>
<td>85,320</td>
<td>102,840</td>
<td>120,360</td>
<td>120,360</td>
<td>120,360</td>
</tr>
</tbody>
</table>

| Net Income Before Taxes | 96,720 | 79,200 | 171,930 | 154,410 | 320,640 | 320,640 | 1,143,540 |
MANAGEMENT TEAM

CPS has assembled a world-class, highly experienced team of staff, consultants and advisors, allowing it to grow as the market opportunity is exposed.

The first task for the company is to establish batch fermentation controllers at up to four different breweries, making a range of different beers. CPS is presently set up with a scale to tackle this Proof of Concept opportunity.

Paul Austin will oversee the project work and customer interactions. Colin Jones will undertake and manage the data collection, controller design and implementation work at each customer site. If the Proof of Concept work extends to four breweries, we will be engaging an extra process control engineer in order to be able to complete this work within two years.

We have available to us two university researchers, Jan Maciejowski and Eric Kerrigan, to undertake appropriate APC research as funding allows and the progress of our work dictates.

<table>
<thead>
<tr>
<th>Staff and their Company Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dr Paul Austin</strong></td>
</tr>
<tr>
<td><strong>Mr Colin Jones</strong></td>
</tr>
<tr>
<td><strong>To be recruited</strong></td>
</tr>
<tr>
<td><strong>Dr Jan Maciejowski</strong></td>
</tr>
<tr>
<td><strong>Dr Eric Kerrigan</strong></td>
</tr>
</tbody>
</table>

We will also be able to call upon the specialist services, as we require, of Prof Nigel Slater, a specialist in the pharmaceuticals industry and of Prof David Bogle, a specialist in the modelling of fermentation kinetics. William McVey will also be available to us for financial help and to manage our accounting and financial needs.

<table>
<thead>
<tr>
<th>Consultants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prof Nigel Slater</strong></td>
</tr>
<tr>
<td><strong>Prof David Bogle</strong></td>
</tr>
<tr>
<td><strong>Mr William McVey</strong></td>
</tr>
</tbody>
</table>
Christopher Fowler, who has long experience in running technology companies, has agreed to sit on CPS’ Advisory Board and William McVey has agreed to play a similar role in relation to financial affairs. We are also fortunate that Prof Simon Stockley has agreed to take a role in assisting us with business strategy and marketing.

| Board of Advisors |
|-------------------|------------------|
| Mr Christopher Fowler | Business Management |
| Mr William McVey | Financial Matters, including tax and VAT |
| Prof Simon Stockley | Business Strategy & Marketing |

**MANAGEMENT BACKGROUND**

**Paul Austin**, a chemical engineer by training, has been involved with Model Predictive Control for more than 30 years. He completed a PhD in the subject at Cambridge University in 1978 and subsequently undertook theoretical and applied research in various aspects of APC from a number of university positions in the UK and in New Zealand, where he was, latterly, Associate Professor of Electrical Engineering and Founder of the NZ Centre for Advanced Control. Arising out of his applied research he took positions with consulting engineering companies focussed on delivering performance improvement in manufacturing and processing using APC technology.

In 1994 he became a Director of Cambridge Control, a start up company on the Cambridge UK Science Park, and was responsible for the development of a successful APC business in the paper industry. One of the research projects he directed from the NZ Centre for Advanced Control established the scientific foundation for better control of batch fermentation and gave rise to CPS.

Having an academic background, some years in APC business development in various companies and considerable experience in managing companies, Paul has a range of the skills required to found and develop Cambridge Performance Solutions.

**Colin Jones** completed a BASc and an MASc in Control Theory in 2000 and 2002 respectively, before moving to England to begin a PhD. He has just submitted his thesis, after having worked with and developed state-of-the-art APC tools in the Engineering Department at the University of Cambridge for the last three years.

Colin has various experience in the process control industry. He has worked for Delta Controls and for Cominco Engineering Services Ltd, in which he helped...
developed the control system for a new hydro-metallurgical copper process.

Colin has the expertise to tackle the development work required in our Proof of Concept projects and the personality to manage site work and the customer interface.

**BOARD OF ADVISORS**

Christopher Fowler initially worked for Phillips Electrical Industries in Cambridge. After an MBA at Cranfield University, he joined Grindlays International and worked for them in various roles in New York and in London. He was a member of Margaret Thatcher’s Industry Think Tank in the 1980s and was subsequently Director of a number of technology companies for more than 15 years, including Cambridge Electronic Industries. Now in semi-retirement, he has taken an enthusiastic interest in Cambridge Performance Solutions.

William McVey is an accountant, who has been a company Secretary, recently in the not-for-profit sector. He was Bursar of Darwin College for many years and has a keen interest in Cambridge start up companies.

Simon Stockley is a recently appointed Professor of Entrepreneurship at the Judge Institute of Management Studies, Cambridge University. For the last four years he has been a lecturer in Entrepreneurship at Imperial College Entrepreneurship Centre. He is also an adjunct Professor at the University of Notre Dame and a Director of ‘Your Perfect Day’ Ltd, a small but rapidly growing publishing company. He also has a small consulting practice, which provides executive education to a variety of UK and International clients. Simon has also been involved in running several other startups, including two consultancies, and an entrepreneurship company.

**CONSULTANTS**

Nigel Slater was a lectureship in the Cambridge University Chemical Engineering Department before holding several senior positions in the pharmaceuticals industry in the UK and in Europe. In 2000 he was appointed to a Chair in Bioprocessing at the Cambridge University Chemical Engineering Department and now heads a large research group focused on the pharmaceuticals industry.

David Bogle is a process engineer who did his PhD at Imperial College in control systems engineering. He now holds a Chair in the Department of Chemical & Biochemical Engineering at University College London where he leads various research projects focused in the bioprocessing industries, including modelling the reaction kinetics of fermentation and other biochemical reactions.
# CPS Income Statement (\$): Proof of Concept Phase

<table>
<thead>
<tr>
<th>Sales Forecast</th>
<th>Pre-start</th>
<th>Start</th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
<th>Quarter 5</th>
<th>Quarter 6</th>
<th>Quarter 7</th>
<th>Quarter 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proof of Concept grant</td>
<td>50,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government funding</td>
<td>150,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Revenues</td>
<td>200,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross Profit</td>
<td>200,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>200,000</td>
</tr>
</tbody>
</table>

## Start-up Expenses

<table>
<thead>
<tr>
<th>Description</th>
<th>Pre-start</th>
<th>Start</th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
<th>Quarter 5</th>
<th>Quarter 6</th>
<th>Quarter 7</th>
<th>Quarter 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deposits</td>
<td>1,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,000</td>
</tr>
<tr>
<td>Rent advance</td>
<td>450</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>450</td>
</tr>
<tr>
<td>Employee training &amp; 1 month salary</td>
<td>2,085</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,085</td>
</tr>
<tr>
<td>Equipment purchase &amp; Computer, office equipment</td>
<td>2,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,000</td>
</tr>
<tr>
<td>Legal advice</td>
<td>1,500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,500</td>
</tr>
<tr>
<td><strong>Total Start-Up Expenses</strong></td>
<td>7,035</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7,035</td>
</tr>
</tbody>
</table>

## Operating Expenses

<table>
<thead>
<tr>
<th>Description</th>
<th>Pre-start</th>
<th>Start</th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
<th>Quarter 5</th>
<th>Quarter 6</th>
<th>Quarter 7</th>
<th>Quarter 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly Salary Principal Engineer</td>
<td>2,085</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>50,040</td>
</tr>
<tr>
<td>Monthly Salary Assistant Engineer</td>
<td>1,670</td>
<td></td>
<td></td>
<td>5,010</td>
<td>5,010</td>
<td>5,010</td>
<td>5,010</td>
<td>5,010</td>
<td>5,010</td>
<td>5,010</td>
<td>20,040</td>
</tr>
<tr>
<td>Accountant’s Monthly Fee</td>
<td>150</td>
<td>500</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>4,100</td>
</tr>
<tr>
<td>Monthly office rental</td>
<td>150</td>
<td>500</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>4,100</td>
</tr>
<tr>
<td>Phones (monthly)</td>
<td>50</td>
<td>100</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>1,300</td>
</tr>
<tr>
<td>Insurance (monthly)</td>
<td>200</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>4,800</td>
</tr>
<tr>
<td>Onsite Travel &amp; Living (weekly)</td>
<td>625</td>
<td>3,125</td>
<td>3,125</td>
<td>1,250</td>
<td>1,250</td>
<td>5,000</td>
<td>5,000</td>
<td>2,500</td>
<td>2,500</td>
<td>2,500</td>
<td>23,750</td>
</tr>
<tr>
<td>Contingency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3,000</td>
</tr>
<tr>
<td><strong>Total Operating Expenses</strong></td>
<td>1,100</td>
<td>11,030</td>
<td>11,030</td>
<td>9,155</td>
<td>9,155</td>
<td>9,155</td>
<td>20,915</td>
<td>20,915</td>
<td>18,415</td>
<td>18,415</td>
<td>120,130</td>
</tr>
</tbody>
</table>

## Depreciation

<table>
<thead>
<tr>
<th>Description</th>
<th>Pre-start</th>
<th>Start</th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
<th>Quarter 5</th>
<th>Quarter 6</th>
<th>Quarter 7</th>
<th>Quarter 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Net Income Before Taxes

<table>
<thead>
<tr>
<th>Description</th>
<th>Pre-start</th>
<th>Start</th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
<th>Quarter 5</th>
<th>Quarter 6</th>
<th>Quarter 7</th>
<th>Quarter 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>200,000</td>
<td>-8,135</td>
<td>-11,030</td>
<td>-11,030</td>
<td>-9,155</td>
<td>-9,155</td>
<td>-20,915</td>
<td>-20,915</td>
<td>-18,415</td>
<td>-18,415</td>
<td>72,835</td>
</tr>
</tbody>
</table>
## CPS Cash Flow Statement (S): Proof of Concept Phase

<table>
<thead>
<tr>
<th>Cash Inflows</th>
<th>Pre-start-up</th>
<th>Start-up</th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
<th>Quarter 5</th>
<th>Quarter 6</th>
<th>Quarter 7</th>
<th>Quarter 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proof of Concept grant</td>
<td>50,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>50,000</td>
</tr>
<tr>
<td>Government funding</td>
<td>150,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>150,000</td>
</tr>
<tr>
<td><strong>Total Cash Inflows</strong></td>
<td><strong>200,000</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
<td><strong>200,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cash Outflows</th>
<th>Pre-start-up</th>
<th>Start-up</th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
<th>Quarter 5</th>
<th>Quarter 6</th>
<th>Quarter 7</th>
<th>Quarter 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up Front Cash Expenditures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deposits</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rent advance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee training</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment purchase &amp; computer, office equipment</td>
<td>2,000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2,000</td>
</tr>
<tr>
<td>Legal advice</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Up Front Cash Expenditures</strong></td>
<td><strong>2,085</strong></td>
<td><strong>7,035</strong></td>
<td><strong>1,100</strong></td>
<td><strong>11,030</strong></td>
<td><strong>11,030</strong></td>
<td><strong>9,155</strong></td>
<td><strong>9,155</strong></td>
<td><strong>20,915</strong></td>
<td><strong>20,915</strong></td>
<td><strong>18,415</strong></td>
<td><strong>18,415</strong></td>
</tr>
<tr>
<td>Fixed Expenses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monthly Salary Principal Engineer</td>
<td>500</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>50,040</td>
</tr>
<tr>
<td>Monthly Salary Assistant Engineer</td>
<td>1,670</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>6,255</td>
<td>20,400</td>
</tr>
<tr>
<td>Accountant's Monthly Fee</td>
<td>150</td>
<td>500</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>4,100</td>
</tr>
<tr>
<td>Monthly office rental</td>
<td>150</td>
<td>500</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>450</td>
<td>4,100</td>
</tr>
<tr>
<td>Phones (monthly)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance (monthly)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onsite Travel &amp; Living (weekly)</td>
<td>625</td>
<td>3,125</td>
<td>3,125</td>
<td>1,250</td>
<td>1,250</td>
<td>1,250</td>
<td>1,250</td>
<td>1,250</td>
<td>1,250</td>
<td>1,250</td>
<td>23,750</td>
</tr>
<tr>
<td>Contingency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Fixed Expenses</strong></td>
<td><strong>1,100</strong></td>
<td><strong>11,030</strong></td>
<td><strong>11,030</strong></td>
<td><strong>9,155</strong></td>
<td><strong>9,155</strong></td>
<td><strong>9,155</strong></td>
<td><strong>20,915</strong></td>
<td><strong>20,915</strong></td>
<td><strong>20,915</strong></td>
<td><strong>18,415</strong></td>
<td><strong>18,415</strong></td>
</tr>
<tr>
<td><strong>Total Cash Outflows</strong></td>
<td><strong>8,135</strong></td>
<td><strong>11,030</strong></td>
<td><strong>11,030</strong></td>
<td><strong>9,155</strong></td>
<td><strong>9,155</strong></td>
<td><strong>9,155</strong></td>
<td><strong>20,915</strong></td>
<td><strong>20,915</strong></td>
<td><strong>20,915</strong></td>
<td><strong>18,415</strong></td>
<td><strong>18,415</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Net Cash In/Out</th>
<th>Pre-start-up</th>
<th>Start-up</th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
<th>Quarter 5</th>
<th>Quarter 6</th>
<th>Quarter 7</th>
<th>Quarter 8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>200,000</strong></td>
<td><strong>-8,135</strong></td>
<td><strong>-11,030</strong></td>
<td><strong>-11,030</strong></td>
<td><strong>-9,155</strong></td>
<td><strong>-9,155</strong></td>
<td><strong>-20,915</strong></td>
<td><strong>-20,915</strong></td>
<td><strong>-18,415</strong></td>
<td><strong>-18,415</strong></td>
<td><strong>72,835</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Cash Balance: Beginning of Quarter

- 0
- 200,000
- 191,865
- 180,835
- 169,805
- 168,805
- 167,805
- 166,805
- 165,805
- 164,805
- 163,805

### Cash Balance: End of Quarter

- 200,000
- -8,135
- -11,030
- -11,030
- -9,155
- -9,155
- -20,915
- -20,915
- -18,415
- -18,415

### Cumulative Cash Balance

- 200,000
- 191,865
- 180,835
- 169,805
- 168,805
- 167,805
- 166,805
- 165,805
- 164,805
- 163,805
- 162,805
- 161,805
- 160,805
- 159,805
- 158,805
- 157,805
- 156,805
- 155,805
- 154,805
- 153,805
- 152,805
- 151,805
- 150,805
- 149,805
- 148,805
- 147,805
- 146,805
- 145,805
- 144,805
- 143,805
- 142,805
- 141,805
- 140,805
- 139,805
- 138,805
- 137,805
- 136,805
- 135,805
- 134,805
- 133,805
- 132,805
- 131,805
- 130,805
- 129,805
- 128,805
- 127,805
- 126,805
- 125,805
- 124,805
- 123,805
- 122,805
- 121,805
- 120,805
- 119,805
- 118,805
- 117,805
- 116,805
- 115,805
- 114,805
- 113,805
- 112,805
- 111,805
- 110,805
- 109,805
- 108,805
- 107,805
- 106,805
- 105,805
- 104,805
- 103,805
- 102,805
- 101,805
- 100,805
- 99,805
- 98,805
- 97,805
- 96,805
- 95,805
- 94,805
- 93,805
- 92,805
- 91,805
- 90,805
- 89,805
- 88,805
- 87,805
- 86,805
- 85,805
- 84,805
- 83,805
- 82,805
- 81,805
- 80,805
- 79,805
- 78,805
- 77,805
- 76,805
- 75,805
- 74,805
- 73,805
- 72,805