

CONTRACT OR CO-OPERATION? INSIGHTS FROM BEYOND CONSTRUCTION: COLLABORATION - THE HONDA EXPERIENCE

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Abstract

This paper takes as a case study the construction of a new European car plant at Swindon for Honda of the UK (Manufacturing) Ltd (the NEP). In October 2002, the new plant was awarded the British Construction Industry Award for a Building Project. The judges commented:

The 'one team one goal' culture of openness and transparency at Honda's New European Plant, and the company's refusal to accept the status quo, has been rewarded with a building cost of only £701/sqm - a 40% improvement on the cost of the original plant at Swindon completed nine years earlier. Outside the plant is an anonymous shed, which would not be in contention for any architectural beauty award. Inside it is an incredible three dimensional jigsaw of services dedicated to the rapid and economical assembly of high quality cars.

Introduction

This aim of this report is to answer the question: 'There are many good tools out there but most people don't use them: why?'

Honda is one of a growing number of client organisations which successfully uses so called 'sophisticated' project management tools and techniques. The end result is a number of projects which have beaten tight financial constraints; and have been delivered on time, to the required quality. Indeed Honda's internal benchmarking has shown that construction costs on many projects are comparable with those in the competitive market in the USA.

In September 2001, Honda completed a £130m investment at Swindon. This was for a second 50,000m² car plant adjacent to the existing car plant. The construction performance was impressive. As Figure 1 shows, Building costs, including design, came in at just over £35m, equivalent to £701 per m². This key performance indicator of £701 per m² can be set into context by comparison with the adjusted cost of £1,173 per m² for an almost identical plant built between 1988 and 1992 on the same site at Swindon. Moreover, in 1998, initial cost estimates from many leading UK and Japanese companies were between £800-£1,000 per m². As Honda builds similar buildings around the world it is able to benchmark its construction costs in the same way as it does its car production costs. Currently the UK operation is achieving construction costs comparable with those in the USA. This is particularly important because the USA construction market has long been held up as one of the most efficient in the world.

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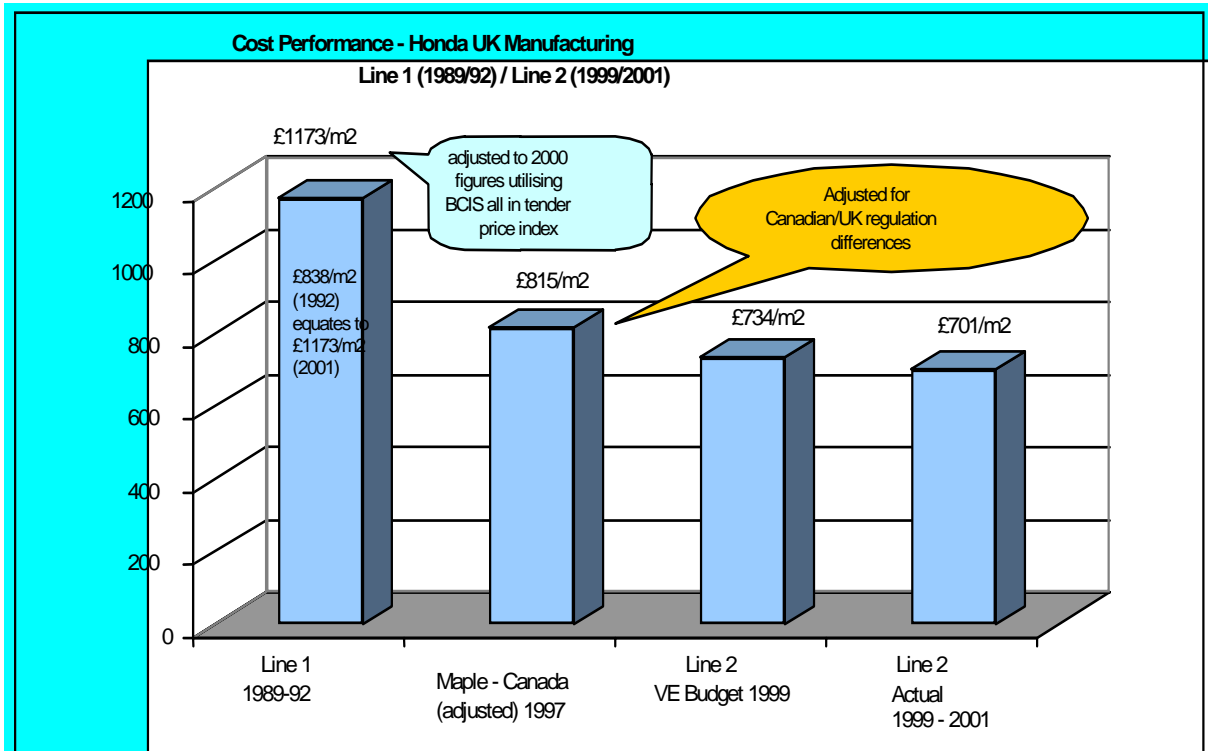


Figure 1. Construction Costs at Swindon compared to other sites.

In summary, Honda has achieved a 40% improvement in its UK construction performance over 11 years (as measured by the building cost for buildings of equivalent functionality). This improvement is well above the 30% improvement suggested by Sir Michael Latham in 1994 in his landmark report on the underperformance of the UK construction industry. The 30% improvement suggested by Sir Michael was widely criticised at the time as being impossible, and indeed there are many who still doubt that such an improvement is possible.

What is more important is that this improvement has not been at the cost of cutting building functionality, nor has it been at the cost of contractor (supplier) margins. Honda recognises that the only way it can survive long term is through its suppliers being profitable. In Honda's case the improvement has largely been achieved by using the best available management tools and techniques, coupled with a company philosophy which actively encourages change and challenges the status quo.

This meant that the recently completed car plant was achieved under a different procurement route and with a different contractual regime from the original plant. Moreover, Honda's own role as client changed between the two comparable projects. In particular, on the NEP it saw itself as central player within a 'one team one goal' philosophy. This significant improvement in out-turn cost between the two projects certainly provides justification for Honda's decision to use the many good management tools now available.

Honda's understanding of the construction client role

Honda recognises that the client's role is central to the success of the project. Through its automotive business, it recognises that with any business operation it is important to get close to the supply chain. It understands that in all areas of its business there are risks. Its strategy is therefore about risk management not risk avoidance.

Hypothesis

Honda has clear business objectives, which in turn translate into business strategy. These objectives comprise being a global brand synonymous with quality. However, part of the business strategy necessary to achieve these objectives is to create a culture which encourages 'thinking the unthinkable and challenging the status quo'. The achievement of Honda is that it manages the paradox created by risk. On the one hand it creates a culture in which risk taking is encouraged, on the other it recognises that risk taking should not be reckless, but should be managed.

The importance of culture and risk should not be understated. If the organisational culture does not allow risk taking, which by definition must include change, then however good the alternative new methods are, they will not be adopted. In the commercial world it is often the case that conservative businesses are forced to take risks and to change because of changes in the market; failure to do so would prejudice their survival. In fact, many businesses which fail do so after eventually recognising the need to change but too late in the day to ensure survival. In the non-commercial world there are not the same pressures of the market place to prompt change. In many organisations there is considerable inertia, which acts as an obstacle to change - no matter how attractive the alternatives might be. The thesis of this paper is that long-term success in construction projects is no different to long-term success in business as a whole. The key is a culture which allows, indeed even requires, risk taking and change, but in a structured rather than reckless or foolhardy manner.

Honda philosophy

'Life is measured by the number of times your soul is deeply stirred': Soichiro Honda.

Honda is a multi-million pound global business. It is also a people driven, philosophy-based company. Honda's philosophy is summed up by: 'Through challenge, fresh ideas, a young attitude [ie young in spirit], teamwork and a friendly working environment, we will achieve all we set out to accomplish'. 'Advancement, challenge, quality and partnership' also describe Honda's philosophy. The Honda philosophy is the key to the construction project's success. The philosophy creates a culture in which it is appropriate to challenge the status quo; indeed the company encourages creative dissatisfaction. This means that every assumption or application within the automotive sector of the business is challenged regularly. It is the drivers (philosophy and culture) of the business which are the key.

Background information

Honda has invested £1.5b at its Swindon manufacturing plant since coming to the UK in 1985, of which approximately £130m has been invested between 1999 and 2001 on the construction and fit out of the NEP. The project was successfully completed at the beginning of July 2001 to enable trial car production to commence immediately. Full single shift production in the new plant commenced in September 2002. The project has been a considerable financial success having been completed within budget and indeed at a lower cost (£701 per m²) than the original value engineered budget of £734 per m². The NEP contrasts with the construction industry's general under performance on major projects.

The scope of the project

An external view of the building may convey the misleading impression that the project simply involves the construction of a large warehouse type structure (see Figure 2). The reality is that there are huge trenches (large enough to include a car, personnel and machinery) running the length (400m) and breadth (125m) of the building. There are also deep pits, mezzanine floors and a basement for the paint shop area. These accommodate many different processes, machines and robots, many of which are highly sophisticated. The services are highly complex and provide the power and environment for the car production process as well as for the people working inside the building.



Figure 2. HONDA EUROPEAN CAR PLANT AT SWINDON

Thus the project comprised a combination of heavy civil engineering involving deep excavations, steel sheet piling, bored concrete piling, heavy reinforced concrete foundations, a steel frame with hanging conveyor plant and extensive infrastructure works. These involved external public highways, new gas, water and electricity supplies and on site wastewater treatment facilities. The work also comprised a complex array of mechanical, electrical and process services and machinery. This covered mechanical and electrical building services and the installation and co-ordination of all the manufacturing equipment, from conveyors to paint booths and robotic machinery.

The challenge of the project was the co-ordination of numerous parallel activities on a fast track programme, whilst achieving the flexibility of finalising many automotive processes and robotic installations at the latest possible time in the project cycle.

Comparison between the car industry and construction

The car industry has often been cited in the debate over construction performance, the proposition essentially being that the performance of the car industry has been turned around over the last 20 years, why can not construction do the same? Honda has taken that advice literally and adopted and adapted many of its processes and methodologies emanating from the automotive industry and applied them to construction. In particular Honda's innovative approach to automation is reflected in its approach to construction. For example, after careful consideration, a Canadian construction

manager who had never previously worked in the UK was appointed to manage the NEP, a decision unlikely to have been made in many other UK organisations. This appointment was critical and yet it breaks with current orthodoxy. Another example of a novel practice was the training in total quality management (TQM) - at Honda's behest - of key trade contractors prior to the project commencing.

UK construction performance

UK construction is a huge sector within the economy and accounts for approximately 8% of GDP. However, generally, construction has a poor track record for both small and large projects alike. The larger project failures are often well documented both in the press and in project audit reports commissioned by private clients and the government. For example, the public accounts committee investigating a 72% baseline budget increase on the Trident programme concluded that there was evidence of 'mismanagement on a grand scale'. This kind of performance is not unique: figures in the technical press suggest that the final Jubilee Line out-turn cost will be around £3b as against a £1b budget.

There is evidence of the emergence of a group of more enlightened client organisations that generally achieve a better performance from the construction industry on their projects than the average. From the outset, Honda has been one of these enlightened organisations, though its activities rarely feature in the press. This project was an opportunity to capture and share in the many good practices of one of the world's pre-eminent engineering businesses.

In his report, Sir John Egan said: 'The Task Force is strongly of the view that there is nothing exceptional about what major clients are doing to improve performance in construction. Anybody can do it, given the time, the commitment and the resources'. The construction industry has had available to it for some time several authoritative publications describing how to improve performance and successfully manage construction projects. This includes documents such as the procurement guidance notes produced by the Audit Commission and Treasury as well as those produced by the leading professional organisations (Institution of Civil Engineers, Royal Institution of Chartered Surveyors, Royal Institute of British Architects, Chartered Institute of Building etc.). There are also whole systems such as PRINCE (Projects in Controlled Environments). However despite good material, the reality of UK construction is that few of the recommended professional management techniques and systems are widely adopted. Honda by contrast has been able to implement - and benefit from - many of the widely recommended techniques and systems and also to develop some of its own methods. This begs the question once more - why did Honda use these methods?

Key findings

We have prepared this paper following internal performance reviews and have also held interviews with key personnel representing all participants within the project (both internal within Honda and external, including designers, contractors, solicitors and insurers).

Summary

During discussion and interviews with the project participants a number of factors came up repeatedly. These were:

1. Honda placed particular emphasis and effort on identifying its corporate objectives and then developing a strategy to achieve these objectives.
2. Honda considered that the only way to secure work within tight financial restraints and to achieve flexibility of design until late into the construction programme was to use construction management as the method for procuring the works. This was seen as an enlightened approach, which few client organisations would be prepared to take.
3. Honda put considerable emphasis on construction manager selection for the project. It was of paramount importance to select the right team of people with the right attitude who could buy into a 'one team one goal' approach.
4. Honda established very effective communications systems within the project.
5. Honda established a culture of transparency in which problems and issues were not held back but were managed in a pro-active manner as soon as they became visible. There was no attempt to create a blame culture.
6. Honda pre-empts and is pro-active; there is a strong emphasis upon planning at all stages of their projects.
7. The Honda culture encourages the questioning of established procedures ('why?' is a word which is frequently used at meetings, but in a positive pro-active context). Many meetings are arranged to pre-empt future problems.
8. Honda contracts are drafted to be as fair and transparent as possible, generally seeking to place the risk with the party best suited to managing that risk.
9. Effective conflict resolution is seen as a necessary part of the project arrangement. In practical terms this means that all issues are brought out into the open as soon as possible. It also meant that, on this project, regular meetings at director level were held.
10. Honda sought to establish a team approach at all stages of the project. Indeed Honda was aware that the only way the project would be successful would be if everyone bought into the 'one team one goal' philosophy - see Figure 2. Accordingly, everyone was required to sign the following project charter: 'We the undersigned are committed to achieve the successful completion of the project and undertake to work together in a spirit of mutual respect, fairness and using flexible attitudes to achieve our goals to the benefit all parties'. (That is, 'one team one goal' not 'two teams own goal'.)

Client involvement

All project participants agreed that Honda is much more actively involved in its projects than most other clients. For example, Tony Damon of SSOE (USA based designers) stated:

I find that Honda, as an organisation, has been more personally involved in their projects than most clients. This is not to say they are micro-managers, but rather, well-informed, knowledgeable and experienced owners, who know what they want. They take a personal interest in the project and its success. Honda has been excellent at setting forth the vision and goals of the project at the beginning of the project; setting the strategy of how we would achieve the goals; and then personally participating in the tactics to follow through on the strategy. They ensured that these goals were communicated to all members of the project team (designer, construction manager and contractors). Honda worked with the designer

and construction manager to establish the key measures of success and then followed through with monitoring progress toward the goals throughout the project.

Steve Snow of Severfield Reeve (steelwork contractor) stated: 'The construction knowledge of Honda played a large part in the project's success'.



Figure 2. Team Approach

Client differences

What sets Honda apart from the others? Paul Watchman of Freshfields (solicitors) stated:

What sets Honda apart is their culture of testing the existing procedure or orthodoxy. They do not accept the status quo. On occasions they will test to the limit in the way that a car component might be tested. However their approach is not confrontational and they are willing to treat advisors and suppliers as part of a team. Their culture is pro-active and pre-emptive rather than negative, sometimes there is 'creative tension' within meetings reflecting a deep will to succeed. However there is not the fear of making mistakes that is found in some organisations.

Tony Damon of SSOE (designers) stated:

What sets Honda apart is their understanding of what it takes to build a true project team (i.e. have a vision; select the right team; involve the team in the planning (strategy); receive commitment from the team members; communicate the vision and goals to all involved (drive it down); treat the team members professionally and fairly.

Paul Rothera of Rothera Goodwin (chartered architects) stated:

Honda are not preoccupied with headline statements or preconceptions about what they ought to be doing or saying. As a result of [this], Honda are prepared to consider what appear sometimes to be slightly out of the ordinary or off the mark approaches to solutions. In general the above attitudes run right through the clients organisation.

The NEP organisation structure is set out below in Figure 3. The key feature is that Honda effectively acts as both client and project manager but utilises considerable external support in areas where it recognises it lacks expertise and/or resource.

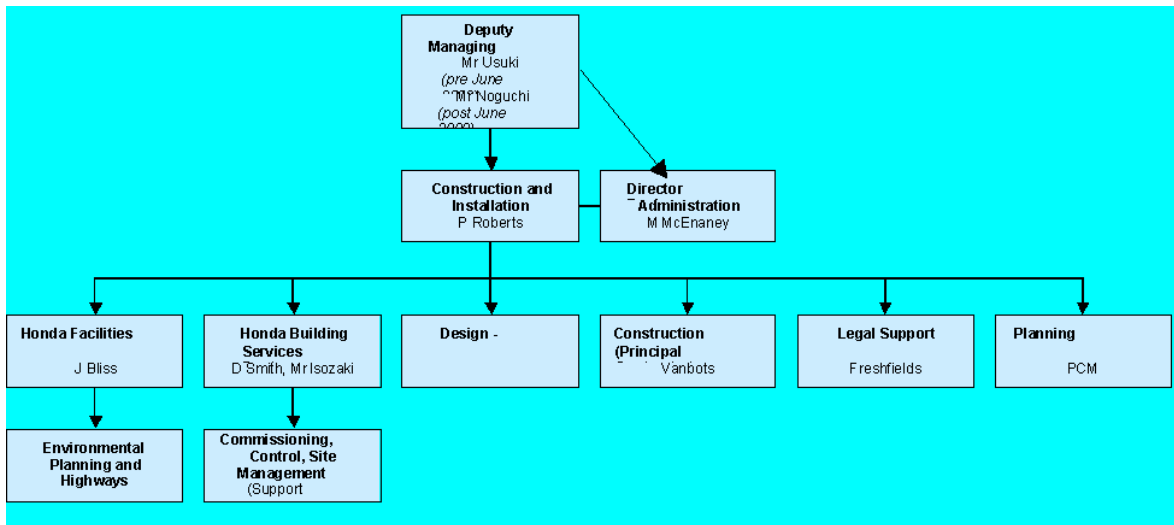


Figure 3. The Organization at NEP

Construction management

Honda recognised that whilst there is a perception in some quarters of higher risk using construction management as a form of procurement, there is also the potential for gain as the client takes on board risks which main contractors would otherwise need to price. Honda's skill is in effectively managing these potential risks using a pro-active and pre-empting management style in order that their impact (if they materialise) is kept to a minimum.

Honda's strategy was to appoint the construction manager as soon as possible in order that he would be able to work with the design team and make a significant input into the design process from the perspective of value engineering and buildability. The appointment involved an innovative selection process (see Figure 4).

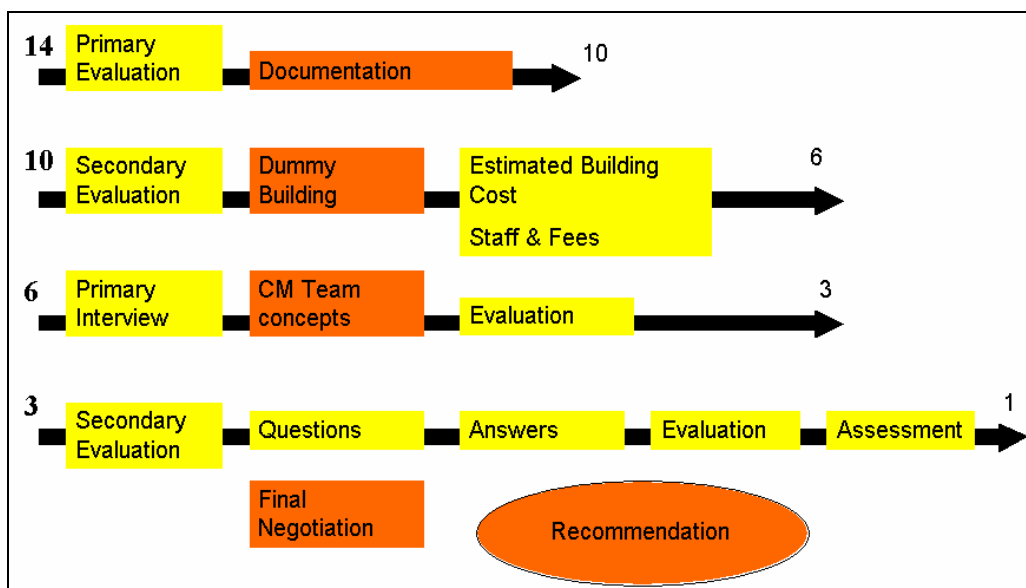


Figure 4. CM Team Evaluation Process - Using QCDMSE

As shown in Figure 4, fourteen leading construction management organisations from the UK and overseas (including Japan) were first invited to offer an expression of interest in the project. The enquiry process was carried out at a distance and Honda's name deliberately kept off this initial enquiry.

As a result of the initial response, ten organisations were invited to tender their construction management services and provide a programme and costing for a dummy building. This was a car plant which had been constructed some years earlier. However by taking this somewhat innovative approach the initial thoughts of the construction managers could be obtained without waiting for the design to be at a stage when initial enquiries normally went out.

A shortlist of six organisations was then invited for a 45 minute interview at which each construction manager was invited to make a presentation. Honda's interview panel comprised representatives of its own in-house business and construction team, the designers (SSOE of USA) and seconded consultants working as part of Honda's team on other projects at the time. The format of the interview comprised 30 minutes for each construction manager to explain their background and experience of similar projects. There was then a 15 minute session of structured questions at which Honda sought to evaluate the ability of the proposed team to achieve the overall project requirements and to measure their attitudes in respect of teamwork, cost control, flexibility and company management structure.

After these interviews a shortlist of three organisations was put forward for a more rigorous final selection appraisal involving a two to three hour interview by the same interview panel. The final interview was preceded by the development of a questionnaire, which was used as the template for each interview. The questionnaire was used to evaluate each organisation under the headings of 'quality, cost, delivery, management, safety and environment' (ie QCDMSE). The weightings under these headings were agreed by the panel prior to the interviews. A further category was introduced of construction manager fees. The final order of weightings was as follows:

- o management: 22%
- o construction manager fees and staff cost: 22%
- o delivery: 15%
- o cost: 15%
- o quality: 11%
- o safety: 7.5%
- o environment: 7.5%.

The highest weighting of 22% was given to management and the fees and staff costs. However this meant that 78% of the selection criteria for the construction manager was not related to his proposed fees. The weighting for approach to construction cost was only 15%, the rationale being that whilst cost issues are very important, without the right management and approach to delivery it would be unrealistic to expect a successful project from a financial perspective. Environmental issues came last simply because the project was under a rigid environmental regime imposed by internal policy considerations and also a project specific environmental impact assessment. The skills being looked for in the prospective manager were essentially to manage construction within these pre-defined environmental restraints rather than develop new environmental standards. A similar view was taken in respect of safety. Honda has its own internal safety regime and this, coupled with the CDM Regulations, meant that

primary assessment was made on the prospective manager's ability to manage and deliver within these pre-defined safety constraints.

An example taken from a QCMDSE assessment form is separately annexed to this report as appendix 1.

As a result of this final interview process, the Canadian company Vanbots was selected to act as construction manager for the project. Vanbots had no previous UK experience although they had completed a similar project for Honda in Canada. This appointment may appear at first instance somewhat illogical. On the one hand it could be seen as a high risk strategy using a construction manager with no UK experience, on the other Vanbots were the 'experts' in what was going to be built. This decision exemplified the Honda culture of 'challenging the status quo' but not before they had prepared a thorough assessment of what they wanted and then measured each prospective construction manager against that profile by the QCMDSE system. The key decision was in identifying the need for a construction manager that had appropriate experience, who would complement the others already in the team and who would work comfortably within Honda's open and transparent project culture.

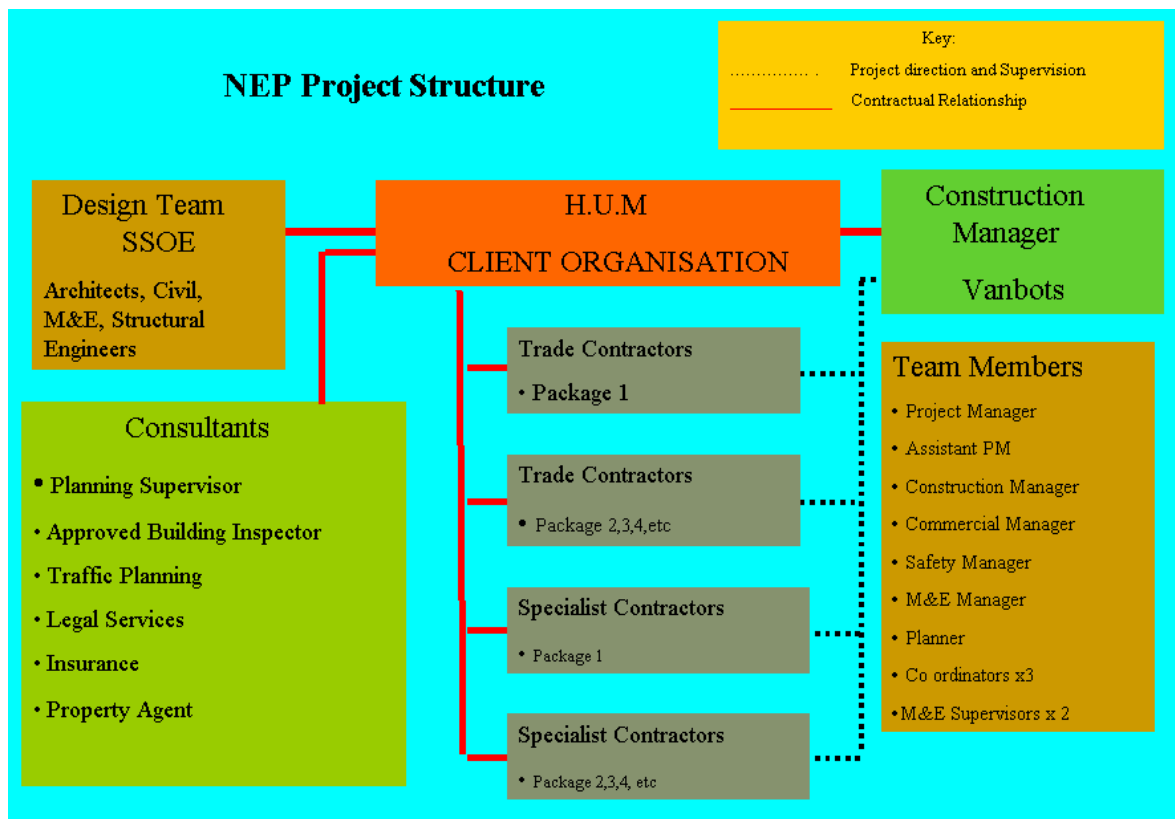


Figure 5. The NEP project structure as proposed by Vanbots

What was also interesting at the interview stage was that Vanbots were able to demonstrate their confidence in a budget of £760 per m2 (based on the dummy building and their knowledge of measures that could be introduced to effect savings without affecting functionality). Vanbots figure of £760 per m2 was close to Honda's own internal assessment. However all other organisations put forward budgets which were significantly higher (ie in the range of £800-£1,000 per m2). Vanbots proposed a staff structure of 16 site staff which was significantly lower than that proposed by all other organisations and Vanbots professional fee was neither the lowest nor the highest proposed.

Value Engineering

As a matter of policy, all Honda projects undergo a value engineering (VE) process at which the proposed design is reviewed by all key stakeholders. For this project there were three principle VE sessions. The first was held at SSOE's design office in Ohio, USA in June 1998; the second occurred at Swindon in July 1998 and the third at Vanbot's Toronto office in August 1998. Each of the three principle VE sessions took three to four days and included key representatives of the designers, Honda and Vanbots. The sessions comprised a mix of small special interest cluster groups of four to six and larger review groups (usually at the end of the day) numbering approximately 20. An external facilitator was not used for the workshops, as is often the case for some large projects. The facilitator for the main workshop sessions was SSOE. However the chairmanship for each small 'cluster' group was regularly changed to ensure that appropriate expertise was leading the discussion.

Tony Damon, of designers SSOE, further describes the VE process:

The value engineering sessions included representatives from Honda, Vanbots and SSOE. SSOE acted as facilitator of the session, recording ideas and the evaluation by the group. Minutes of each session were kept via electronic whiteboard. Ideas were encouraged from all participants in a 'brainstorming' type session. Suggestions were then evaluated for technical merit and feasibility (SSOE); construction cost and constructability (Vanbots); and general acceptability, long term impact on the life of the facility and value (Honda). The final decision on implementation was, of course, left up to Honda.

The key outcome from the VE sessions was a radical decision to construct the paint shop within a lowered basement portion of the site. Traditionally paint shops (which are a large part of a car plant) are built on mezzanine floors above ground level. In this instance huge savings on earthmoving were made by adapting the design solution to suit the existing topography. The functionality remained unaltered.

Tony Damon of designers SSOE further describes the background to the paint shop VE decision:

The value engineering idea that, perhaps, had the largest impact on the facility design, construction and cost savings was the decision to lower the paint shop operational floor. Traditionally, Honda constructs a mezzanine level above the level of the main plant floor to carry out this operation. The VE group identified very early on in our sessions that there could be significant cost savings to the project if the mezzanine level were brought down to the level of the main plant. Due to the sloping nature of the site, this saved considerable amounts of imported fill that would have otherwise been required. I believe this concept challenged Honda's paradigm of a paint shop.

Other savings were achieved by changing the structural steel from grade 43 to grade 50 steel and by a rigorous evaluation of hanging loads. On previous car plants there has been some 'overcapacity' designed into the roof structure to allow for future increases in hanging loads arising from additional services, overhead walkways and conveyors. In this instance the project philosophy was to keep increased capacity to a minimum but instead allow the opportunity of isolated strengthening in areas where hanging loads need to be increased at a future date.

As a result of the value engineering workshops, in the summer of 1998 the agreed budget for the project was reduced from over £760 per m² to £734 per m². Design progressed in the autumn of 1998, although the project did not commence on site until the summer of 1999. This was in part due to Honda's extended negotiations with the planning authorities relating to environmental impact to external highways.

Effective communications - co-ordination between trades

Since the early 1990's, Honda has adopted a management philosophy of 'openness' on its construction projects, which it first used with its automotive suppliers. This means all parties working on site share information about their own plans and problems: an approach which on many UK construction projects would be seen to be 'dangerous' or 'high risk'.



Figure 6. Management philosophy of 'openness'

Much of Vanbots construction work in Canada is carried out in a similar 'open' way and so there were no 'obstacles' to Vanbots buying in to the Honda culture. In practical terms this meant, for example, weekly meetings chaired by Vanbots with all trade contractors being represented at a senior level. At these meetings the 'look ahead' programme for the whole site would be projected on to a large screen and all difficulties discussed in open forum. There was no hiding place for the contractor who had a late delivery, the designer who was late with design or indeed for Honda who was delaying the finalisation of a detailed design brief.

As a result of the co-ordination meeting, everyone would be aware of all 'risks and threats' to the project programme. However Vanbots as construction manager adopted a pre-emptive and pro-active approach to problem solving at this meeting. This typified their dealings with the trade contractors. In essence the philosophy of the co-ordination meeting would be for all present to look for 'counter-measures' to resolve risks. The prevailing project culture amongst all trade contractors was to jointly agree strategies to resolve problems rather than use them as reasons for delays and claims. Vanbots management style certainly reflected the Honda philosophy.

Effective communications - co-ordination involving designer

Honda and SSOE have worked closely with the selected steelwork contractor (Severfield Reeve) on a number of projects. Honda and SSOE were therefore confident in Severfield Reeve's design ability. This meant that a direct communication link was set up between SSOE and Severfield Reeve. Naturally Vanbots and Honda were kept informed as to how the detailed steelwork design was evolving. However, the effect of the direct communication between these key specialists meant a smoother and more efficient flow of information and rationalisation of design.

In practical terms there were fewer 'misunderstandings' between fabricator and designer than might otherwise have occurred under a more traditional arrangement in which the trade contractor is kept at 'arms length' from the professional designer. It is hard to measure the true effect of positive communications such as these, however it is considered that a layer of drawings was saved from the overall process by facilitating this direct communication (see Figure 7).

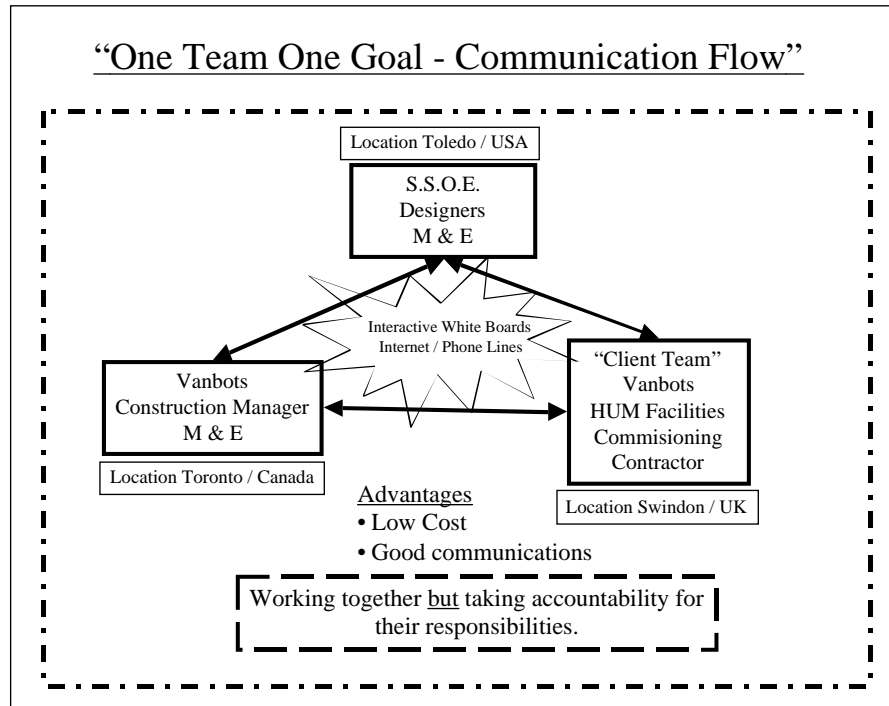


Figure 7. Communication structure in the NEP project

Planning

‘Why should Honda have to be dependent upon a random aggregation of events when it procures construction?’ - Mike McEnaney (Director of Business Administration, Honda of the UK Manufacturing Ltd).

Honda places great emphasis on planning and on process management systems. This is an unavoidable consequence of the core business which undertakes the following:

- capacity to produce up to 1,000 vehicles per day;
- installs 3,000-4,000 components in every vehicle, the components naturally needing to be assembled in the correct sequence;
- employs just over 4,000 people at Swindon on the two car plants.

Moreover, the automotive business requires process synchronisation and co-ordination at the highest level. In a production line the process demands the right component at the right time, otherwise the production sequence spins out of control. There is not the flexibility which might be found in other industries in this part of the business.

This leads to further process and planning detection systems to ensure a rapid response when the line stops working, and statistical analysis to identify maintenance risks. All of which encourages a culture of pre-empting as well as rigorous testing of existing procedures. The philosophy is to identify potential problems before they arise, whereas

in many industries (including construction) the more normal state of affairs is to 'deal with problems as they arise'.

Applying this thinking to Honda's construction activities results in a greater emphasis on planning (from the employer's perspective) than on most similar UK projects. In particular Honda prepared its own project programme using in house expertise and seconded staff. The programme was refined, developed and updated by the construction manager (Vanbots) working alongside Honda staff. The programme was given high visibility throughout the project by requiring all trade contractors to submit a programme in electronic format (Microsoft Project) at inception of their work and to update it with actual progress on a weekly basis. Honda provided some training assistance when needed, as it recognised that not all of its contractors had all the necessary skills. This meant that at all stages of the project Vanbots and Honda had access to a 'real time' project programme embracing all packages of work which thereby produced a realistic projected completion date based on actual progress to date.

The programme was then reviewed at trade contractor meetings by projecting it on to a large whiteboard (ie a smartboard). The programme was used to identify potential problems, 'what if' scenarios were highlighted and discussed with all contractors present. Thus the effect of a potential delay by one contractor was visible to all. The programme of construction activities embraced some 3,000 activities but weekly reviews were focused on a 'look ahead' for the next two to three weeks, thereby bringing down immediate activities to less than 100 in number.

There were also regular Honda/Vanbots review meetings at which the programme and progress was reviewed and interrogated at a strategic level. This was particularly important because of Honda's developing technology in areas such as robotics. This impacted upon the building itself, as certain building components could not be designed until the robot arrangements were confirmed. Thus certain areas were built as late as possible to incorporate the latest research and development. The programme was used as a tool to manage decision making and identify the 'latest possible decision date before the programme end date was threatened'.

In essence the programme was used as a highly visible tool to 'pre-empt' potential problems and to manage the remaining work (ie the future), rather than to identify where things went wrong after the event. Martin Challons Brown of Marsh Consulting (insurance brokers and risk consultants) stated: 'This project benefited from detailed advance planning including specifications developed with input from all stakeholders so that there were 'no surprises' when letting out packages to contractors.' Mathew Clarke of N G Bailey (mechanical and electrical contractor) stated: 'Overall master plan was good (it relied upon all sub-contractors inputting)'.

Pre-empting philosophy

'Identify a problem, define it and solve it, collectively as a team!' - Mike McEnaney
(Director of Business Administration, Honda of the UK Manufacturing Ltd.)

The pre-empting philosophy was actioned in a number of ways. Some of these, such as weekly trade contractor meetings and detailed updated programmes, have been described already. It was part of the weekly project meetings to consider the key project risks and when appropriate certain countermeasures were put into place. The countermeasures varied from certain contractors working overtime to developing an interim factory operational strategy for parts of the factory whose robot scoping was delayed by internal technology issues.

One particular area of pre-empting was in the field of commissioning. Commissioning is an area fraught with difficulty in heavily processed areas such as car plants. Moreover whilst commission problems are usually to be anticipated, they cannot easily be overcome by a contractual sanction or by making one organisation responsible for everything. Commissioning is an iterative process, which depends upon a number of different components (and therefore packages of work). Indeed on the first car plant built between 1989 and 1991, commissioning involved over 33,000 man hours in engineers' time (see Table 1). There was probably a similar amount of time spent by the contractors who installed the plant and services. Much of this time involved re-work and investigating of the word of one person as against another after project handover by the management contractor.

Given this experience, Honda took a pre-emptive decision on the second car plant and engaged a commissioning team some eight months before practical completion. As illustrated in Figure 8, the brief of the commissioning engineers was to work alongside the installers and understand the system throughout.

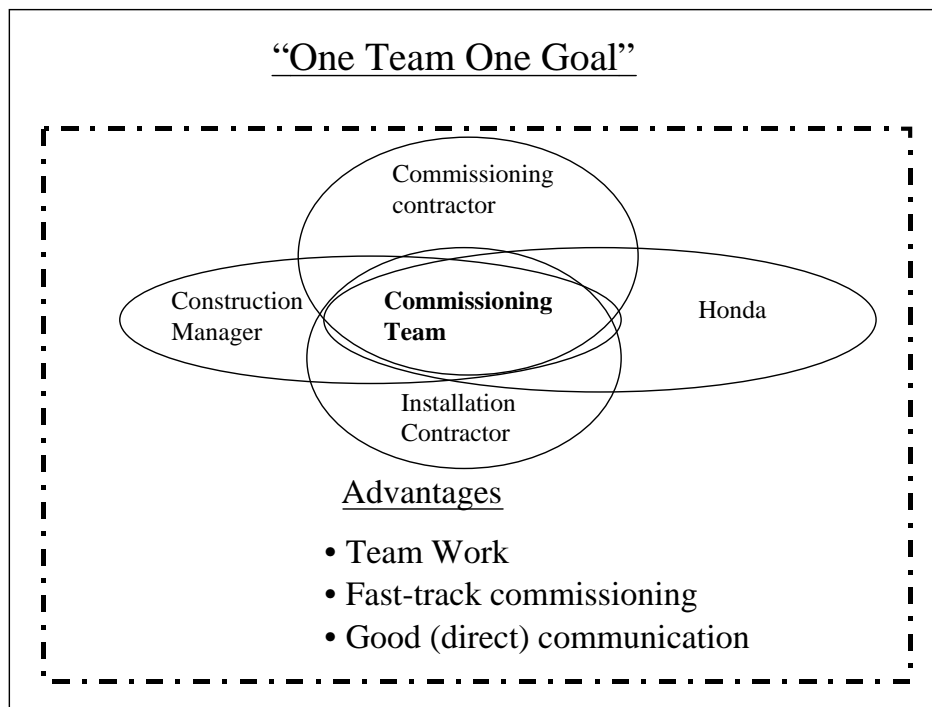


Figure 8 The Commissioning team in relation to project stakeholders

As shown in Table 1, the target was to reduce commissioning engineers' time to 5,000 man hours - and more importantly to have a working plant at practical completion. Both targets were met, thus achieving zero down time at the start of manufacturing operations. Whilst this approach reflected the risk analysis carried out at the start of the project, it could easily be adopted for more traditional projects with different funding arrangements. All that would be required would be a review of the risk strategy at commissioning stage.

David Law of Initiate Consulting (seconded project management staff) pointed out that there were: '... interactive co-ordination meetings, forward planning integrated with contingency planning for high risk areas, daily team meetings to ensure everyone knows what they are doing'.

Sean McGettigan of SIAC Construction (UK) Ltd stated: 'The project management team adopted a can do attitude from the outset which allowed an open discussions of problems as they arose.'

Paul Rothera of Rothera Goodwin, chartered architects stated: 'Honda are prepared to put in the extra work to ensure they have prepared themselves for most circumstances. This includes investigating options on potential problem areas before they arise.'

Table 1 Commissioning comparison Line 1 v Line 2

	Line 1 - E4II Actual Situation (1991)	Line 2 - NEP Actual (2001)
Manpower Actual	33,000 Man Hours	5000 Man Hours
Commissioning Time	3 years	8 months
Commissioning Cost	£300,000	£100,000

Conflict resolution

'Claims represent inefficiency; all benefit by working efficiently' - Mike McEnaney (Director of Business Administration, Honda of the UK Manufacturing Ltd).

In essence the Honda philosophy is one which, starting with a train of thought, says that problems start small and get bigger if they are not identified and resolved. It is perhaps easier to imagine this perspective from the production line analogy where the same problem can repeat itself hundreds, even thousands, of times a day if left unchecked. Given this philosophy all problems were addressed openly and transparently at trade contractor and other key meetings as soon as they emerged regardless of contractual rights, remedies or blame.

Honda's and Vanbots 'open' philosophy meant that all trade contractors knew where they stood in relation to the progress of other trade contractors and the project overall. Thus the trade contractors were made aware when their slippages were likely to impact upon the progress of others and vice versa. Indeed Honda would be the first to acknowledge that its own technical development in areas such as robotics led to delays to certain areas of the building work.

The open communications enabled many trade contractors to make positive contributions. Whilst those with a background in claims would recommend more limited sharing of knowledge, the effect on the project was clearly positive. There were justified increased costs incurred by a few contractors, primarily as a result of client changes or delayed decisions. This led to negotiated settlements with all contractors such that all final accounts were agreed before the end of 2001 (ie within three months of the project being officially opened). Moreover there were no accounts which needed resolution by an outside third party (such as an adjudicator).

Sean McGettigan of SIAC (cladding contractor) stated: 'Regular meetings were held with the project management team to resolve progress and financial issues. As a result we had no financial disputes and our account was agreed in a progressive manner.'

Matt Clarke of N G Bailey (M & E contractor) stated: 'Good management does not always require aggression and confrontation. Results can still be achieved in other ways.'

Martin Challons Brown of Marsh Consulting (insurance brokers and risk consultants) stated: 'The key was regular update meetings, and the fact that everyone knew and understood each other's role and information / communication requirements.'

Fair contracts based upon appropriate risk

Honda engaged the solicitors Freshfields to prepare trade contracts that fairly reflected the balance of risk between trade contractors and Honda. The philosophy being that contractors should not have to price for risks that Honda is better off taking or managing. The trade contract was based on a modified JCT Intermediate Form. A standard form was chosen as the basis for the document since it was felt this approach was likely to be seen as less controversial from the perspective of the trade contractors.

The fair and practical approach to risk management (as reflected in the trade contracts) was seen by Carl de Rocher and John Martin of Vanbots as a key ingredient to the overall success of the project:

Honda also has a far more practical approach to risk management; they do not just try to offload all the risks onto someone lower down the supply chain. They endeavour to put the risk with the party that is in the best position to manage that risk, and I believe that this is a key ingredient for the success of the project; by sharing the risk and allocating responsibility where there is control, you move away from the blame / claim culture of British construction, and keep costs manageable.

Early warning philosophy

A key feature of the contract is the requirement that the trade contractors provide an early warning of any problems as soon as they become apparent. This fits with Honda's 'pre-emptive approach' to identifying and managing problems. Essentially the trade contractor and the construction manager are obliged to give each other notice as soon as they become aware of a matter which may increase cost, delay the project or impair performance.

An extract from the trade contract follows below:

Early Warning

3.5A.1 The Trade Contractor shall and the Construction Manager may give the other an early warning notice of any matter which in their opinion could increase the Contract Sum, delay completion of the Works, or impair the performance of the Works in use, as soon either becomes aware of it.

3.5A.2 Either the Construction Manager or the Contractor may instruct the other to attend an early warning meeting.

3.5A.3 At an early warning meeting those who attend shall co-operate in making and considering written proposals for how the effect of each matter which has been notified can be avoided or reduced; and deciding upon actions which they will take and who, in accordance with the Contract, will take each action.

3.5A.4 The Construction Manager will record the proposals considered and the decisions taken at the early warning meeting and give a copy to the Contractor together with any instructions he considers appropriate. Nothing agreed at an early warning meeting shall be binding upon the Employer unless the subject of a separate specific written instruction given by the Architect/Project Manager.

3.5A.5 If the Construction Manager notifies the Contractor that he is of the opinion that the Contractor did not give an early warning of an event, which gave rise to an extension of time, a variation, or a claim for direct loss/or expense, which an experienced contractor could have given, the Contractor's claims in respect of

such event shall be assessed taking into account any savings of cost and time which would have occurred if the Contractor had given the early warning.

Thus the contract provides for a separate early warning meeting as soon as one party is aware of a major problem. In practice however, the subject of early warning is first discussed and recorded at the weekly trade contractor meetings. If a potentially serious matter is identified as an early warning at the weekly meeting, then a separate meeting is held to discuss the matter in greater detail. Honda adopted this 'early warning' practice on several previous projects in the early 1990's. This was prior to the publication of the New Engineering Contract which was the first standard form to include an 'early warning' clause.

The successful use of the early warning philosophy and the fact that Vanbots have adopted it on other UK projects is described by Carl de Rocher and John Martin of Vanbots thus:

One aspect of the project that we are using on other projects is the early warning clause. The early warning clause and especially the part that says that a meeting must be held as soon as possible to at least mitigate the problem is key to the team approach philosophy. If there is a problem, then bring it to the table and resolve the issue. The key is to deal with the problems as they rise. It is important to create an atmosphere or culture with subcontractors in which they know they will be treated fairly and with respect.

Teamwork

In order to reflect the one team one goal vision, a large board outlining the project charter was placed in the reception area of Vanbots project office making it highly visible to all staff, contractors and visitors (see Figure 9). All project participants were invited to sign the board, the text of which was as follows:

We the undersigned are committed to achieve the successful completion of the project and undertake to work together in a spirit of mutual respect, fairness and using flexible attitudes to achieve our goals to the benefit all parties

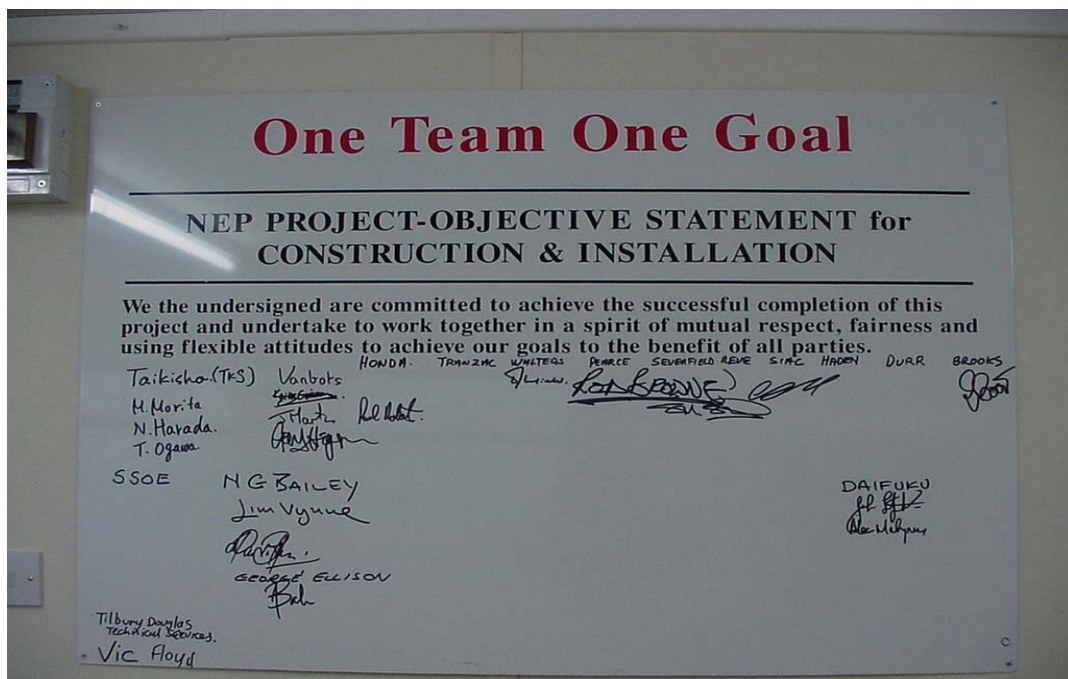


Figure 9. Team approach commitment statement visible to all on project

One key to successful project teamwork was the fact that contractors felt able to share information without feeling threatened. For example, Steve Snow of Severfield Reeve (Steelwork Contractor) said: 'The teamwork approach of Vanbots and Honda - especially when problems arose, they were sorted out by all parties with the only aim being to resolve the issue as quickly as possible and not to use the event to mount a claim or counterclaim.'

The successful project teamwork was seen by Carl de Rocher and John Martin of Vanbots as the most positive aspect of the project:

The most positive aspect of the project was the team approach with Honda. The shared offices and the white uniforms did help to create a 'one team, one goal' attitude on the project. The open book approach by both parties was also a positive aspect of the project that allowed tender packages that met with the construction goals and Honda's goals while keeping within budget constraints. Vanbots' staff dressed in white, the same as Honda, indicating to all the 'one team' approach.

Integrated project teams

A key feature of Vanbots site operation was an open plan office shared with the client and the client's external advisors, including the designers. There were short daily communication meetings first thing in the morning (maximum 20 minutes - with the object of informing everyone of daily site activities and threats to progress). All correspondence, programmes and project data was made available to all members of the project team both in hard copy and by allowing open access to Vanbots computer network.

Specialist support staff

Honda has for a number of years supplemented its own internal team with specialists in the areas of cost control, programming and safety. The arrangements are essentially ad hoc, support being brought in as and when needed. However apart from keeping its own internal staff levels at an appropriate level, Honda sees the main benefits of this approach in terms of cross fertilisation of ideas and flexibility. All seconded staff fully embrace the single status Honda culture including the wearing of white uniforms.

The NEP project involved seconded staff working as part of the client team in the areas of risk management, project planning, safety and cost control. All were given a wide brief to act in the best interests of the project. In practical terms this meant often acting as facilitators and identifying areas where internal or external lines of communication needed to be improved. The brief also included the identification of potential problems whilst they were still at the embryonic stage.

Front end cost control

Honda adopts a financial system on all its projects which it terms 'front end cost control'. A key feature of this system is that estimated costs to complete the project are reviewed on a monthly basis at the same time as actual expenditure to date is reviewed. Thus the risk of a sudden 'jump' in out turn project cost is extremely low. Moreover as risk items such as unforeseen ground conditions are passed then the contingency allowance within the cost plan is either spent or removed and the project budget adjusted as appropriate.

Specifically this means that if a change in design is proposed, then the anticipated cost of the change is agreed before the change is formally agreed. There may be circumstances, such as unforeseen ground conditions, where the change procedure

needs to be managed very quickly. As an organisation Honda has the communication structure to so do.

The effect of this approach to financial management is that Honda has a realistic chance of achieving actual savings against agreed budgets. On many projects if savings are made in one area they are spent elsewhere. In Honda's system savings against a risk item not materialising go back to the company, rather than on enhancements to the previously specified and agreed finishes. This scenario often occurs in the wider construction industry in order that the allocated budget is fully spent. Another advantage of Honda's disciplined approach to financial management is that they are able to negotiate capital allowances with the Inland Revenue in a fast track manner, which gives the company certain cash flow benefits

Prompt payment

It has been Honda's policy for several years to ensure prompt and fair payments to all suppliers. In the early 1990's Honda paid all their suppliers by BACS on a regular date every month and gave advance notice of the precise amount due to be paid. This contrasted with many large organisations that used cheques, which were not always sent timeously.

Project insurance

As part of Honda's project appraisal process, it was decided that Honda would take out an insurance policy for the whole of the works. This decision was made as a consequence of realising that insurance of at least part of the works would be necessary once Honda started to take early possession of certain large areas of the building in order to install process plant and machinery. The prospect of Honda insuring part of the works and the construction manager or the trade contractors insuring other parts was not attractive. It would be complex to administer and would no doubt lead to duplication of cover and therefore wasted insurance costs. The solution was for Honda to take out a block policy for the works and ensure the trade contractors did not include for works insurance in their tenders.

Interactive whiteboard (Smartboard)

Honda has for many years used photocopier whiteboards as part of the automotive business in all its meeting rooms at Swindon and elsewhere. They have been used as part of the automotive business for some time. As shown in Figure 10, these boards provide the focal point for the majority of meetings, whether internal or external, whether with suppliers, designers, contractors or whoever.

The purpose of the whiteboards is to provide a focus for the meeting in what is normally a technical environment, although it may not necessarily be a technical meeting. The boards allow the participants to draw diagrams, plans and sketches in just the same way that a 'flip chart' is used. The boards also allow notes to be made of who attended and key actions agreed at the meeting. All these boards have a photocopier facility so that at the end of the meeting each participant leaves the meeting with an agreed record of future action.

In theory it would be possible for the chairman to make similar notes on an A4 sheet of paper and then photocopy them for all present to take at the end of the meeting. In practice the whiteboard achieves far more because of its greater visibility. This means that all participants in the meeting are effectively stakeholders. Thus a comment on the whiteboard with which some of the participants disagree can be challenged and adjusted. This is much harder to achieve when it is on the chairman's personal

notepad! Moreover because all participants feel that their voice is being heard, the meetings become more productive and more constructive than in other similar environments. The taking of notes and agreeing actions in this highly visible way almost always achieves a consensus. If a consensus cannot be agreed then a record of the alternatives is made.



Figure 10. Communication meetings to share progress with all team members

Moreover given Honda's 'pre-emptive' and 'no blame culture,' Honda sees very little benefit in lengthy meeting minutes. In essence therefore the whiteboard note becomes the record of the meeting. The advantage of this methodology is its speed, the fact all present agree the meeting record before it is finally printed and the fact that the management style is oriented towards future actions and deadlines rather than historical review. Essentially the whiteboard methodology reflects Honda's open and transparent philosophy.

Contrast the situation where everyone leaving a meeting takes with them a short written record of what has been agreed at the meeting, followed by the all too common situation in construction projects whereby meeting minutes are circulated at the start of the next meeting, which may be two or three weeks later. Consider also the situation whereby the next meeting starts with a long debate about the accuracy of the previous minutes, and the downward spiral continues. Consider how much time is saved by managers not having to write up lengthy minutes. Honda's view is that lengthy meeting minutes rarely add value to the process and therefore they should only be taken as an exception rather than the rule. Whilst this may be perceived by some as a 'radical' approach to take, it comes from a carefully thought through appraisal of the situation.

On the NEP project the whiteboard approach to managing meetings was taken to the next level by the technical development of 'interactive whiteboards' or 'smartboards'. These are essentially a combination of a 'flip chart' and a computer screen. Individuals can make hand written notes on them but also computer generated images can be projected onto them.

This meant that project meetings had the facilities for drawings, programmes, photographs or plain text being projected onto the screen. The images were then annotated or adjusted in a highly visible way to reflect the agreement of all present. At

the end of the meeting the key action points together with the annotated drawing and programme extracts were printed out and passed to all present. In addition copies of these notes and annotations were emailed to the other relevant members of the project team.

Moreover the computer used with the whiteboard could be linked via the internet to other locations, thereby creating 'virtual meetings'. Thus weekly project meetings were linked to Vanbots and SSOE's offices in Canada and the USA at key stages during the project. The design team in the USA could thus see the same image on their whiteboard as was on the whiteboard in the Swindon project office. Discussion then took place over the speakerphone as to how to resolve problems. This approach significantly improved the speed of decision making and dramatically improved communications. These improved communications greatly increased the effectiveness of the project team as a whole.

Use of technology

Honda is an organisation which is constantly looking for ways of using new technology, not as end for its own sake, but as a tool to improve its existing processes. The use of the Smartboards on this project is a case in point. The principle of whiteboards being used as the focus point for meetings had been established for several years at Honda, as explained above. The progression from whiteboards to interactive Smartboards exemplifies how Honda uses technological developments. However the Smartboards are very much a tool, which improves the existing process, rather than a fancy piece of technological wizardry brought in to create a misleading impression.

Vanbots as construction manager were very receptive to the use of the Smartboards. Their chief executive, Keith Gillam, describes how the knowledge and skills acquired on this project has been used to win major projects back in Canada:

In June 2001 Vanbots acquired a prestigious project with one of the largest hospitals in Canada. Sunnybrook & Womens College Hospital awarded Vanbots Construction an \$85million construction management program for M-Wing, comprising a three floor addition over existing operating theatres used for trauma. This hospital is the major trauma centre for Southern Ontario. Our task is to install gynaecology and obstetric facilities including operating rooms in addition to orthopaedic facilities, combining three major hospitals into one major facility. In addition we were advised that we would be continuing through a ten year master program should we deliver the services in a successful way.

In securing the project we brought one of our staff from the UK to demonstrate the Smartboard system technology. We successfully convinced Sunnybrook that the systems that we had developed in England with Honda would control the project in terms of programming and project control administration such that a seamless and integrated information flow between design and construction team would be of major benefit to this client. Of all the major construction companies invited to provide proposals, Vanbots was considered to be the only firm that provided this system.

Vanbots Construction recently acquired the expansion to the Royal Ontario Museum in Canada, destined to be the largest natural history museum in North America. This important facility is undergoing a \$200million expansion program. Vanbots was retained in a highly competitive construction management proposal call. The architectural selection had reached a short list of three architects: Byng Thom from Vancouver, Andrea Bruno from Italy and Daniel Libeskind from Berlin. We were able to demonstrate that due to our Smartboard technology, the location of the architect or

any of the design team consultants was immaterial. Communication on design development was instantaneous and bridged any geography no matter which architect was selected. We were retained to comment upon the cost of design, the program of design and construction, and the impact on the existing museum, thus enabling the Royal Ontario Museum to select the appropriate architect considering all the facts. The chairman of the Board of Trustees, in accepting the recommendation of Vanbots from the selection committee, noted that: 'Vanbots is the most technologically advanced construction company of all those major construction companies that submitted proposals which is entirely in keeping with the global outlook of the Museum'.

Ultimately the crystals of Daniel Libeskind was selected and Vanbots now are working with the Smartboard technology and an architect who is located in Berlin.

Staffing levels

Vanbots proposals to act as construction manager included staffing levels generally lower than its competitors. The two main reasons for this were a management style which was very close to Honda's, coupled with their previous experience of constructing a car plant at Maple in Canada. In the event Vanbots average project team numbered 15 in total and Honda supplemented this with an average of three further internal/seconded staff for the project duration. It is perceived that most UK organisations would be looking for a site team of 24 or more for a project of this size and complexity.

The key areas where significant staff savings were made were in improved communications, no requirement for 'defensive management' techniques and lower cost management requirements. Minute taking and 'defensive' letter writing (ie blame culture) was kept to a minimum through the adoption of whiteboarded meetings for the whole of the project. When problems arose a short record of the facts was noted on the whiteboard and agreed by all, there was therefore no need to get involved in further lengthy correspondence. Most packages were let on a lump sum basis with a schedule of rates and provision for milestone triggered stage payments, thereby considerably reducing the quantity surveying input needed.

Safety passports

Honda required that everyone entering site had to have a 'safety passport' which was not issued until after each individual had attended an induction course carried out by Vanbots safety team. The induction course focused on site specific hazards and more generic issues of personal protective clothing. The policing of this passport scheme involved a credit card sized photo card, which was checked by site security at the site entry point.

Honda and Vanbots required that all employed wore helmets, high visibility jackets and protective boots. Those who did not comply were made to leave the site. Honda and Vanbots carried out regular safety awareness training and toolbox talks, particular as the site arrangements changed and, with them, the hazards. Certain areas such as the paint shop were restricted to those who had received further training. Whilst safety is never something to be complacent about, the overall safety record of the project was significantly above the construction industry average in terms of the accident rate per 1,000 hours worked.

Blue Book conditions

At the inception of the project Honda took the view that it wanted to encourage good industrial relations on the project. In risk management terms it was after all in Honda's interests to ensure that there was no industrial unrest. Honda was not employing tradesmen direct and therefore had no scope for direct influence on pay and conditions. However it did make it a contract condition that the employment conditions of the trade contractors' employees reflected national agreements in terms of safety, general benefits and payment. In the event there was no industrial unrest and therefore no need to investigate how rigorously this requirement had been applied in practice.

Contractor training

Prior to work commencing, Honda held total quality management (TQM) workshops for all prospective contractors and suppliers of professional services. During the course of the project, Honda facilitated training in project planning software (Microsoft Project). The cost involved was a few thousand pounds, however the benefit was considerable in that all parties were working to a common standard in the same way that Excel is generally used as the common standard for spreadsheets.

Environmental considerations

The existing Honda operation is accredited to the ISO 14001 environmental management standard. Honda were therefore keen to work with Vanbots and SSOE to incorporate good environmental practice within the construction project. The building design incorporated a number of the BREEAM [RB stands for?] design considerations, such as a recycled water system and maximum use of the site topography to minimise visual impact.

Evaluations of the environmental performance of the building services plant and equipment were performed in order to select equipment that operate efficiently and minimise release of greenhouse gases. Some novel approaches were taken to predict the potential nuisance impact of the development on the local residents with the use of computerised noise modelling. More obvious strategies were also adopted, such as construction waste segregation and the use of imported recycled fill materials.

Lessons from the automotive industry

Total quality management

The main feature of a TQM culture is customer focus and the recognition that there are many customers involved with any process, whether it is building a car or building a car factory. The customer is not just the end user but also the next person on the production line or the next contractor in the chain (e.g. the brick contractor who has to build a wall on foundations built by the groundwork contractor). The management style which is appropriate to a TQM culture places a premium on setting a clear vision, and operating in a way that encourages openness, trust, teamwork, a pro-active and challenging culture, but also enables performance to be measured and improved. Prior to the NEP project commencing, Honda arranged for a training workshop explaining their TQM philosophy to all construction companies likely to be involved in the project.

Continuous improvement

Continuous improvement is very much part of a TQM philosophy. The objective is to find ways of improving performance, not only within the organisation but also within suppliers and others (e.g. designers) who have an influence on overall project performance. The key features of a continuous improvement process are that everybody is involved in the improvement process and they should never accept the status quo.

Gap analysis

It is a feature of Honda's automotive business that as part of the TQM process there is regular measurement of the 'gap' between what was planned and what actually occurred. The measurement can be in quality, money, time or some other variable. The purpose is to measure the difference and then understand why it occurred.

Effective communication

The effective communication principles, such as using the whiteboard as an aid to facilitate meetings, are probably the most radical and yet most simple methods that can be adopted in other environments.

Honda culture

A culture which actively encourages questioning and challenges existing practices resulted in a saving on paint shop construction costs of over £1million through the value engineering process.

Conclusion

The project was completed on time and within the agreed budget. Indeed the saving of £33 per m² (ie £734 - £701 per m²) equated to a further saving of £1.65m on the agreed construction budget. Construction costs on a like for like inflation adjusted basis were 40% lower than on a similar plant built on the same site some eleven years earlier.

Central question

The aim of this report was essentially to answer the question: 'there are many good tools out there but most people don't use them - why?' It is clear that Honda's own core values and culture demand that the status quo is forever under threat. Therefore Honda is forever considering new methods and tools; they are fully evaluated and sometimes adopted.

Why is this not the case for other organisations? A clear theme emerged during interviews: neither Honda staff nor their advisors feel under threat of making a mistake. As Mike McEnaney (Director of Business Administration, Honda of the UK Manufacturing Ltd) put it: 'If the culture of never admitting to a concern dominated then it would not be possible to build a car!' At Honda there are high expectations placed on all, but if a problem arises the pervading culture is to discuss the problem and share in its early resolution. This is an important distinction between Honda and many other organisations where a risk averse, 'backside covering' culture pervades.

The challenge for the construction industry, and in particular the major clients who are the major instruments for change, is to recognise that there are huge benefits to be had from adopting the new tools and methods. Moreover it is not just about adopting these

new methods but ensuring that the culture is receptive to new tools and methods in the future. We believe that many client organisations do not fully appreciate all the risks which their projects and organisations face (and if they do not fully understand the problems, how can they possibly develop a strategy to manage them?)

Some client organisations perceive that by attempting to transfer all risk to others, whether contractors or designers they can satisfy shareholders, funders and other stakeholders in the project. In reality it is not possible to transfer all risks and therein lies the crux of the problem. Any project is liable to external risks including political, environmental, economic, social and technical risks (the 'PEST' factors). Risks faced by clients are wider than those normally associated with construction. Moreover, the transfer of all the construction risk to the construction industry means transfer of control of the risk. The result of risk transfer away from the client is that the project is then managed without regard to the overall business needs of the client.

For Honda it is important to be able to influence the project at all times. This is because their business need may have changed and also because the project may need 'rescuing'. If you have the ability to 'get in there', then you have the ability to rescue it.

Paul Rothera of Rothera Goodwin chartered architects stated:

Clients should try to follow Honda's commitment and loyalty to their suppliers and professional advisors and their challenging spirit, rather than hiding behind accountability and justification exercises. By remaining committed to their suppliers a working environment is generated which allows trust and understanding to develop to the benefit of the Client. Public clients need to look beyond the accountability issues. The total or overall value of the final product needs to be reviewed at all times. This total value should extend to reviewing the service provided as well as the usual budget and programme measures. Individuals in public client organisations need to be encouraged to take some risk when setting up project parameters.

Whilst there are probably several different answers to the question: 'there are many good tools out there but most people don't use them - why?' the primary answer must be because of the 'cultural barriers' in many organisations, which act as obstacles to change.

Recommendations

Potential 'quick wins'

We list below some tangible methods of project management which have been successfully applied within the car industry and have been used equally successfully within construction. The truth is that all the key findings within this paper have their origins in the car industry, but have been equally successfully applied by Honda within construction. Those methods which can be readily adopted (ie quick wins) are separately identified. These methods of project management can be adopted by any organisation wishing to improve performance and reduce cost. However the key is an organisational culture which allows, indeed even requires, risk taking and change, but in a structured rather than reckless or foolhardy manner.

Whilst it would be good to simply list out the key findings and say the key to success is to adopt them, the truth is that before any change can be implemented within an organisation, there has to be a champion to instigate the necessary cultural change. However, with that rider in mind, we would re-commend the following 'quick wins':

- challenge the status quo;
- learn about risk and then how to manage it;
- recognise the importance of planning;
- recognise the importance of effective communications;
- adopt the smartboard methodology for improving the effectiveness of meetings and reducing management time writing up minutes;
- create integrated project teams and actively promote teamwork;
- accept that conflict (like risk) cannot be avoided and needs to be managed; use methods, such as 'early warnings' to ensure potential problems are brought out into the open at an early stage;
- consider using experienced seconded staff as part of the client team;
- recognise that construction management (despite criticism in certain quarters) can often offer the client extremely good value for money;
- adopt customer focussed total quality management (TQM) methods.

If our 'champion' can only adopt one recommendation then we would suggest the adoption of smartboard methodology for improving the effectiveness of meetings and communication, whilst achieving an overall saving in management time.

Suggestions for further initiatives and research

In essence this paper simply provides a strong financial argument for clients to adopt the Rethinking Construction recommendations made by Sir John Egan. The key drivers for change were identified by Sir John Egan as:

- committed leadership;
- a focus on the customer;
- integrated processes and teams;
- a quality driven agenda;
- commitment to people.

Given Sir John Egan's recommendations and the 40% cost reduction achieved by Honda (without any functionality change), perhaps the main suggestion is to improve knowledge and education amongst the construction industry's key client decision makers. As to how to improve knowledge and education, there is now far greater potential than ever before as a consequence of the internet. Government sponsored agencies should make use of training opportunities and the internet to disseminate information as widely as possible.

Finally we note that the implementation toolkit for the Egan Report makes certain key recommendations which are very similar to our own:

- move from a risk averse culture;
- challenge the status quo;
- form integrated teams;
- appoint a 'champion' to make it happen.

Postscript - Rethinking Construction Award (March 2002)

In March 2002, the Western branch of the Chartered Institute of Building awarded Vanbots the 'rethinking construction award' for their work with Honda on the NEP Project.

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Appendix 1 -- Extracts from QCMDSE assessment form

	QCMDSE INTERVIEW CHECK LIST	H	M	L	TOTAL
		5	3	1	
Q1	How will you verify the quality of your employees workmanship whilst on site				
Q3	How do you verify the quality of information in O&M manuals handed over to Honda				
C1	Can you explain how you intend to assist Honda with value engineering				
C2	How do you control cost changes from your subcontractors				
D1	If you were experiencing scheduling problems mid way through an installation project what sort of activities would you employ to try and get back on programme				
D2	What is your minimum guaranteed response time to attend the Swindon site during normal working hours				
D5	How you can you guarantee you resource commitment to Honda				
D6	How do you propose to avoid claims?				
M5	What capabilities do you have for in house design				
M6	How can you demonstrate you competence to perform this type of design work?				
M7	How can you guarantee continuity of Honda site knowledge within your employees				
M8	What level of supervision would you propose to have on site at any one time?				
M15	What in house IT / CAD / Drawing facilities do you have				
M19	How would you co-operate with Honda's contract requirement for early warning.				
M20	How will you coordinate / manage document control, i.e. ensure use of latest design info.				
M21	Do you participate in any training schemes for your employees personal development				
S7	What do you understand by the Honda Safe Working Rules				
S11	How do you intend to manage site safety				
S12	What systems and procedures do you operate for the preparation of method statements				
E2	Does your company operate an environmental policy?				
WEIGHT, times					
	Total				