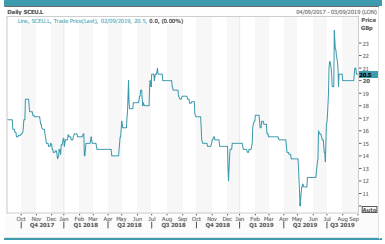
HARDMAN&CO.

Automotive components



Source: Refinitv

Market data

EPIC/TKR	**SCE**
Price (p)	20.5
12m High (p)	24
12m Low (p)	12
Shares (m)	136
Mkt Cap (£m)	27.9
EV (£m)	25.4
Free Float*	86%
Market	AIM

**As defined by AIM Rule 26*

Description

Surface Transforms is 100% focused on manufacture and sales of carbon ceramic brake discs. It has recently expanded its manufacturing capacity.

Company information

Non-Exec. Chair.	David Bundred
CEO	Dr Kevin Johnson
Finance Director	Michael Cunningham

+ 44 151 356 2141

www.surfacetransforms.com

Key shareholders

Directors	14.0%
Canaccord	14.8%
Unicorn	12.3%
Richard Gledhill esq. (director)	9.9%
Richard Sneller esq.	8.2%
Hargreaves Lansdown	4.5%

Diary

9 Sep	Final results
30 Oct	Capital markets day
11 Dec	AGM

Analyst

Mike Foster 020 7194 7633

mf@hardmanandco.com

SURFACE TRANSFORMS

Rapid acceleration – "game-change" announcements

Surface Transforms manufactures and sells carbon ceramic brake discs. The last three-month period of contract awards since the financial year-end has been transformational in the development of the company. It now has multi-year, multi-million, recurring income contracts from European-based global OEMs. These will support cash breakeven during 2020, moving to EBITDA-positive (post-tax credit) in fiscal 2021 and profitability in 2022. Long-term contracts collectively bring lifetime revenues of over £20m. The overwhelming significance is that this follows many years' client-testing, and this product-endorsement opens the path to order-of-magnitude sales expansion.

- **Surface Transforms' potential is clearly set:** It is set to win a large share in a carbon ceramic market that is currently worth ca.£150m p.a. Potential is £2bn p.a. measured against the real competitor – traditional iron discs. This realistic £2bn market equates to ca.4.5m discs, which is near 10% of total European auto sales.
- **A clear road to transformative growth**: Carbon ceramic brakes bring performance and safety benefits and, importantly, weigh less, last longer and (a current big issue for the customers) produce less environmentally-unfriendly brake pad dust. Indeed, they have a number of environmentally-positive attributes, supported by legislation.
- **Capacity allocation model:** Surface Transforms' current capacity is £17m sales p.a. This gives much scope for expansion, and – typically in new automotive components – as volumes rise, production efficiencies also rise and prices fall, expanding market demand further.
- **Risks:** Surface Transforms has invested ahead of these firm orders, and so is well ahead in terms of capital investment. These contracts benefit from set pricing and highly predicable timings of off-take, with the start of production date set. Only one competitor exists, and no more are envisaged for many years.
- **Investment case:** This is a large, growing market, 99%-supplied by one, highly-profitable player. This single supply was a most anomalous position for an auto OEM market – now Surface Transforms also supplies. June/July contract wins de-risk the business, and both open and expand the target market. The path to Surface Transforms' discs being designed-in to many more models is clear.

Financial summary and valuation

Year-end May*/ December**(£m)	FY18*	FY19E*	*7-month 19E***	FY20E**	FY21E**	FY22E**
Sales	1.36	1.00	1.10	3.30	4.10	5.80
EBITDA	-2.00	-2.40	-1.25	-0.50	-0.10	1.00
EBITA	-2.30	-2.80	-1.45	-1.30	-0.80	0.30
PBT	-2.30	-2.80	-1.45	-1.30	-0.80	0.30
PAT	-1.83	-2.20	-1.15	-0.75	-0.30	0.80
EPS (adjusted, p)	-1.66	-1.65	-0.85	-0.55	-0.22	0.58
Shareholders' funds	5.55	6.55	5.40	6.00	5.70	6.50
Net (debt)/cash	0.62	1.50	1.10	0.75	1.20	2.45
P/E (x)	loss	loss	n.a.	loss	n.a.	35.3
EV/sales (x)	16.0	25.8	n.a.	8.2	6.5	4.4
EV/EBITDA (x)	loss	loss	n.a.	loss	loss	26.4
DPS (p)	nil	nil	nil	nil	nil	nil

**May year-end, **the company has announced its change of year-end to December*

Source: Surface Transforms accounts, Hardman & Co Research estimates

Table of contents

Executive summary

What Surface Transforms makes and why this is the chosen market

Total focus: carbon ceramic brake discs

Surface Transforms' entire focus is on one product: carbon ceramic brake discs.

A demanding chosen market, providing barriers to competition

The rationale for this focus is the exacting nature of any safety-related automotive component, but particularly this one. The discs require expertise in chemical engineering (which Surface Transforms has to PhD level), in the design of exceptionally difficult-to- manufacture components, and expertise in how to prove the robust nature of the product and the systems to the most exacting of OEMs. Once a potential tier-one supplier of such components can achieve acceptance, the barriers to competition are high.

Road-testing alone has lasted nearly five years – a major barrier to new competition and an economic "moat"

The time taken with the OEM clients' pre-orders creates an "economic moat" – Surface Transforms has been in the stages of the road-testing process for nearly five years – this has been frustratingly slow from the company's point of view, but it now puts it in a strong position, as it is now both difficult and time-consuming for new entrants, and tests clearly take many years. In addition, this is a difficult product to design and manufacture; it is like baking a particularly difficult cake, as opposed to casting some metal component. Any new potential manufacturer has to prove its specific product, and so any new competitors will be many years off. We see no new entrants.

Surface Transforms' recent breakthrough into its target customer base

Surface Transforms has recently announced some major multi-year contracts. Important as these are, it is also important to keep in sight that Surface Transforms has been successfully manufacturing and selling the product for years – albeit to OEMs of a second-tier size and enthusiasts who take the original discs off their cars and fit Surface Transforms' products. Surface Transforms is now a first-tier and second-tier supplier on long-term contracts to two European-based OEMs of global importance. We strongly anticipate more global OEMs to come.

Game-changer one

Game-changer two

In June, a new contract of £6m lifetime revenues to a UK OEM (OEM 6) was announced. Production is due to start at the end of calendar year 2021. This contract shows the company's ability to achieve new contracts with existing customers. In July came a larger "game-changing" contract for supply to OEM 5. This first model starts series production in October 2021, with annual offtake of ca.€2m p.a., tapering from 2026: an €11.8m contract. The company has agreed pricing across a range of platforms, and this presents the opportunity to be selected for multiple vehicles, which will generate revenues many times the value of this first contract.

Our estimates are based on gross margins in the range of 60%-70%, and remaining in that range in the future. Both announcements had been anticipated: prospective clients have been evaluating Surface Transforms' products, manufacturing and supply chain for several years. The timing was in the hands of the OEMs.

Clarity for major, order-of-magnitude, expansion

True value of contract lies in endorsement and visibility to much more growth

Now that these first contracts are in place, the endorsement for Surface Transforms is clearly visible to the whole OEM community. The contracts themselves are valuable: for instance, they take the company into profitable territory and last several years (most likely six to seven years).

Their true value lies in the endorsement and hence the clear path to significantly greater numbers of (potentially individually larger) contracts. Indeed, one potential OEM (OEM 3) is in well-advanced evaluation.

This is a large, growing market, 99% (2019) and 98% (2020E) supplied by one player, Surface Transform's competitor, the BremboSGL joint venture (JV). Indeed, it supplies 100% of the global automotive OEM market currently and is highly profitable. Brembo is a well-established brake systems manufacturer.

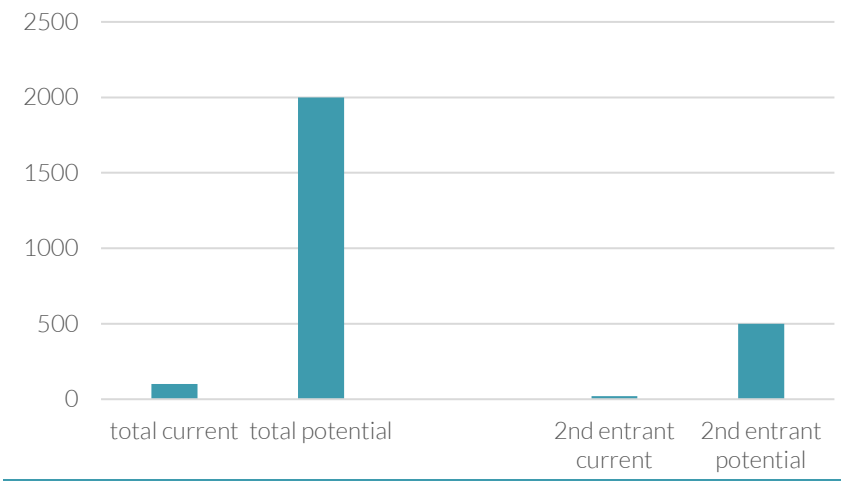
99% single supply from a competitor – this type of position is unsustainable…

…OEMs invariably welcome a second source…

…and invariably this second source is the trigger to major market expansion

This 99% single-supply current position is a most anomalous situation for an auto OEM market, which is now being resolved by Surface Transforms. This market share will evolve, and Surface Transforms will grow its market share significantly. Below, we provide an illustration (we stress that this is simply an illustration, and is Hardman & Co's current view) of the potential for the market and for Surface Transforms within it. We stress that we provide no time scale here. £500m is specifically not a forecast for Surface Transforms' revenue, but it illustrates our view of what appears the realistic potential sales over the next 10 to 15 years. Surface Transforms' entering as a credible and significant supplier to global auto OEMs kick-starts an order-of-magnitude acceleration in market size.

Illustrative potential size of OEM carbon ceramic disc market (£m)



Source: Hardman & Co Research

Scope of our research: barriers overcome and upside from here

In this report, we assess the manner in which:

A ca.20-fold expansion is non-controversial

- The market is likely to grow initially some 20-fold to £2bn and beyond.
- Surface Transforms has a – or the – leading role in this specific market's journey.
- This emerging market presents uniquely attractive competitive conditions, Surface Transforms is one of only two suppliers, and we note that the other – while currently larger – has some hurdles to surmount if it seeks to address the whole market.

It takes many years for the market to "get ready" in terms of technical-acceptable. This is now achieved.

- This is as difficult as any automotive OEM market to be accepted into – it takes many years and successful technical development. Surface Transforms has achieved this over a period of five years after its original manufacturing proof of concept – the June and July announcements noted earlier are further confirmation – if any is needed. A third entrant is at least many years off.
- The beneficial characteristics of the initial types of automotive models into which the Surface Transforms product is to be designed – all have extensive customer waiting lists, making any volume projections based on hard end-orders.
- The product's demonstrable superiority, its robust manufacture (replicable production "cell" for future expansion) and cost effectiveness (expansion pays for itself in around 18 months).
- The unambiguously positive impact and implications of the evolving environmental position for automotive (including the benefits of reduced disc brake pad dust – the next big environmental issue for automotive companies), and the positive implications of the transition to electric cars.

Surface Transforms already benefits from income in the retrofit market for its product and has received a number of OEM income streams for development ahead of start of production (SOP). But this is the first tangible commitment by an OEM at scale.

Global auto-component market receptive to carbon ceramic discs

Carbon ceramic discs lighter in weight and do not create dust

Why use such brake discs? Carbon ceramic brakes save ca.100kg on a chassis: a major amount – typically 5% of an average 2000kg car. The chassis is the main weight saving (albeit the discs save weight too), so being designed-in is a greater benefit than an optional extra. Thus, once the brakes are designed-in for the model, revenue is determined by total sales of that model and no less. Currently, and for some years to come until the inevitable (as we see it) transition to a mid-mass-market, the models specified for the carbon ceramic brakes have customer purchase waiting lists and are marketed in order to have demand ahead of planned supply. Once Surface Transforms' brakes are specified on a model, volume and pricing will be highly predictable.

To save weight, they need to be designed-in to the chassis

Once designed-in, volumes are highly predictable at the luxury-model end

The main strength – in addition to the strong competitive position with only one, volume-constrained competitor – is that, once the product is specified, volumes are highly predictable.

This is a technically superior product vs. competition

Surface Transforms is well placed profitably to become the largest supplier, with a product with many attributes and advantages:

- Engineered-in superiority, based on its lower-running temperature, once operating. This is 150^{O}C cooler than the competition, for the same kinetic energy of a car's speed and weight.

Manufacturing process well-tested by company and customers

- A product made at or below the cost of competition.
- A product efficiently made, using well-tested manufacturing technology and a manufacturing cell-structured facility where commissioning of additional cells is readily accomplished in order to match capacity with future demand.

Capacity numbers support positive profit and cash outlook

To quantify some shorter-term forecasts, production cell 1 (dating from 2017) is potentially completely allocated to the two OEMs' contracts, plus a potential OEM 3. Its capacity equates to ca.£12m p.a. There also is £4.5m capacity in a small-volume facility.

Capacity for £17m p.a. revenue has been built – ready to be expanded further

Importantly, not only is the capacity fully in place to supply the contracts also now in place, and to take revenue towards £17m p.a. on further contracts, but all capital expenditure from this point is primarily self-funded. With gross margins in excess of 60% – which is a norm for this type of specialist component – the cashflow generated at the time that manufacturing cell one approaches full capacity (contingent on an additional contract or contracts) will fund cell two over a period of around 18 months.

In our *Investment case* below, we turn, in more detail, to three drivers outlined above, namely:

- why this market has been chosen, quantifying the potential;
- the recent breakthrough into its target customer base;
- the barriers overcome and the upside from here (segmented into six topics).

This research report is published ahead of the scheduled 9 September year-end results announcement.

Investment case

The choice of playing field

The target market is large…

£2bn target addressable market is significant, to say the least

The choice of playing field has been all-important for this business. First, the choice of automotive as a target market is crucial. We shall refer to, and analyse the scope of, a £2bn-plus addressable market for Surface Transforms in a subsequent section of this report (page 21). In this ultra-large automotive marketplace, a segment of £2bn is far from large. The European car manufacturing market alone is some 12 million units p.a. (48 million wheels). Sport, luxury and upper-medium cars comprise over 6% of this volume figure (Source: European Vehicle Market Statistics, which defines "upper-medium" as £40,000 to £100,000 RRP). The £2bn addressable market figure assumes that under half of cars selling for between £50,000 and £75,000 take the product. Carbon ceramic discs sell at a significant multiple of the price of standard iron discs. That such a large addressable market appears to exist within only ca.6% of total volume size makes the opportunity particularly attractive, we believe. There are a number of such component markets of this size – so it remains, and will remain, relatively niche.

The global automotive brake systems market is expected to reach $31bn by 2025, according to a study published by Grand View Research, Inc.

In context, the size of another global automotive component market – namely electronics – is expected to expand at a CAGR of 8.6%, to reach $410bn by 2025 (Source: Businesswire).

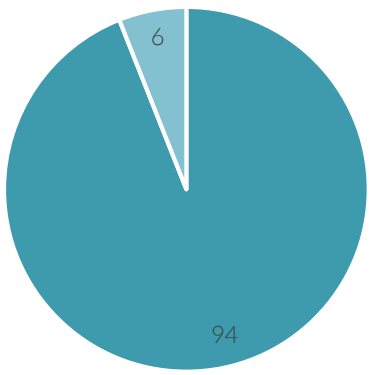
…yet also niche (in automotive equipment terms)

£2bn requires small minority of volume to transfer to the new product

There then comes the assessment of the competitive landscape. Here, we conclude that being relatively niche – namely the potential 6% of total volumes of European brake discs – is beneficial. In automotive terms, a £2bn market can be described as niche, we believe. While this modelling is for the European market, we do expect other markets, for example the USA, to become material in the readily foreseeable future.

Figures shown in chart are volume, not value. Our point is that we estimate ca.6% of market volume to switch to carbon ceramic, but this 6% equates to ca.£2bn carbon ceramic sales potential – in Europe alone

Carbon ceramic disc market volume target: 6% as portion of European total



■ Assumed to remain iron discs ■ Target for carbon ceramic discs

Source: Hardman & Co Research

Note that the above chart refers to unit volumes, not financial size. Being such an attractive market, it is unsurprising that another manufacturer is selling into this commercial space. However, technical barriers to entry are high. So, there is no third supplier. From proof of manufacturing concept to now, Surface Transforms has been in detailed design and development (DD) discussions with the OEMs for over five years, followed by a series of extended rigorous tests. It is beneficial to Surface Transforms that its product is superior by design, and so a "root and branch" manufacturing redesign would be needed for the competitor to catch up.

Given the market size and given also that OEMs invariably require two independent manufacturers for the mission-critical components on which they rely, Surface Transforms' place would seem assured.

Dual-sourcing typically required

Dual-sourcing is typically required, and now dual-sourcing has been achieved for the OEMs. Would they go for a third supplier? Surface Transforms is in advanced stages of testing with a large proportion of the relevant OEMs; in addition, the product and its manufacturing process are proven, and all the hurdles have taken many years to clear.

A theoretical third supplier? This is many years off – no sign at all, currently.

Even were OEMs to look to further widening the supply chain for this exceptionally innovative component, it would take many years to begin to design-in the alternative product to future models, and we do not expect this to happen. Then comes the product and the manufacture. This plays to Surface Transforms' strengths.

Materials technology and chemistry is complex

Years of research, including PhD level

Production of carbon ceramic discs involves chemical engineering, as well as advanced materials technology. With years of research (including PhD level), development and design, Surface Transforms has refined each stage, and has a clear pathway to further reducing costs, thereby keeping strong relationships with the important OEMs.

The manufacturing process has been worked on diligently, and is excellent. The OEMs expect no less. We term it "excellent" because it works – proof being existing sales and the OEM tests' success. Because there is a simple-to-replicate "cell" configuration, expansion should be a low-risk process; this is because there is built-in scope to secure production cost reductions as volumes rise.

Modern equipment

The manufacturing process – while remaining batch-driven – is in an ultra-modern plant (2017) and in a well-configured manufacturing cell. This first cell can be readily replicated by Surface Transforms (using know-how developed only by the company itself) at a specific cost, enabling analysis to conclude that further capacity can be brought on at a cost of around 18 months' gross profits from full-volume production at the first cell.

This finalises the loop begun with the choice of market, development and testing of the product, in addition to its manufacture and the precise costings of the potential expansion as the market grows. The current market is an infant and totals some £150m. Surface Transforms' positioning gives it a highly visible path now, through to a large market share in a market whose size should readily expand to maybe 20 times larger than the current volumes. We state that the time is now. What is the current order position? The current order book is significantly over £20m. This brings us to the detail of recent "game-changer" order announcements.

Order book now over £20m

The "game-change" in June and July 2019

Significant OEM contracts secured

Surface Transforms has achieved what had been promised to investors – namely long-term supply contracts to several leading global automotive OEMs. It has secured two long-term contracts with two major OEMs (and an additional shorter-term one with one of those two). It is in advanced discussions and testing with three other major OEMs (for more details, see section on orders, later in this report, page 14).

June and July saw multi-year orders from two global OEMs

In June 2019, OEM 6 (a British OEM) agreed a total lifetime £6m contract over three years (a short, limited-edition model), plus a slightly enhanced existing smaller contract for £2m spread over two years (from calendar 2020).

In July 2019, OEM 5 agreed a total €11.8m lifetime contract over around eight years, commencing in October 2021 (tapering off from 2026). This runs at a steady €2m p.a. for the majority of the contract.

Further good news regarding orders

These orders confirm Surface Transforms as one of only two suppliers into a market that is growing rapidly. Surface Transforms' recently announced long-term contracts demonstrate that – after several years – it has now passed all the extensive testing stages required by its clients, the European global automotive OEMs. It is worth reminding readers that Surface Transforms has been supplying discs for a number of years, including to "near-OEMs" such as Koenigsegg. Importantly, in July 2019, we note that Koenigsegg agreed a medium-term supply contract with its existing supplier, Surface Transforms, for a new model, with revenues of some £0.3m p.a.

Six main supporting factors to investment case

1) Existing contracts lead to EBITDA (post-tax)-positive Surface Transforms in 2021, with profitability in 2022

Cashflow-positive for 2021, and profitability in 2022

Full production contracts are now won – taking the company to EBITDA-positive for 2021, post the tax credit, and to profitability in 2022. These are as yet small in the context of medium-term potential. Off-take volume and timing visibility are exceptionally high once a contract is won. This is because – at this stage – the models where Surface Transforms' products are specified have a long order backlog at launch, and so delivery-rate timings are production-volume-driven, not demand-driven.

They are important, as they bring high financial security and are crucial evidence to the "game-change" market position now made crystal-clear. Surface Transforms' supply to the global OEMs gives much scope for expansion, and global OEMs seek dual-sourced supply. This supply is now confirmed and in place. From this flows the fact that – typically in new automotive components – as volumes rise, production efficiencies rise also (see section in this report on the company's falling production cost, page 27), and prices fall, expanding market demand further. These contracts are in themselves one element of the stock valuation, but there is a wide and dramatically encouraging context of market growth into which they should be placed. Let us take one step back – to the wider investment case. We turn to the market characteristics and how Surface Transforms' products fit into this.

2) The superior product

The contracts serve as confirmation that Surface Transforms is well on its way to winning other, larger contracts, supported by the extensive testing, which is progressing well. One contract comprises a switch in supply demanded by the OEM to Surface Transforms from the only other supplier of carbon ceramic brake discs.

The product runs 150° C cooler than the competition

Surface Transforms' disc is the best, in our view. It runs 150° C cooler at any given road usage, the result of its differentiated method of making the product – a difference "baked-in" and difficult to replicate. Surface Transforms faced an established single supplier and, in order to secure a strong foothold to compete, it totally re-engineered the high-performance product. This is, after all, a particularly early stage of development of carbon ceramic for brake discs. Being at such an early stage, the OEMs closely oversee DD, and indeed Surface Transforms' contracts with the OEMs include DD payments.

The business plan has no need or intention to oust the competitor. The competitor has taken this to a market worth ca. £150m p.a., but this size is, effectively, nothing in terms of any automotive component. The question therefore arises as to why Surface Transforms would take a percentage market share (both it and the competition growing revenues) and how it seems to us that it is highly likely that Surface Transforms will be one of two significant players in this exciting market.

3) Surface Transforms' growth

Plenty of growth in market for both suppliers

Surface Transforms' sales will rise rapidly and its market share will too, mathematically, given that it currently stands at 1%, rising to 2% in the next couple of years. The share will rise to a significantly greater percentage, we estimate. Further contracts from existing and other clients are firmly anticipated, but both suppliers (i.e. Surface Transforms and its competitor) are anticipated to see significant growth. The real competitor is the existing older technology – the grey iron disc. We estimate an illustrative potential for Surface Transforms' eventual potential at £500m (see chart on page 4) and, even if the competitor had similar or even greater revenue, the market would still not be satisfied.

It is important that automotive OEMs simply do not countenance mission-critical components being single-source-supplied – so the fact there are now two strong suppliers grows the market significantly. No component worth addressing has ever been single-source-supplied for any period of time into the globalised automotive OEM market. What would happen if this component supplier became incapacitated or reached capacity to form a bottleneck of component supply timing, or indeed pricing? We believe a clear path to dual-sourcing is an obvious requirement from the OEMs.

We illustrate Surface Transforms' potential as being £500m revenue at some future stage

We have made illustrative statements about a £500m revenue potential at some stage for Surface Transforms. What is our confidence?

In automotive component terms, this would be far from large

- We analyse the market potential at £2bn or more. See section (page 21) in this report entitled *The size of the opportunity*.
- Dual-sourcing – in itself – facilitates a market expansion.
- Surface Transforms' position is strong, with the competitor's ownership structure being pertinent.

It is highly likely that Surface Transforms will be one of two significant players – our confidence in this is two-fold

We think it highly likely that Surface Transforms will be one of two significant players. We are confident about this for two reasons. The competitor's ownership structure is strong, with well-resourced owners who possess a strong "name" in the global automotive industry. Yet the very strength of that name is a source of interest to the OEMs that are BMW competitors.

The sole competitor's major owners are BMW and the family behind BMW. It is a most unusual position for any given automotive OEM to rely on a component supplier owned by a direct competitor. We reiterate our belief that Surface Transforms' business plan assumes that the competitor's business will grow well in this large, rapidly-expanding, high-potential market. In addition to this, we have stated that Surface Transforms' product is superior, and we outline more on this later in this report.

Therefore, Surface Transforms' route to market and to exponentially growing its share of a significantly growing market is clear.

There are unlikely to be any further competitors for a long time – given the lead times on testing approvals. Barriers to further competition are high.

4) The right side of major barriers to entry

Many years refining materials technology…

…and many years road-testing and refining manufacturing process

Surface Transforms is on the right side of barriers to entry, we believe. The contracts that Surface Transforms recently announced are after extensive testing, thereby showing how difficult it is to be invited to supply performance-critical component contracts. We consider that these meaningful barriers to new entrants are a significant part of Surface Transforms' investment case.

The value of the business is, of course, not simply the current clients' contracts, or even the potential clients where road-tests are well under way.

The business is worth its share of the market, which is potentially a multiple of £ billions. A significant share translates into a significant valuation, especially as it would appear that capital expansion would be readily financed out of a modest part of retained profits. So, barriers to others taking some of this potential are important. And those barriers are high. We, therefore, deliberately dwell on this important aspect. The barriers are:

Regulatory barriers

- Regulatory barriers: mission-critical components have to comply with industry standards before any further progress. Surface Transforms has these – but this was achieved only after significant DD work. Environmental regulations in the chemical process are complex, and the regulatory authorities will only approve companies with proven expertise.

Client-testing for years

- Client-testing of design and manufacture: Surface Transforms has spent years on formulating this chemically-engineered product – then testing a series of improving iterations of design and, separately, of improving the manufacturing process.

Other client requirements take long time to work through

- Client approval of manufacturing and supply-chain: Surface Transforms' manufacturing process, while still batch-driven, is a continuous production line in a manufacturing cell. This was installed over two years ago as a prerequisite to being considered acceptable, by potential global OEM clients, for volume production. The manufacturing cell has plenty of space capacity currently and is designed to be simply replicated in a second cell (more later in this report on these two areas), thereby eliminating risk to the client and to Surface Transforms and its investors.

Chemistry is challenging

- Surface Transforms' discs are manufactured from a complex physical and chemical input of raw materials, whose supply-chain is robust and at least dual-sourced.

Then, more client-testing for years

- Client-testing of the product "in the field": Surface Transforms' discs have been on test-bed and road-test trials for some years with several global OEMs. This is stated in brief here, but achieving this, bespoke with several OEMs, has been a process requiring dedication, co-operation and skill (together with some financial cost).

Then challenging to stay in the game

- The ability to cost-engineer through ongoing R&D: Surface Transforms has a meaningful R&D expenditure history and budget, and well-resourced capability, including to PhD level.

5) Capacity in place for these "game-changer" contracts

£17m revenue capacity in place – and can be readily expanded

Next on our list of investor topics is that there is no capital requirement to secure the scaling-up of production to fulfil these "game-changer' contracts. Manufacturing capacity is in place (since 2017) for ca.£17m p.a. revenue. Capacity comprises a smaller-volume cell and one "standard" manufacturing cell (see page 25, cell 1 on chart in section in this report entitled *The manufacturing process*). We estimate £4.0m revenue in the year to December 2021. Within this estimate, just under 15% derives from the retrofit market in our model. We stress that this is a Hardman & Co model. This is currently a steadily (albeit not dramatically) rising market in terms of volumes and revenue. It is, however, not contractual far in advance. With just the current contracts (which – recall – take the company through to positive cashflow and profitability), capacity in place is ca.40% utilised once the contracts rise to the anticipated full run-rate.

OEM 3 "pipeline" of prospects as tests well-advanced

The projections for the year to December 2021 are the right side of cashflow-breakeven, and significant spare capacity is in place. We have referred to the OEM 3 "pipeline" of prospects as tests are well-advanced.

6) Gross margins set to remain in 60%-70% range

Gross margins should remain robust for number of reasons

Gross margins should remain robust for a number of reasons:

- Given the benefits to customers' "feel" of the car and to the OEMs' compliance with emissions (weight), environmental and marketing benefits, as well as the superiority of the Surface Transforms product to the competition, in combination with very limited competition, we are confident that gross margins will remain resilient.

Visibility ahead of model launch

- On individual contracts, typically, OEMs complete the selection of components for a new model two years ahead of launch. Essentially, the component supplier has a monopoly for the life of the model, since the costs of re-engineering and re-testing the model are unlikely to justify a change on the part of the OEMs.
- Gross margins on DD work, where client-funded, are healthy.
- We expand on the support for visibility of the volume of off-take in the section in this report (see page 17) entitled *Three-fold commercial visibility*. This also brings visibility and security of healthy gross margins, through the set-pricing. The current types of model are at the luxury end. Such models have a customer waiting list, so annual volumes are highly predictable, benefiting scheduling and hence gross margin (as well as revenue) projections.

Summary of six investment case points

To summarise these six points:

- 1) Full production contracts are now won – taking the company to cashflow-positive and profitability territory in 2022. Surface Transforms' products are designed-in to models that have a long order backlog at launch, and so delivery-rate timings are production-volume-driven, not demand-driven. These contracts are as yet small in the context of medium-term potential. The contracts in themselves assist in triggering significant rapid market expansion.
- 2) Superior technology to the existing competitor.
- 3) This is – and will remain for the foreseeable future – a specialist component market with just two suppliers, including Surface Transforms. As Surface Transforms is expected to supply only ca.2% of the 2020 market and now has the credibility of several leading global OEMs' supply contracts, the volume ramp-up potential is clear. Surface Transforms' share will rise – mathematically – but both suppliers are anticipated to see significant growth. It is important that automotive OEMs do not countenance mission-critical components being single-sourced.

- 4) Barriers to entry are high – and lengthy – Surface Transforms is on the right side of barriers to entry. These are significant in terms of time and multi-layered complexity, with diverse, extensive testing, complex material composition, design, manufacturing and raw material dual-sourcing.
- 5) There are no capital requirements to scale up production for the recent contracts – the manufacturing cell is installed and fully proven. An eventual doubling in capacity would require around 18 months' gross profits from the existing capacity.
- 6) Gross margins should remain robust (ca.65% currently and remaining at this level in the contracts we assess, trending down clearly as volumes expand by orders of magnitude). The company has a robust production cost reduction plan, which has halved production costs in the last five years and which will continue to advance. At no time do we see gross margins falling below 50%, even on volumes of an order of magnitude higher than the run-rate of these new contracts.

Automotive component market so large that even a niche market – carbon ceramic brake discs – comprises a potential market size of several £bn

The six points above stem from Surface Transforms' skills in capitalising on its position in the automotive components market. This brings us back to the main point outlined at the start of the *Investment case* section of our report: the automotive component market is so large that even a niche – carbon ceramic brake discs – comprises a potential market size of several £ billion.

The "game-change" of June and July 2019

What has triggered the recent share price rise?

The several new contracts themselves

OEM 5 and OEM 6 initial contracts secured

The announcements of June 2019 and July 2019 brought two new major revenue streams, secured for several coming years. This is also allied to some initial DD works. Within the time-frame of this chart, we anticipate further major contracts being won (compared with the current Surface Transforms revenue). We have referred to the ongoing tests at the Continental European OEM 3. Note that this revenue potential is not in our financial estimates – for the OEMs, only firm orders are.

High hopes for OEM 3 at some stage (this is not in our financial model)

By 2022E, there is an encouraging revenue balance between OEM 6, OEM 5 and the other income from retrofit, near OEMs, and also DD income from global OEMs. While these three broad categories will not generate exactly the same quantum, the sizes are broadly not dissimilar. This is before factoring in potential revenue from spares. We expect revenue from spares, but do not include this in any element of our financial modelling.

Contracts show the market size is set to "take off"

To date, global OEMs have been able to source from only one supplier (Surface Transforms' competitor), but this has now changed…

We have made clear our view that this eventual £2bn (plus) market is now at what we see as a "take-off" stage. The big change happened at the end of June 2019, with the first announcement. To date, global OEMs have been able to source from only one supplier (Surface Transforms' competitor), but Surface Transforms – via the established revenue of the smaller retrofit and "near-OEM" market – has now arrived. With the announcement of the first OEM, this June, incorporating Surface Transforms' product into its forthcoming model, a major threshold has been crossed.

…and implications are large

What it means for now is this: with the very first OEM announcement of Surface Transforms' product being adopted, there are now three clear benefits:

- Surface Transforms' immediate future revenue line will benefit from a confirmed off-take;
- this takes it into cashflow-positive territory; and
- the OEMs and the financial markets can now plainly see acceptance that Surface Transforms' product, robustness of volume supply capability and its own supply chain meet the most rigorous of requirements.

28 June: OEM 6 contract award

OEM 6 – one existing, one additional contract

OEM 6 – an existing client: two contracts

Two contracts – outlined immediately below – provide an order book of ca.£8m with OEM 6 over the next five years, and discussions continue regarding other future models with significantly higher anticipated production volumes.

Surface Transforms has been selected as the tier-two, carbon ceramic brake disc supplier on a new car to an existing British OEM customer (OEM 6). The company has also concluded a commercial settlement on the existing contract with OEM 6 regarding the delay to SOP of the original car in that contract.

The new contract award by OEM 6 is for a limited-edition car to be produced over three years, with SOP towards the end of calendar 2021.The Board estimates that the contract will generate lifetime revenues of £6m (excluding spares) to the company. Hardman & Co anticipates spares revenue of a relatively material nature, but we include zero from this source in our estimates.

Separately, and in recognition of the delays to SOP of the original car in the first contract, it has been agreed that Surface Transforms will be paid £0.3m cash. This relates to the direct costs on discs that had been partially completed prior to notification of the delay. This existing contract is still expected by the Board to generate revenues to the company of ca.£2m over two years, starting in calendar 2020, at margins in line with previous guidance. The above narrative is based on the announcement released by Surface Transforms on 28 June.

A diverse set of income drivers

Surface Transforms has several sources of income already

Surface Transforms has other sources of income, principally:

- retrofit on race cars; and
- near OEMs.

Both these global client-sets have been, and remain, important for the company's product credibility and, indeed, evolution, as well as for its cashflow and its ability to negotiate with the crucially important global OEMs on a strong footing, with existing sales to a diversity of supportive clients; and they indeed are supportive.

28 June: Koenigsegg contract award

New Koenigsegg contract (an existing client)

Koenigsegg – another existing Surface Transforms customer

The second new contract is with Koenigsegg, another existing Surface Transforms customer, for the Jesko, its new 300 mph supercar, launched at the recent Geneva Motor Show. The Jesko replaces the Regera model, with an expected SOP in autumn next year. Surface Transforms will be the tier-one supplier for the carbon ceramic brake disc, with annual revenues of ca.£0.3m.

Similarly to OEM 6, discussions regarding future models that will add volume, rather than replace existing revenues, are ongoing. The above narrative is based on the announcement released by Surface Transforms on 28 June.

Both the OEM 6 and Koenigsegg contracts are important, but of greater quantum is the OEM 5 contract announced in July 2019.

16 July: OEM 5 contract award

OEM 5 contract

A new client – Surface Transforms has been working on this for years

Surface Transforms received an order for the production tooling. A master purchase agreement, and a multi-year supply and pricing agreement have since been received.

Surface Transforms has been selected as sole supplier of the carbon ceramic brake disc option on one axle of a new edition of an existing, well-known model of this German OEM 5. "The existing model already uses carbon ceramic discs as an option and therefore the forecast production volumes reflect this experience. The lifetime revenue on this specific car model contract is estimated to be approximately €11.8m commencing in October 2021. Annual revenue is estimated to be approximately €2.0m per year before tapering off during 2026."

There is a commercial understanding, including the opportunity to be selected for further multiple vehicle platforms into OEM 5 over the coming years (as new appropriate models launch). "These potential awards could generate revenues of many times the value of this first contract. Following entering into the Agreement, the ceramic brake disc product will be part of German OEM 5's approved product list and whilst there will always be testing on new models, these tests are more about sizing and system integration than product evaluation. Moreover, pricing has been agreed across the potential range of platforms providing a link between increasing volumes and reduced product pricing. The customer has stated that the potential for further model-by-model awards will reflect their experience of Surface Transforms' supply chain and quality performance."

The above narratives are from quotes from the announcement released by Surface Transforms on 16 July.

Three-fold commercial visibility

Pre-sales of the cars

Volume

1. Surface Transforms now has high visibility year-by-year of revenue from the two OEMs (and has decent visibility on the ongoing and rising revenue from retrofit and near-OEM clients). The visibility stems from the pre-sold waiting list of customers buying the car on which the brake discs are now designed.

Pricing

Pricing agreed

2. Surface Transforms also has high visibility year-by-year of pricing and costs, and hence gross margins. The OEM clients benefit from Surface Transforms' programmes of cost reduction, which will halve production costs over the 2016 to 2020 period. See page 26 of this report for further detail on the cost reductions. This, among other benefits, brings cashflow-positive trading once current contracts ramp up.

Pipeline

Trials last for years, and several have been ongoing

3. Surface Transforms also has ongoing trials with three other OEMs, and the global automotive industry's OEMs have major similarities – particularly across the European OEMs. Surface Transforms' likelihood of securing other, similar contracts, therefore, should be high. We are not in a position to forecast the timing – so we forecast nil in our financial forecast time-frame. This is likely to prove too conservative, we believe.

Volume and pricing visibility provided by type of OEM contract now being secured

The recent share price rise is a function of the revenue uplift, and it is also reasonable to assume a high degree of certainty on the revenue from these OEM contracts.

- These contracts are for models that have high pre-launch orders in place. It is, therefore, overwhelmingly a question of production volumes (which can be, and are, accurately scheduled), rather than additional customer demand.
- That stated, one contract does have the carbon ceramic brake discs as an option, rather than standard. We expanded on the reasons for this in the earlier section of this report, looking at the recent OEM announcements. These reasons make us stand by our conclusion that off-take is strongly predictable.
- The visibility of further contracts with these OEMs is high. The OEMs that have given contracts to Surface Transforms clearly have bought into the product and its manufacturing resilience. There is no reason why the OEMs should not place further orders in due course (possibly beyond our financial forecast time-frame).
- The visibility of contracts from other OEMs is good, we consider. Surface Transforms has been progressing detailed trials with five OEMs. None of them have stated that the trials have been unsatisfactory; indeed, the OEMs have also been reviewing Surface Transforms' broader commercial capabilities, and a number had pronounced positively on this in public. All these are broadly similar contracts – namely production of a given volume scheduled year-by-year for new luxury model launches.

- The typical life-span of a model is seven or more years – so not only is the annual volume highly predictable but so too is the length of the contract and its likelihood of being rolled over onto further new models.

Other OEMs coming – the "pipeline"

Three other OEMs in near-term frame

We believe the recent share price rise does not give the appropriate regard to the likelihood of further OEMs awarding similar types of contracts, and we note that Surface Transforms' products are progressing in tests with three other leading automotive OEMs.

This is far from a series of "standard, volume contracts", but it is an OEM environment where the participants have many characteristics that are common to most or indeed all. There should be particularly strong read-across from the first contract or two onto more contracts. The timing of "on-boarding" further OEMs is uncertain. Tests have to be concluded, and the brake discs designed into callipers and braking arrangements on the chassis. All these then need to be designed into a new model, the timing of which is determined by factors outside Surface Transforms' influence.

Ongoing advanced product testing at OEM 3

OEM 3 is eagerly anticipated, but timing on these extreme road-test conditions is in the hands of the OEM. In earlier research published by Hardman & Co, we had modelled a positive conclusion to these tests earlier during 2018. Further tests have been added and models rescheduled – we understand that nothing negative has come from any test. This (salt conditions testing) is still ongoing.

They have direct read-across to each other – this is big

Hardman & Co considers it interesting to note that OEM 2 and OEM 4 are owned by the owner of OEM 3. The well-advanced extreme condition road-tests for OEM 3 will therefore have read-across. We understand this is the case, as the parent has, we understand, given Group authority to OEM 3 to give engineering approval for all companies in the Group (including OEM 2 and OEM 4) once it is happy to sign off for itself.

Additionally, we note from the July 2019 announcement from OEM 5 that there is a commercial understanding for the opportunity to be selected for further models over the coming years – as new appropriate models launch.

Aerospace – we model nil income

Surface Transforms has a product for a specific airframe manufacturer in the USA. Final approval has been delayed many times in this regard (by the DOD for this US military helicopter). Pre-production revenues totalling some £0.3m were received in former years. Nothing is in our estimates, and there is no cost expenditure being undertaken. Note that no other carbon ceramic brake disc manufacturer addresses the aerospace market.

Why buy carbon ceramic brake discs?

The reasons are both environmental and performance-led.

Environmental benefits and legislation in place on emissions – aided by reduced weight – benefit the company

A significant factor behind adoption is environmental considerations – some of them legislative-driven, but also as part of global OEMs' brand-building. The principal benefit is the weight saving on the chassis. Not only do the discs weigh much less than conventional iron discs but the whole assemblage on the chassis is much lighter. We also note that the discs emit nearly nil dust particulates. This is a topic of increasing importance for legislators and environmentalists.

Material savings in the chassis weight, but also lower particulate pollution

These aspects also bring direct benefits to a car's driver and passengers – namely performance and aesthetics. Adoption is very much not reliant on legislation, but this is a one-way journey where there will be constant support from legislators.

It is also worth noting that electric cars benefit from weight reduction (batteries are unlikely ever to reduce to minimal weight). Electric cars' superior acceleration points to the benefits of good, cooler-running discs. Regenerative braking typically only provides half the braking required on electric cars.

Currently, the discs are a much more expensive alternative to the traditional discs. However, manufacturing costs are currently halving at least every five years. Eventually, the legislative-driven costs of traditional discs may encourage mid-range OEMs to adopt the technology. In terms of mass-volumes, though, it is important to bear in mind that, even working at full capacity, one manufacturing cell addresses a fraction of 0.1% of the total European brake disc market by volume.

Environmental and performance reasons: weight reduction

OEM models: designed-in, as opposed to retrofit

Four Surface Transforms brake discs weigh 20kg, which is ca.40% the weight of four iron brakes. In reality, this is only part of the weight saving achievable, since the lighter brake system allows a lighter chassis to be specified. We understand the total savings could be +/- 100kg, where the discs are an intrinsic part of the model design. This difference is a large number – 5% of the average two-tonne car weight. Of course, a retrofit or an optional extra does not have this advantage. The model's design has to incorporate the whole new system from the start if the full weight gain is to be achieved. Early adopters of carbon ceramic brakes are performance car manufacturers, since the "liveliness" of a car depends largely on its power-to weight ratio.

Performance

Attractive performance

The un-sprung weight of a car (i.e. the wheel and brake) is key to the handling. The lower this weight, the better the driving experience will be. Again, it becomes clear why performance car OEMs have been first to embrace carbon ceramic brakes.

4x the lifespan of conventional iron discs

Significant lifespan extension

The strength of the product in sustaining very high temperatures means it will typically last four times as long as an iron brake. In practice, for most drivers, it will last the life of the car.

Regulatory incentive: 2020 emissions regime – weight

EU 2020 emission targets require significant weight savings

Weight saving is likely to be a key part of OEMs' strategy to meet new regulatory targets. The need to save weight is as important for electric cars as for conventional ones. The weight is principally saved on the chassis more than the carbon ceramic disc, with significant positive implications.

Environmental and aesthetic issues: brake dust

As carbon ceramic brakes wear much more slowly than iron ones, they produce virtually no brake dust. This dust eats into the fabric of alloy wheels, which nearly every high-end car has, as well as making them look unsightly. Further to this is a point that – for the long term – we consider to be of prime importance: air quality. This is rising rapidly up the agenda of health advocates, brands and legislators. It might be the case, in the future, that legislators begin to see the benefit of much-reduced brake dust particles. This might be a legislative trigger to carbon ceramic disks being adopted by manufacturers of high-volume, mass-market cars. This would trigger a multiple-sized market for carbon ceramic brake discs – at a significantly reduced price (for the volume rise), no doubt.

The size of the opportunity

Effective supply from a second source

We have touched on our assessment that a £2bn market opportunity presents itself. We also remind readers that such a size in automotive components is relatively small: a niche, at an estimated 6% of the European market by volume (not price). At the risk of stating the obvious, as technology is rolled out in greater numbers, the price falls (gross margins remaining robust) and volume demand increases. In due course, the market size may well be revised upwards.

Auto OEM component markets tend to grow significantly once there are two suppliers. To all intents and purposes, the second sourcing on contracts began with Surface Transforms' June 2019 announcement. Prior to this, the growth was strictly limited.

This – currently – indicates to us that the carbon ceramic brake disc market is being held back on a leash, with the manufacturer of the disc and the automotive OEMs both trying to maximise the robustness of the rollout of delivery volume rises.

We attempt to give more detail as to sub-categories within that growth to our assessed market potential.

A £2bn potential market is highly visible

The £2bn estimate makes the following assumptions:

- Under half of cars currently selling for between £50,000 and £75,000 take the product – i.e. potentially only on the driven axle for more upper-/mid-range cars. We ignore the longer-term market available below that price range. Over time, as manufacturers of mid-range vehicles see the brand benefit and as the pricing evolves, the likely market size will expand further still. This segment (see table below) is estimated to comprise just under 30% of current sales – this is assuming the take-up on the driving axle only.
- All cars currently selling between £75,000 and £100,000 (see table below).
- All cars currently selling between £100,000 and £115,000.
- All cars currently selling for over £115,000.

Typically, luxury and upper-/mid-range cars adopt earlier-stage new technology

The table below adds a refinement (assumption [3] in the table below) that looks at the £115,000-plus RRP segment and discounts it to the lower sales rates that pertained post the 2008 general financial crisis. The important point in this analysis is that we are strongly of the opinion that this is a £2bn addressable market.

These assumptions are based on the Society of Motor Manufacturers and Traders (SMMT) and from Parkers.co.uk, as well as on recent historical sales bands of cars (by RRP). The assumption has also been referred to at times by Surface Transforms.

There is a clear path to a £2bn+ market in £50,000+ RRP models

Potential £2bn carbon ceramic brake disc market in Europe

£ selling price of car	Assumption	% of total assumed £2bn potential market
50,000-75,000	[1]	ca.30
75,000-100,000	[2]	ca.60
100,000-115,000	[2]	ca.10
115,000 +	[2]	ca.4
115,000 +	[3]	Slightly over 2

[1] Based on 50% axle take-up [2] Based on 100% take-up [3] Based on typical sales volumes ca. 2010-13

Source: Hardman & Co estimates, based on SMMT and Surface Transforms

£250m luxury-end "highly visible, effective immediately"

We analyse the luxury-end potential but do not get bogged down in the detail – this is a market for cars with RRP of mass-market levels

First, let us look at the – in automotive terms – tiny market of early adopters, and note that, here, we assess only the European market. We point to the wider potential £2bn annual market as the key figure, but let us consider cars selling at over £100,000 in a little more detail here. While this is the typical car taking carbon ceramic brakes near term, there will be manufacturers applying carbon ceramic brake technology to cars with RRP below (even well below) £100,000 for a variety of brand-driven or other reasons.

So, even the immediately addressable annual market is well over £250m. Let us "drill down" a bit more closely. Typically, in the early stages, a new technology is adopted on luxury and upper-middle cars. We estimate that annual sales of European cars with RRP above £100,000 are over 100,000 units; thus, this market alone is worth over £250m. We consider a "highly visible, effective immediately" market of £250m. Looking at this market regarding the true luxury-end vehicles, let us model some scenarios for this segment and take an extreme, conservative view.

Playing with different scenarios – extreme conservative modelling

Note that the past decade has seen significant fluctuations in numbers for the category of cars (all data specific to Europe alone) selling for over £115,000. The impact of the general financial crisis from 2008 was clear. By 2013, sales of cars in the range of £100,000 to £115,000 were similar to current levels, but sales of models at prices over £115,000 were certainly affected. The estimates we use for market volumes for cars selling over £115,000 are current estimates, and these current levels equate to levels seen (broadly) in 2007. Taking what we consider to be an ultra-conservative view and significantly discounting current volumes of sales of cars priced over £115,000, Surface Transforms' luxury-end addressable market would still remain at over £150m. In fact, we consider that the relevant volumes will continue at current levels, or more. This is not a level of detail we consider material to our investment case. It does, however, we suggest, indicate that the investment case is still compelling in the short term, even if i) investors consider only the extreme-luxury end of the European market and, further, ii) investors significantly discount for the risk of a potential economic-led downturn in that market.

- There is a clear path to £2bn+ assessing the likely take-up of the £50,000+ RRP segment, with further growth beyond that in due course. That further growth comes in part from the typical characteristic of automotive components to fall in price and thus expand the market. In part, it also derives from environmental legislation. We have referred to the importance (medium term) of mitigating brake dust emissions.
- Our £250m addressable market, which is "highly visible, effective immediately", takes account only of cars selling at £100,000-plus. While this is the typical car taking carbon ceramic brakes in the near term, there will be manufacturers applying carbon ceramic brake technology to cars with RRP below (even well below) £100,000 for a variety of reasons.

We look at European addressable markets, but certainly other global markets are in play

We anticipate global sales but with a strong focus on the European markets. There certainly is scope in the USA and other non-European markets. It may be worth noting that this is not the type of product to be unduly affected by modest potential changes in tariff regimes.

Summary of the market-wide position to date

A competitor opened the market but, in 10 years, growth has been slow

- As we have noted, a competitor JV, part of a larger group, has kick-started the market over the past near-decade in the racing and luxury market.
- However, OEMs demand dual supply, seldom volume-buying without the second source.
- Surface Transforms provides that second source of supply.

However, Surface Transforms has the potential to revolutionise (i.e. grow 20+ fold) this market

As the product price evolves and the OEMs see increasingly more brand benefit to sales in the mid-range, the market growth potential is very large. There are no hard-and-fast delineations, but there is an extensive list of other value-creating components that have grown to these types of volumes and far beyond.

Surface Transforms' discs will open up the market size, and its commercial potential is based on taking a share of this market growth, not in attacking the competitor for share.

Creating a dual-source industry

Surface Transforms operates in a market searching for secure dual-source supply of a cost-effective nature

There are strong and obvious factors almost forcing OEMs to look to a second supply source for components used in any kind of volume. As the alternative to the current dominant player, we note that Surface Transforms is well placed to benefit

Auto products with high environmental and performance benefits do not last long as low- volume, single-source, expensive products. OEMs seek out a credible second supplier. Surface Transforms is continually engineering out costs, has a superior product and, with its new factory, is now the emerging second supply source. It is inevitably the case in automotive OEM that, when costs fall for a relatively new component product, volumes multiply.

Surface Transforms is the second source, and new factory transforms this into effective supply

Surface Transforms has engineered out costs and has specific programmes (related to both engineering and new volume capacities) in position to reduce costs (by a further 30%-40%).

Continually working costs down, has a superior product, and now the emerging second supply source

Automotive customers are averse to single-source situations, so Surface Transforms needs to sell at least an equal product in order to break in. We are confident that Surface Transforms does indeed have a better product. It is also a proven product, having had several years' revenue from the auto-racing retrofit market. It supplies retrofit, we understand, to Porsche, Ferrari and Nissan owners, and also to many others.

BremboSGL: success in opening the market; constraints from here

Market currently small and young, at ca.£100m p.a., 99% supplied by BremboSGL.

The BremboSGL JV was created in 2009, and its first sales of carbon ceramic discs (of some €70m) were in that year, with the Brembo partner being a well-established brake systems manufacturer. Surface Transforms has been "serving its time", successfully proving the product and the manufacturing resilience. The first sales for Surface Transforms were well over a decade ago.

Surface Transforms' only competitor, BremboSGL, is currently therefore much larger, but remains, in auto industry terms, still a niche market. BremboSGL is growing, but relatively slowly, at a CAGR of ca.10-15%. This is a company generating healthy profit margins. Its niche is the luxury end. We estimate EU registrations of cars with an RRP of £100,000 or higher to total some 60,000 p.a., so BremboSGL's growth is relatively steady, having achieved good penetration in the racing and luxury markets, although it has struggled to reach broader markets, which are currently capacity-constrained.

BremboSGL 18%-owned by BMW, 9.9% by VW and 27.5% by Quandt family – an impressive pedigree, but may prove a constraint for the company

It is relevant that BremboSGL is 18%-owned by BMW, 9.9% by VW and 27.5% by the Quandt family (which, in turn, owns a substantial amount of BMW equity). This is an impressive pedigree, but may prove a severe constraint for its product being utilised *as a single source in meaningful volumes* by marques beyond BMW, such as Mercedes (which includes AMG) and the VW Group (which includes Porsche, Audi and Bentley). Surface Transforms thus i) opens up the market, and ii) generates and supplies a market that is currently only ca.8% of the realistic £2bn+ annual size.

Surface Transforms' business plan is to take a significant share of the growth in this market, while this rapid market evolution also enables BremboSGL to grow. Its

profitability is good. Any other potential competitors are a long way off and not apparent. It is not surprising that, currently, the market is niche and growing, but not in the exciting way we anticipate it will going forward. The OEMs – as ever – are looking for dual supply and production-efficiency-driven cost reductions. This has happened – delivered by Surface Transforms, its 2017 factory and its five years of testing with various OEMs.

Quality and capacity

Surface Transforms' superior offering

Lower running temperatures are significant to acceptance and expansion in revenue potential

The engineered-in superiority of the Surface Transforms product stands principally on its lower running temperature, once operating. This is 150^{O} C cooler than the competition, for the same kinetic energy of a car's speed and weight. This is a significant part of the reason for the lighter weight than the competition.

There are also strength and durability improvements, in part from the structured alignment of the original carbon fibres. The process has, over the years, been improved significantly – but there is still room for further advances. The superiority of the product is "built-in" and hard to emulate.

Scalability "de-risked"

The 2017 Surface Transforms factory facility adopts a cell structure. The scalability and surety of replication of the process in each new cell are crucial for volume OEMs. Surface Transforms is securing continuous advances in the quality, cost and timing of its process. It has moved the four-stage process (incorporating 11 sub-processes) to larger, well laid-out premises, has reduced costs, and is well advanced in securing significantly lower costs and speeding up the process.

The initial Smaller Volume Production cell (SVP) has a capacity of £4.5m p.a. in revenue.

The demand/price curve

We see "low-risk" route to expect £400m p.a. market, with Surface Transforms the leader – and aspire to much larger market still

We see a realistic initial total market target of several hundreds of £m p.a. This luxury end of the market is not dependent on meaningful price reductions beyond those currently projected by Surface Transforms. Beyond, that, it is then also highly likely that, as costs fall, the take-up will spread to the middle market (e.g. Audi A4, etc). Realistically, in time, the market will certainly reach further, with adoption of this innovation growing like other automotive efficiency/regulatory/safety/performance components, but quantum and timing are to be determined. This would be a quantum change beyond anything required to fill Surface Transforms' current factory, even were it to be running at its full sales rate, which is significantly over £50m p.a.

Capex payback around 18 months

£10m capital investment per call. This would generate return with payback well under 18 months.

Note that each full-scale cell requires a ca.£10m capital investment. This would generate a return with a payback well under 18 months. This allows for gross margins of 55%, while we consider that 60% or higher is a good possibility.

The manufacturing process

Carbon ceramic brake disc manufacture is a complex series of chemical, metallurgical and engineering (tooling) processes. These take years to perfect. Surface Transforms' cost reduction programme – involving many complex steps, including capital and intellectual investment, as well as testing – is well under way. In this manner, gross margins of over 60% are set to remain, with the efficiency savings being passed on to the OEM customers. As the price per disc falls, to perhaps half the level of a short number of years ago, the demand rises exponentially.

In 2017, Surface Transforms successfully relocated to a modern factory facility – showing ability to step volumes on a phased basis

In 2017, Surface Transforms successfully relocated to a modern factory facility. This had several benefits, among which the ability to step volumes on a phased basis. The manufacture adopts a cell structure. Cell one is up and working (not yet to full capacity, even on current contracts' full deployment). There is planned scope for a number of additional cells, each materially identical. The cost of delivery of one cell is some £10m.

One cell has a capacity of at least £12m sales, probably slightly greater. We recall that the £17m current capacity includes a smaller-volume facility (co-located), with capacity of ca.£4.5m revenue. In the time-frame of our financial model, we estimate no gross margin reduction from recent levels, but would see a long-term modest reduction, while still maintaining levels usefully above a healthy (as a round number) 50% for far greater volumes than those on our forecast horizon. At the £10m capital cost, investors can see a rapid return on capital from the gross profits per each cell. This scalability and surety of replication of the process in each new cell are crucial for volume OEMs. This "replication" underpins our confidence that the OEMs will continue to progress steadily, with Surface Transforms as a trusted mission-critical partner.

Investment – in process, delivery and testing, as well as the whole new scalable factory – has been put in place ahead of volume contracts. This therefore remains a situation of cash burn, but the existing contracts take the company to a cashflow-positive position.

Former Ellesmere Port manufacturing site moved to new, modern, optimally-designed facility in Knowsley, Liverpool, with 20-fold larger capacity

Later in 2017, Surface Transforms commissioned its manufacturing facility. Because it is a manufacturing cell structure, with plenty of space and infrastructure to add additional cells as and when demand expands, it brings:

- financial predictability;
- production process repeatability and finished product predictability; and
- better budgeting of capital and operating costs versus income from dedicated contracts.

Current contracts comprise a small base of retrofit work, which is on a batch-by-batch basis, but the new contract indicates what will become the norm – namely production runs of predictable size running for the duration of a model of car.

Quality, cost and cycle times all see ongoing improvements

The factory move, in 2017, brought all the initial production expertise to date into an effective, scalable, efficient facility. Surface Transforms moved its Ellesmere Port manufacturing site in late 2016 to the new facility in Knowsley, Liverpool, initially to a £4m p.a. SVP capacity, and then shortly afterwards to a "Cell One" production facility. A factory move is not without risks, but its successful completion changed the risk profile to the OEMs very materially.

IATF 16949 and ISO14001 certification in 2018

While the rationale for moving to the modern Knowsley facility was primarily about capacity, there was also always an equal objective to improve process structure and efficiency, in respect of which the award of the quality standard IATF 16949 in July

2018 was important. This was achieved following an audit by Lloyd's Register Quality Assurance for this automotive quality management system standard. Following an external audit by Lloyd's Register Quality Assurance, Surface Transforms was certified to the ISO14001:2015 environmental management system standard. This is a worldwide benchmark for best practice.

Surface Transforms' industrial process

New factory, operational for the past two years

The company now possesses the space and infrastructure to eventually produce over £50m sales turnover at the current expected "mature" market price, albeit prices will be higher in the early stages of a developing manufacturing process/market.

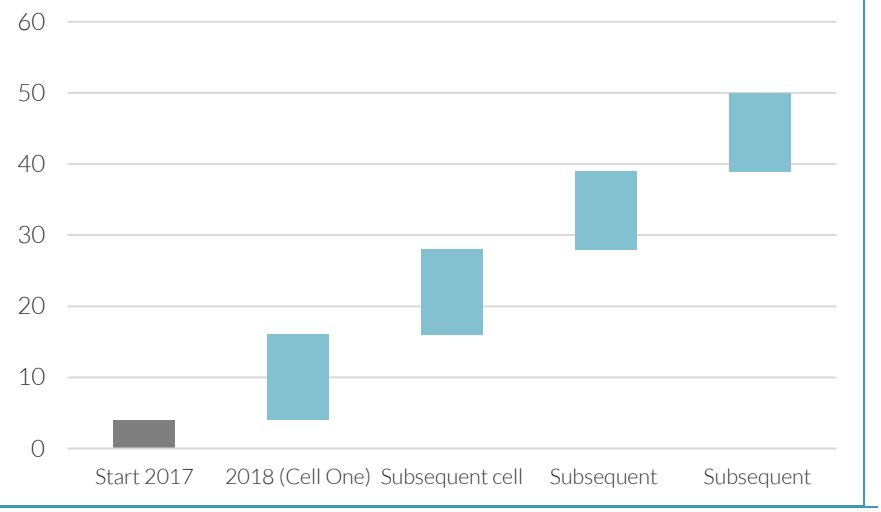
In early 2018, further capital equipment was successfully commissioned, enhancing in-house processes. This was the full optimisation of the first of these enhanced-volume cells. To get to this point, Surface Transforms' engineering process has been developed over a number of years:

- optimising the engineering qualities of the finished product;
- improving the process and reducing costs where possible; and
- identifying areas where investment is required to improve the process and reduce costs.

Capacity expansion is by adding further cells, replicating cell one

Indeed, we note current factory has scope for five cells – here we illustrate four, plus SVP initial capacity

Capacity expansion as new manufacturing cells commissioned (£m)



Source: Hardman & Co Research

The cell structure means that future growth can simply be fulfilled by replicating the first cell.

Process robust and, importantly, product appears superior to existing competition

Engineered-in, best-of-breed

The engineered-in superiority of the product stands principally on its lower running temperature once operating. As noted, this is 150^{O} C cooler than the competition, for the same kinetic energy of a car's speed and weight. This is a significant part of the reason for the lighter weight than the competition. There are also strength and durability improvements, in part from the structured alignment of the original carbon fibres.

Materials technology/chemistry/engineering not something readily replicated

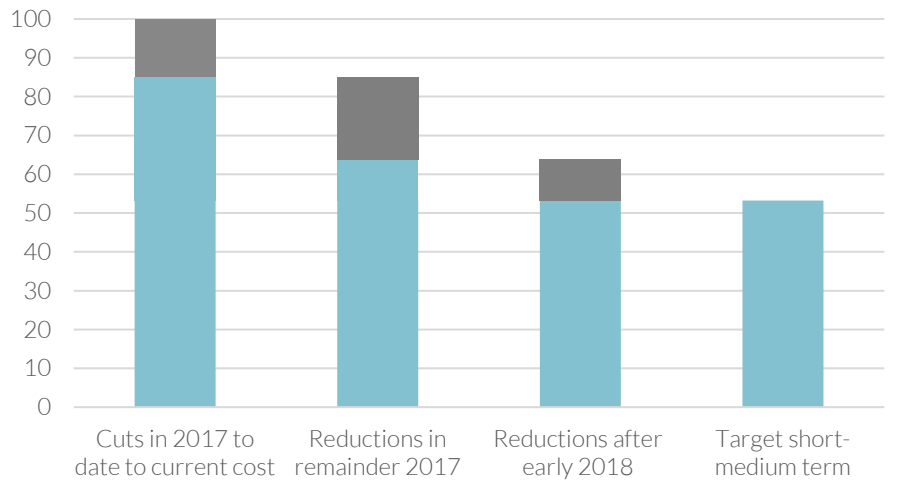
Again, as noted earlier, the process has, over the years, been improved significantly – but there is still room for further advances. The superiority of the product is "built-in" and hard to emulate.

Cost (including cycle-time) reductions

We believe costs reduced by some 35% in 2017 and by a further 20% in 2018. With further falls this year, cost efficiencies are ongoing. As noted above, the assumption is an ongoing sharing of savings with the client, maintaining gross profit margins for a number of years, and any potential erosion, when much larger volumes come onstream, being relatively modest.

Costs are falling – high visibility of how this is achieved

Manufacturing costs per disc (indexed 100 current)



Source: Hardman & Co Research

The first bar in the chart above indicates 2017 cuts in the lead-up to the new factory. The last bar in the chart includes other cost savings in process and raw materials savings.

The four stages of production

Stage 1: Make the OxPAN preform

First – weave together and align carbon fibres

Felted squares of fibre are received, needle-stitch-machined to form cross layers, and then cut. The machining is undertaken so that all fibres are aligned in the X or the Y axis. The needles are micro-crochet, and the complexity of the set-up alignment of the needles exceeds one million potential permutations. If the shuttle speed is not exactly correct, the needles will break and eventually abort the process, which binds up to 30 layers. Then pre-formed carbonisation occurs (using hardly any gas). Polyacrylonitrile (PAN) is fabricated into a polymer nanofiber mat. A very important property of the "mat", as fabricated by Surface Transforms, is the regular alignment of the fibres,

Alignment gives structural strength – a positive point of differentiation vs. competition

which is key to consistency and handling the characteristics of the rotor. The alignment gives structural strength and is a different configuration from that of the competitor – a positive point of differentiation.

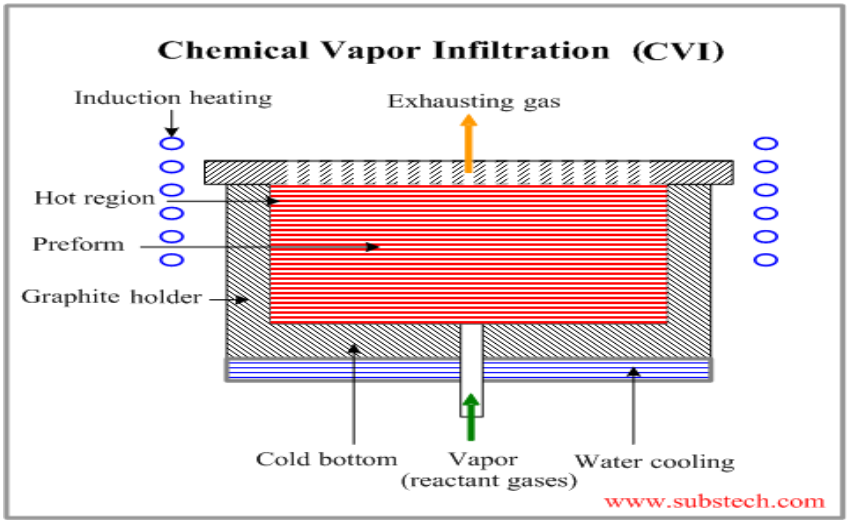
Stage 2: Carbonisation

Atomic alignment is key

The carbon fibre (OxPAN) pre-forms are heated to a temperature of 1,000-3,000° C in a furnace filled with a gas mixture that does not contain oxygen. The lack of oxygen prevents the carbon from burning. Upon heating, the pre-forms begin to lose their non-carbon atoms in the form of various gases. As these atoms are expelled, the remaining carbon atoms form tightly-bonded carbon crystals, aligned more or less parallel to the long axis of the fibres. Note that this process uses very little gas.

Stage 3: Make the carbon ceramic blank

Carbon vapour infiltration (CViST)



Source: Surface Transforms

Adding more carbon – the CVI furnace

The ST product "runs cooler" due to atomic structure

This process densifies fibres with further pure graphite "laminar" carbon crystals. Natural gas is introduced into the bottom and sucked straight out, after carbon has been stripped off. Solid carbon material grows atom-by-atom. This builds layers to "duct" heat out. It is thus a key issue behind the superior performance derived from cooler running of the disc vs. the competition. It builds up the carbon content to 6kg once more, operating 500 discs at a time. Testing is through microscopic calibrating of how light bounces off the fibre. Heat treatment is then undertaken.

Stage 4: Make the ceramic rotor: treating, machining, MiST, coating

After heat treatment and between two machining stages, the MiST process adds silicon, thereby hardening further

After a heat treatment stage (to minimise energy costs, the disc itself acts as the heating element, rising to 1,700^{O} C), rotors are "green-state"-machined (for cooling properties "in service") and weight-reducing vents/holes are cut. Then, the MiST (melt infiltration) process runs overnight (around 16 hours). This infuses silicon to make hard silicon carbide from a carbon ceramic "sponge", hardening the disc further. After a further short period of highly specialist machining, sintering and a coating are added to prevent oxidisation. This machining of such a hard material is exceptionally specialised, with significant IP generated by/for Surface Transforms (indeed, the company co-operated with local academic institutions on a knowledge transfer process in this regard). This whole process is repeated and lasts three days. The final coating is "self-healing"' in that, as the disc in use heats – up to 500^{O} C, the coating moves over to cover scratches. After a finish grind, balance and inspection, including by laser, the rotor with the disc assembly added is ready for despatch.

Board and senior management

Board

David Bundred – Non-Executive Chairman

David Bundred has 30 years of automotive experience, with a particular speciality in the brake systems segment. Formerly, he was CEO of TMD Friction GmbH, a €600m sales, private, German-headquartered company, and one of the world's leading automotive brake pad system suppliers. Before that, he was COO of Lucas Aerospace. In another division of Lucas, he led the automotive industry introduction of anti-lock brakes. He holds an MBA from Cranfield University, and is both a chartered engineer and chartered management accountant.

Dr Kevin Johnson – Chief Executive Officer

Kevin Johnson has a doctorate in Chemistry from the University of Liverpool and an MBA from Manchester Business School. He has spent six years in chemical industry product development, and has broad experience with OEMs in the area of new technology development, previously working for Avecia (former AstraZeneca).

Kevin D'Silva – Non-Executive Director

Kevin D'Silva has been CEO or chairman of several medical private and public companies. He is an MBA, chemical engineer and University of Leeds graduate.

Richard Gledhill – Non-Executive Director

Richard Gledhill's principal activity has been, and continues to be, the building and developing of USG-Gledco Ltd, which produces mechanical carbon components and materials for the aerospace and oil & gas industries from the UK, USA and Mexico.

Michael Cunningham – Finance Director

Michael Cunningham joined at the commencement of 2018 from Bentley Motors Ltd. Prior to joining Bentley, Michael was Finance Director of Aquila Truck Centres Ltd, Commercial Director (initially Regional Financial Controller) of MAN Truck and Bus UK, and Financial Controller of Preston Group, a family-owned car dealership.

He is a Fellow of the Association of Chartered Certified Accountants, holds an MBA from the European School of Management and Technology in Berlin and a Bachelor of Engineering degree from Queens University Belfast.

Senior management

Michael Sinai – European Sales Manager

Michael Sinai is based in Germany, and has 20 years' automotive industry experience, including senior sales positions at Bosch, Trimble and Flextronics.

Geoff Whitfield – Engineering Manager

Geoff Whitfield has over 15 years' experience in automotive and aerospace product and process design, development and testing. This includes polymer composite product design and testing, and high-volume manufacturing. Geoff has a BSc (Hons) in aeronautical engineering and an MSc in engineering (composite materials) from the University of the Witwatersrand in South Africa.

Steve Harvey – Senior Operations Manager

Steve, a fellow of the Chartered Institute of Quality, is a chartered Senior Manager with over 27 years' international experience in operations, quality, lean manufacturing and continuous improvement. He has held both operational and strategic positions with divisional responsibility for major tier-one global corporations throughout the last 22 years. Previously, he was responsible for the launch of three Greenfield automotive JIT plants, as well as several plant turnarounds.

Risks and mitigation

Cashflow

Cash burn

The company is currently cash-flow-negative. Meaningful, positive cashflow is built into the financial projections on current contracts, which run for several years. Although Surface Transforms has been selling carbon ceramic discs for many years, the quantum to date has been modest, largely to the retrofit market and niche OEMs (e.g. Koenigsegg). As a result of this and the strong, repeat R&D, free cashflow has been negative. Auto retrofit and niche sales have mitigated the cash burn, but new equity issuance has taken place. The situation has now changed irrevocably. Cashflow remains negative this year and next, but moves towards neutral and turns positive within our forecast horizon. Within this, we only assume contracts already in hand. Further, we assume nil for spares – a meaningful figure is likely here, however.

Currently, inventories and work in progress are higher than they will be – as a percentage of sales – in the longer run. This is a function of the modest level of sales, certain minimum-size contracts with supply-chain partners and dual-sourcing of some suppliers in the year, as the company switched suppliers. While we make allowance for modest Work-in-Progress (WIP) outflow in our cashflow model (and note that trade receivables have consistently run below trade payables), we do not anticipate onerous WIP implications for the OEM supplies. This is, however, yet to be demonstrated.

IP and product superiority

Financing for foreseeable capital expenditure is well-covered by net operating profits. This is because it can be rolled out on a phased basis. This assumption is on the basis of steady timing on contract wins.

Product and intellectual property (IP)

The product has been tested in use by customers for several years and by prospective customers in extreme-condition road tests. The product works.

Strong competitive position – and not needing to take volume from competitor

As volumes ramp up, we have every expectation that quality assurance is a high priority. The manufacturing cell structure assists this. Industry standards qualification has been secured as required, with imminent granting of the latest industry qualification confidently expected.

New factory successful commissioning, modular structure for easy expansion, cost cutting

The company's IP has been crucial to securing orders and to the manufacturing process. It would be difficult for a competitor to copy the company's processes, even without patent protection, since the detail of, for example, pressure, time and temperatures is critical. Surface Transforms considers its technology to be superior to its competitors as a result of a number of factors in the manufacturing process, including alignment of fibres and a lower running temperature once operating (150^{O} C cooler than the competition for the same vehicle kinetic energy).

Competitive position

There is only one competitor, BremboSGL, and the substantial ownership of it by the Quandt family (the owners of BMW) makes other OEMs cautious, offering a very significant opportunity for Surface Transforms.

Modern, cell-configured manufacturing facility

This mitigates i) the order fulfilment risk as seen by the potential customer, and ii) the risk faced by Surface Transforms in expanding production. To be specified in any meaningful volume, Surface Transforms still has the opportunity to cut its manufacturing costs. Energy accounts for ca.25% of production costs, which should fall, partly through the new Combined Heat and Power facility. Each programme to

achieve this is clearly calibrated. The cell structure makes scaling relatively pain-free and incremental.

- Gas costs have been fixed for 10 years (in 2017).
- Supply chain improvements (including dual source) are in place.

Further detailed points

We highlight the following points:

- In the past, over half of revenue has been from outside the UK, in a range of currencies. Most costs are in Sterling. Going forward, OEM volume contracts will likely be €-priced. OEM 5 is €-priced. OEM 6 is a British £-based OEM.
- The only debt the company has is an interest-free loan related to public-sector funders. The company has never been in a net debt position.
- The OEM 6 cars (and thus the Surface Transforms revenues) are all pre-sold.
- The OEM 5 Hardman & Co estimated revenue is based on the lower end of historical experience in take-up of options similar to the carbon ceramic brake disc option that is being offered. We incorporate these into our model.
- The OEM 5 and OEM 6 contracts have guaranteed pricing structures (in respective currencies of € and £).
- Our model assumes a €/£ exchange rate of 1.15 – the average for the past six months. Were the current rate to persist, we would see a very minor upgrade to revenue and profits.
- Energy accounts for ca.25% of production costs, with materially all fixed long term.
- There is no defined benefit pension obligation.
- In terms of market/trading uncertainties, product sales are expected to decline in the race markets, but continue to grow in the retrofit and niche vehicle markets, with an increasing number of distributors and niche vehicles. This uncertainty is constantly assessed by regular customer meetings, and monitoring the level of enquiries and orders for the company's products and industry-wide. In addition, the company faces the continued uncertainty created by the global economic and political climate.
- A more significant concern might have been the risk of exit from the single EU market and possible trade barriers. Whichever way this develops, the product is a high-gross-margin sale. Recent contract wins have been secured well after the Referendum result to exit the EU. But supply-chain disruption could potentially lead to warehousing of the finished product in Germany.

Communications – risk management

At all levels, the Board's focus is to minimise risk – to actual and potential customers and with regard to financing of the growth. It communicates regularly at a high level with customers and all six OEM potential clients.

Progress of testing is incremental, and the processes are clearly visible, as is the dialogue between potential customers and Surface Transforms. Each OEM has its own tests – so their ongoing status represents investment by the potential customer into the Surface Transforms product.

Valuation

The company is cash-positive, and remains so at the bottom of its projected cash cycle, as the new contracts ramp to full output.

There is a cost to securing new OEM clients, but Surface Transforms is well advanced in the three OEMs that have not yet delivered an order to the company.

There is minimal (if any) cost to Surface Transforms of a new (some years into the future) model contract with an existing OEM. Additional tests should be minimal, and the OEM typically provides Surface Transforms with DD income.

Filling the current factory would take the company to around £50m revenue

We are confident that, at some stage in the future, Surface Transforms will fill five manufacturing cells, and also that it will exceed £50m p.a. revenue. As volumes rise, prices (but not gross margins) invariably fall.

Gross margins 50% or better at all times

Assuming prices halve and gross margins reduce slightly to at least 50% (a conservative level, we consider), there is visibility to £50m revenue and £25m gross profit. Naturally, overheads (for such a level of revenue) will rise from current levels. There is some way to go to achieve this. Clearly, there are significant future contracts to be secured to reach this level, but it would equate to a 0.2% share (or less) of the total European brake disc market by volume. It would also equate to ca.2.5% of the addressable market, which we consider to be £2bn, approximately.

Current valuations give no credit at all for the potential from here – we consider

Current market valuation gives about zero credit for any potential beyond what has been built to date

- The cost of delivery of one manufacturing cell is some £10m. R&D expenditure over the past near-decade is a similar amount, if DD costs allied to the OEM tests are included. The market capitalisation and EV equate only to these "sunk costs": this seems significantly anomalously low, given the near-term potential.

- A valuation at a round figure of £20m, therefore, we contend, values at near-zero the potential beyond just one further "toe in the water" contract from a new OEM. OEM 3 is well advanced, we understand, but there is a wide field of potential contracts pending. Such a contract would move Surface Transforms towards filling cell one. Even filling five cells should be only the start of the real story.

- We consider the 4.4x EV to sales of 2022E to be conservative, given the robust gross margins, the significant available capacity and the near-term growth prospects, let alone the medium-term strategic potential.

Market capitalisation less than one year's potential gross profits from current factory (from here all self-funded growth)

- It is noteworthy that the current ratio of market capitalisation versus gross profits under the £50m revenue scenario outlined above is under 100%. Gross profits would be £25m-plus. This can be funded out of just a part of free cashflow. This appears significantly out of line, or, at least, overly conservative.

Financial performance

This research report is published ahead of the posting of the final results to May 2019, scheduled on 9 September.

Change in year-end makes eminent sense

On 15 August, it was announced that there was to be a change in the year-end from May to December. As stated by the Chairman at the time: "This change brings the Company's reporting periods in line with both its new and target OEM customers and also avoids having a year-end in the middle of the automotive racing season. In addition, we believe that it will simplify messaging to the investment community."

Our tables, below and overleaf, estimate 12-month fiscal periods, but these are to May year-end up to and including May 2019, and then December for 2020 onwards. It is important to note that the second 2019 period stated is for seven months only – from end-May 2019 (the "old" fiscal period) to end-December 2019 (the new fiscal year-end).

Revenue account

Revenue account							
Year-end May*/December**(£m)	FY17*	FY18*	FY19E*	*7 month period FY19E***	FY20E**	FY21E**	FY22E**
Sales	0.70	1.36	1.00	*1.10*	3.30	4.10	5.80
Gross profit	0.43	0.92	0.65	*0.65*	2.50	2.90	4.00
Gross margin	61.43%	68.00%	65.00%	*59.00%*	75.70%	70.70%	68.90%
R&D & overheads***	-2.81	-2.93	-3.05	*-1.90*	-3.00	-3.00	-3.00
EBITDA	-2.38	-2.00	-2.40	*-1.25*	-0.50	-0.10	1.00
EBITDA margin	loss	loss	loss	*loss*	-15.20%	-2.40%	17.20%
EBITA	-2.53	-2.30	-2.80	*-1.45*	-1.30	-0.80	0.30
EBITA margin	loss	loss	loss	*loss*	-39.30%	-20.00%	5.20%
Net finance income	0.00	0.00	0.00	*0.00*	0.00	0.00	0.00
PAT (adjusted)	-2.53	-2.30	-2.80	*-1.45*	-1.30	-0.80	0.30
Exceptional items	0.00	0.00	0.00	*0.00*	0.00	0.00	0.00
Tax	0.35	0.47	0.60	*0.30*	0.55	0.50	0.50
PAT	-2.18	-1.83	-2.20	*-1.15*	-0.75	-0.30	0.80
EPS (diluted, adjusted, p)	-2.42	-1.66	-1.65	*-0.85*	-0.55	-0.22	0.58
DPS (p)	0.00	0.00	0.00	*0.00*	0.00	0.00	0.00

May year-end, **December year-end, * includes certain small exceptional items*
Source: Surface Transforms accounts, Hardman & Co Research estimates

Balance sheet

There was a 12.30m new share placing on 20 March 2019 at 15.5p per share (gross £1.9m).

Balance sheet							
@ 31 May*/December**(£m)	FY17*	FY18*	FY19E*	*7 month period FY19E***	FY20E**	FY21E**	FY22E**
Net current assets (including cash)	2.53	1.73	2.50	*2.10*	1.75	2.20	3.45
Shareholders' funds	3.90	5.55	6.55	*5.40*	6.00	5.70	6.50
Net cash (debt)	1.53	0.62	1.50	*1.10*	0.75	1.20	2.45
Avg. shares diluted (m)	90.00	109.00	133.00	*136.00*	136.00	136.00	136.00

**May year-end, **December year-end* *Source: Surface Transforms accounts, Hardman & Co Research estimates*

Cashflow

We anticipate a cashflow-positive situation in FY21, assisted by (ongoing) R&D tax inflow and a modest EBITDA-positive figure, including the tax credit. For FY20 and FY21, we anticipate modest benefits from invoice factoring – if appropriate. Note that our estimates include a reduction in the ratio of work in progress versus revenue.

Cashflow							
Year-end May*/December** (£m)	FY17*	FY18*	FY19E*	*7 month period FY19E**	FY20E**	FY21E**	FY22E**
Cash from operations, net tax	-1.21	-2.17	-2.02	-0.10	0.05	0.70	1.50
Capex	-2.07	-2.00	-0.30	-0.30	-0.40	-0.25	-0.25
Interest	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity issuance	0.05	3.48	3.20	0.00	0.00	0.00	0.00
Net cashflow	-3.23	-0.69	0.88	-0.40	-0.35	0.45	1.25
Depreciation	0.15	0.29	0.40	0.20	0.80	0.70	0.70

** May year-end ** December year-end* *Source: Surface Transforms accounts, Hardman & Co Research estimates*

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The fact that Hardman & Co is commissioned to write the research is disclosed in the disclaimer, and the research is widely available.

The full detail is on page 26 of the full directive, which can be accessed here: http://ec.europa.eu/finance/docs/level-2-measures/mifid-delegated-regulation-2016-2031.pdf

In addition, it should be noted that MiFID II's main aim is to ensure transparency in the relationship between fund managers and brokers/suppliers, and eliminate what is termed 'inducement', whereby free research is provided to fund managers to encourage them to deal with the broker. Hardman & Co is not inducing the reader of our research to trade through us, since we do not deal in any security or legal entity.

research@hardmanandco.com

35 New Broad Street
London
EC2M 1NH

+44(0)20 7194 7622

www.hardmanandco.com