Visit to Toyota's Motomachi plant close to Toyota City in Japan on 11 April 2007.

I have read case studies in Operations Management, articles in Business magazines, and books about the Toyota Production System(TPS) and the Toyota Way. The TPS is a philosophy of complete elimination of waste. It is hard to read literature on Quality Management Systems and not come across references to the TPS. Unfortunately we not able to take pictures at the actual factory, but were allowed to take pictures at the nearby Kaikan Exhibition hall

Toyota has 15 plants in total in Japan of which 10 are in close proximity of Toyota City. The luxury models of Toyota like the Crown, Brevis, Progres, Mark II Blit, Mark X and the Etima are manufactured at the Motomachi plant. The plant consists of 4 main parts of the process :
1) Stamping 2) Welding 3) Painting & 4) Assembly

We were allowed to visit 2) Welding and 4) Assembly.

The impressive thing about the Toyota plant is to see the TPS in action. The 2 concepts of TPS, that is Jidoka and Just-In-Time(JIT) were illustrated. Even before we started out walking in the actual assembly area, there was an entrance hall which clearly displayed the overall process of stamping, welding, painting and assembly. This was on large, wall to wall boards from floor to ceiling. It was really impressive to be able to walk from left to right and be able to view the complete process.

Jidoka(Automation with human like intelligence)
Automatic stops when problems occur. Operators can pull on a line stop cord, to change the status of the station or cell from green to yellow to red. During our tour of 2 hours, we noticed this happening a number of times, both in Welding and in Assembly. In Assembly, the largest part of the activities are done by operators, and not machines. We evidenced operators pulling the cord. In some cases they manage to resolve the issues themselves, this happened within seconds. In other cases, they needed the assistance of supervisors, who hurried to the particular cell to resolve the issues.
Andon, visual display board showing abnormalities in the process. Each station or cell has a unique number, so when looking at the display board, you can clearly see at which station the problem is. This is off course also very useful for the supervisors so that they know which cells to run to. The Andon board does not only show which cells were having issues, but it also shows the actual number of cars rolling off the line versus the planned number of cars as absolute numbers, and as a percentage. It also displays the number of cars in absolute cars that they are behind schedule of to that point.
Error proofing (e.g. Mechanical detection of an error). This means that machinery will not continue performing its task if an error is detected, it shuts down as soon as possible, thereby preventing further potential damage.
In Station quality control. The factory does not allow defects to pass down the line, with the idea of fixing it 'later'. It fixes its problems during each stage.
Solve root cause of problems by using techniques like 5 Why. Many problem solvers like to use a work around method in the short term to gain time for find a more permanent solution in the long run. This is not so at Toyota, to search for the root cause on the spot, until it is clearly identified. In the Kaizen mindset they then don't only fix the immediate problem, but investigate what they can do it from occurring again in the future

JIT (Make what is needed when it is needed, and only as much as needed)
Takt time planning. Tradition industrial thinking would assume that one should run maximum batch sizes, but through Takt time planning, the factory can be adjusted to meet the requirements of customer orders, rather than building large runs of production that might end up as excess stock.
Continuous flow. Even thought stops occur during the day, Toyota manages to get a new care to roll of the line every 80 seconds(their Takt time). This means that when the car passes any particular part of the process, it passes by at an average of once every 80 seconds.
Pull system(Kanban). When the process that requires a part goes to the preceding process to retrieve parts, it uses a Kanban(card displaying info about the part) to communicate what parts have been used. This

means that the preceding process will only manufacture according to the needs of the following process, thereby not generating any excess stock of parts.
Quick changeover. Toyota is able to manufacture 8 different models of its car in the Motomachi plant. We witnessed this during the tour, on one given line there were a number of different models. The operators would assembly those cars one by one as if they were the same.

Other aspects of Toyota's quality management system that made an impression on me were:

Employee suggestion system
All employees get the chance to make suggestions. It is quite often the case that managers are not complete aware of the opportunities that arrive through daily operational activities. The workers on the other hand, experience many repetitive actions, so when they realize that a particular action can be done differently, they have the option to post a suggestion. These suggestions are taken seriously by Toyota's management, as part of their continuous improvement philosophy, they appreciate workers to make suggestions about how they can constantly approve. The tour leader told us that during the previous year, Toyota had received in excess of 60,000 suggestions, of which a significant percentage were implemented.
Core competence.
The operators have clear ratings according to their level of skills. There is a clear roadmap of which skills had to be mastered in order to reach which level of operator, tradesmen or technician. They also had a fun section during the tour, where visitors could test their physical hand-eye co-ordination. The record for most of those activities are held by one of the Toyota operators, visitors are simply not able to beat the Toyota operators at those skills. This might sound like something small or insignificant, but this agains shows how Toyota is constantly trying to improve not only their processes, but the skills of their workers in all actions that they do. I can imagine how these skills could help workers to imporve the way they mount body parts to the cars, and how they apply nuts and bolts. Toyota has a very strong sense that operators should be multiple skillls, which make workers flexible in being able to do many different tasks in a particular cell. This motivates the workers to develop themselves, but also not to become bored with mundane repetitive tasks.

References:
http://www.toyota.co.jp/en/vision/production_system/index.html "
http://en.wikipedia.org/wiki/Total_Quality_Management

"The Toyota Way" by Jeffrey K. Liker, 2004, ISBN 0-07-139231-9