



Red Bull Salzburg vs. Blackburn Rovers FC.

FIFA have started to use video technology to examine and quantify match analysis on FIFA RECOMMENDED 2 STAR football turf surfaces. The aim to compare and contrast football matches on FIFA RECOMMENDED 2 STAR football turf and top quality natural grass. From this analysis we will begin to answer the fundamental question: Does the game change on football turf?

This will be the first of many case studies analysing match analysis on artificial turf within the professional game. For these case studies FIFA will be working with Pro Zone to quantify the data from video tracking.

Introduction

The aim of this study is to analyse the potential impact that artificial turf may have on the pattern of a game and therefore performance, and in doing so provide further informed and objective feedback around the use of artificial turf playing surfaces in football.

Key Words

Artificial turf, natural turf, ProZone, performance analysis, objective feedback, football.

Methods

Data was collated from the UEFA Cup matches between Red Bull Salzburg Vs Blackburn Rovers FC (14th September 2006) and Blackburn Rovers FC Vs Red Bull Salzburg (28th September 2006). Red Bull Salzburg play their competitive matches on artificial turf at the Red Bull Stadium in Austria, while Blackburn Rovers FC play on natural turf at Ewood Park in England.

Matches were analysed using the computerised ProZone MatchViewer and ProZone3 systems (ProZone Group Ltd UK, independently validated by Di Salvo et al. 2006). MatchViewer enables a range of tactical information to be extracted from a single camera source through plotting on the ball actions (event, player and pitch position). ProZone3 provides a range of physical outputs (in addition to the tactical analysis supplied by MatchViewer) from the tracking of every outfield player via ProZone's proprietary capture technology. Given that ProZone3 data was only available at Ewood Park (where a fixed ProZone installation had been undertaken), only MatchViewer tactical data was used for the purpose of this comparative analysis.

Additional tactical data was exported from ProZone's centralised database, so comparisons could be between the following:

1. Salzburg & Blackburn combined player data average from artificial turf (14.09.06) Vs Blackburn & Salzburg combined player data average from grass (28.09.06). Appendix 5
2. Blackburn playing away at Salzburg on artificial turf (14.09.06) Vs Blackburn player away at Wisla Krakow on grass (19.10.06). Appendix 6.
3. UEFA Cup average from last 5 seasons (grass pitches only, any formation) Vs Salzburg & Blackburn combined player data from artificial turf (14.09.06). Appendix 7.

4. Blackburn Rovers away League average data (4-5-1 formation only) played on grass (with Mark Hughes as Manager) Vs Blackburn Rovers away data from Salzburg on artificial turf (14.09.06). Appendix 8.

All data was collated with the permission of Blackburn Rovers FC for the purpose of this study. Key ProZone Definitions can be found in Appendix 1.





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Key ProZone Definitions can be found in Appendix 1

Main Events Table for Salzburg Vs Blackburn 14.09.06 + Blackburn Vs Salzburg 28.09.06

| Salzburg Vs Blackburn 14.09.06 (artificial turf) | | | | Blackburn Vs Salzburg 28.09.06 (grass turf) | | |
|--|----------|------------|--------------|---|-----------|----------|
| | Salzburg | Blackburn | Total | Total | Blackburn | Salzburg |
| Tactical Overview | | | | | | |
| Total Headers | 61 | 56 | 117 | 144 | 74 | 70 |
| Tackles | 21 | 23 | 44 | 43 | 17 | 26 |
| Fouls | 10 | 16 | 26 | 35 | 20 | 15 |
| Blocks | 14 | 22 | 36 | 25 | 12 | 13 |
| Interceptions | 127 | 113 | 240 | 233 | 126 | 107 |
| Clearances | 16 | 33 | 49 | 44 | 19 | 25 |
| Possession Won | 224 | 225 | 449 | 408 | 204 | 204 |
| Possession Lost | 234 | 233 | 467 | 422 | 213 | 209 |
| Average Number Touches | 2.52 | 2.47 | 2.50 | 2.70 | 2.73 | 2.67 |
| Passing Analysis | | | | | | |
| | Salzburg | Blackburn | Total | Total | Blackburn | Salzburg |
| Total Passes | 336 | 367 | 703 | 720 | 405 | 315 |
| Successful Passes | 263 | 296 | 559 | 601 | 345 | 256 |
| Unsuccessful Passes | 73 | 71 | 144 | 119 | 60 | 59 |
| Total Pass Completion % | 78 | 81 | 80 | 83 | 85 | 81 |
| Passes Received | 380 | 412 | 792 | 833 | 466 | 367 |
| Passes Forwards | 168 | 160 | 328 | 323 | 182 | 141 |
| Passes Backwards | 59 | 87 | 146 | 160 | 91 | 69 |
| Passes Sideways | 109 | 120 | 229 | 237 | 132 | 105 |
| Pass Attempted Own Half | 198 | 237 | 435 | 397 | 228 | 169 |
| Passes Attempted in Opposition Half | 138 | 130 | 268 | 323 | 177 | 146 |
| Total No Short Passes | 81 | 112 | 193 | 213 | 120 | 93 |
| Total No Medium Passes | 150 | 189 | 339 | 374 | 205 | 169 |
| Total No Long Passes | 105 | 66 | 171 | 133 | 80 | 53 |
| Attacking Overview | | | | | | |
| | Salzburg | Blackburn | Total | Total | Blackburn | Salzburg |
| Goals | 2 | 2 | 4 | 2 | 2 | 0 |
| Total Number of Shots | 18 | 12 | 30 | 23 | 14 | 9 |
| Shooting Accuracy % | 39 | 50 | 43 | 43 | 43 | 44 |
| Final Third Entries | 73 | 56 | 129 | 119 | 64 | 55 |
| Penalty Area Entries | 52 | 21 | 73 | 52 | 28 | 24 |
| Total Corners | 9 | 2 | 11 | 8 | 5 | 3 |
| Crosses | 22 | 9 | 31 | 37 | 25 | 12 |





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Discussion

The artificial surface at Red Bull Salzburg and the grass surface at Blackburn Rovers FC produced very similar results in terms of combined total team passes (703 Vs 720 respectively). Slightly higher passing success were recorded on Ewood Park's grass turf (83% Vs 80%) with more unsuccessful passes being made on the Salzburg

Stadion's artificial turf (144 total Vs 119). Rather than looking at this data in isolation, however, it is important to compare with a larger data set. In relation to the UEFA Cup data played on grass (captured by ProZone during the last 5 UEFA competitions, 2001-2005 seasons – see Appendix 7), the Salzburg Vs Blackburn game (on artificial

turf) produced passing outputs and success rates superior to the average (total team average passes: 351 on artificial turf, 80% success rate Vs 343 UEFA Cup on grass, 78% success rate). Benchmarking Blackburn's away performance in the Salzburg UEFA Cup tie against their away league averages played on grass also shows that the artificial turf produced more total passes (367 Vs 308), more successful passes (296 Vs 222) and greater passing success (81% Vs 72%).

Salzburg received more passes on artificial turf than they did on grass (380 Vs 367), with the opposite true for Blackburn (466 received at Ewood Park Vs 412 at the Salzburg Stadion). In these specific games, the higher number of passes received may have been linked to home advantage although it is possible that familiarity with the playing surface also affected player's willingness to show the ball and, in turn, control the pass successfully. An inspection of Blackburn's away data from their tie against Wisla Krakow on the 19th October 2006 (see Appendix 6), shows that they were more comfortable playing on grass surface with more passes made (424); higher pass completion (85%) and more passes received (477). This may also have been linked, of course, to the standard of opposition and the different formation adopted during these away matches (4-4-2 Vs Krakow and 4-5-1 Vs Salzburg) and so further highlights the need to benchmark against multiple matches. In their game against Salzburg on artificial turf, Blackburn received more total passes as a team than the average team does in a single UEFA Cup match (412 Vs 369) and also more than they do on average in an away league encounter (412 Vs 325). It would seem,





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therefore, that in this specific match the artificial turf encouraged greater (and more successful) passing sequences than is the norm with matches played on grass.

In terms of passing direction, there were no clear differences in sideways passes (229 at the Red Bull Stadium Vs 237 at Ewood Park, of which 210 were successful on each surface) or backward passes (146 at the Red Bull Stadium Vs 160 at Ewood Park, of which 94% were successful at both venues). There was, however, a distinction in forward passing, where the total number of forward passes was greater on artificial turf than on grass (328 Vs 323), which represented 46.6% and 44.9% of total passes on that respective playing surface). More importantly, from these forward passes, 10% more were successful on the natural turf at Ewood Park. This would suggest that artificial turf encourages a more positive (or direct) style of play and also that players found it more difficult to control forward passes on artificial turf. The findings could, however, also be linked to Blackburn utilising a 4-5-1 formation on the artificial turf (as opposed to 4-4-2 on grass) and hence have fewer target players for forward passes. Indeed, in their away game Vs Krakow on grass, Blackburn passed the ball forward 46.6% of the time (compared to 43.5% on artificial turf Vs Salzburg) highlighting that a greater number of games would need to be analysed before any definitive conclusions on passing direction can be made. The UEFA Cup averages and Blackburn away averages also tell us that the artificial turf promoted more forward passes (160 and 143 respectively for average team total passes forward compared to 164 on the artificial turf match at Salzburg). Interestingly, there were more passes

attempted by both teams in their own respective halves of the pitch on artificial turf than on grass (435 Vs 397), with the opposite being true for passes attempted in the opposition's half (323 on grass Vs 268 on artificial turf). This would suggest that perhaps both teams defended deeper and enjoyed possession more on the artificial turf; whereas the latter finding is almost certainly linked to the fact that players were better at maintaining possession of forward passes in the first instance on grass (thus giving the opportunity to play subsequent passes in the opponent's half). In terms of passing distance in the isolated Salzburg-Blackburn matches, there were notably more long balls played on artificial surface (171 Vs 133), with teams demonstrating a tendency towards playing short to medium passes (<25 metres) on grass (213 Vs 193 and 374 Vs 339 respectively). Salzburg more than Blackburn contributed to the long ball data, with 105 out of the 171 total passes on artificial surface coming from the home team. Indeed Blackburn played less long balls on artificial turf than they did on grass (17.9% Vs 19.7%), which would suggest that the data may be reflective of individual team tactics as opposed to playing surface trends.

In light of the passing distance data, it is slightly surprising there were more total headers performed by both teams on the grass turf at Ewood Park than on the artificial surface at the Salzburg Stadion (144 Vs 117 respectively). This suggests that the longer passes performed on artificial turf (predominantly by Salzburg) were not necessarily high long balls, but rather long balls played along the floor (or under head height). Additional data on ball trajectory would be required before making

a concrete assertion, especially in light of the fact that Blackburn actually performed less headers away at Krakow on grass (54 in total) than they did away at Salzburg on artificial turf (57 in total). The average number of headers in Blackburn's away league matches is 86 and in an average UEFA Cup match is 68, suggesting that artificial turf actually encourages a less direct style of play and fewer long, high distributions.

There were no dribbles recorded by any player during the match played on grass at Ewood Park, although the average in a UEFA Cup game is 5 per team per game. There were 8 dribbles in the Salzburg Vs Blackburn UEFA Cup encounter suggesting that the players were more comfortable carrying the ball at the Red Bull Stadium, perhaps due to perceptions around artificial turf being a superior playing surface (no 'bobbles' or diverts in the surface). The average number of player touches taken per possession would compliment this assertion, with players taking fewer touches on artificial turf (2.5 Vs 2.7 touches on average) per possession. It would follow, therefore, that players were able to control and release the ball quicker on artificial turf than on grass.

In contrast to these findings, however, transitions of possession were more common in the artificial turf game than during the second leg on grass (916 Vs 830), with 449 total possessions won and 467 lost on artificial turf (compared to 408 won and 422 lost on the grass pitch at Ewood Park). This suggests that perhaps players found it easier to control and maintain possession of the ball on grass. Interestingly (and in contrast to the findings on forward



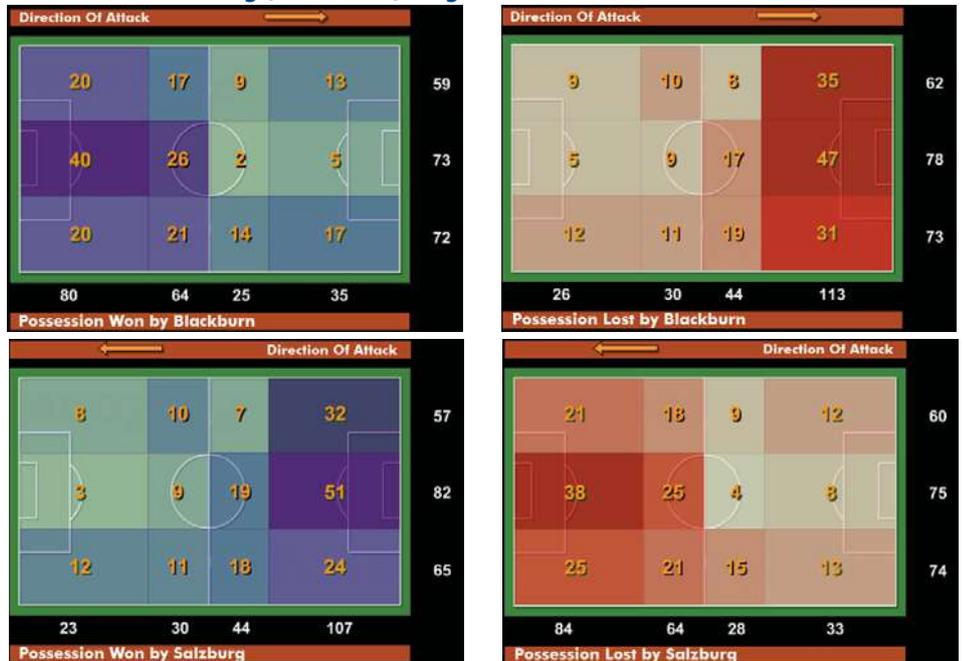
passing where perceivably players found it more difficult to retain possession of the ball on artificial turf), possession was lost in the opponents half more on grass than on artificial turf (72.2% Vs 71% respectively, as a percentage of the total possession losses on the field).

The fact that there was little variation between teams for transitions in possession (Salzburg: 224 possessions won & 234 possessions lost; Blackburn: 225 won & 233 lost on artificial and Blackburn: 204 possessions won & 213 possessions lost; Salzburg: 204 won & 209 lost on artificial) and suggests the limitations of single-game analysis and that, in these specific examples, the findings are more likely to be a reflection of the tactics, mentality and formations utilised in each game (rather than the playing surface).

Salzburg vs Blackburn (14.09.2006) on artificial turf



Blackburn vs Salzburg (28.09.2006) on grass turf





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Almost exactly the same number of tackles were made in both games (44 total at the Red Bull Stadium Vs 43 total at Ewood Park), which would compliment F-MARC's findings that there is very little difference in the incidence, nature and causes of injuries observed during games played on artificial turf compared with those played on grass. There were, in fact, more tackles reported during Blackburn's away match with Krakow on (32 being the team average = 64 per match in total) and also on average in UEFA Cup matches (27 the team average = 54 per match in total) and in Blackburn's away league matches (29 the team average = 58 per match in total). Unsurprisingly, therefore, more fouls were reported on grass than on artificial turf (35 Vs 26), possibly due to players being more inclined to stay on their feet on artificial turf rather than sliding into challenges. There was double the number of offside decisions on artificial turf than during Blackburn's games on grass against Salzburg and Krakow (12 Vs 6 Vs 7 respectively). The limited data available, therefore, suggests that attacking players are more likely to get caught offside more often on artificial turf, which may be an interesting pattern to monitor across a larger number of games.

Similarities were also observed for interceptions (240 in total for both teams at the Red Bull Stadium Vs 233 at Ewood Park) and clearances (49 at the Salzburg Stadion Vs 44 at Ewood Park), although more blocks were made on artificial turf than on grass (36 Vs 25 respectively). This finding could be linked to the greater number of shooting opportunities created on the artificial turf match at the Red Bull Stadium (30 Vs the 23 at Ewood park), which was reflected by the higher number of goals scored by both



teams on artificial turf (4 Vs 2). Caution should again be exercised, however before drawing definitive conclusions from this single-game data comparison given that Blackburn performed 18 shots in their game Vs Krakow on grass (compared to 12 Vs Salzburg on artificial turf and 14 Vs Salzburg on grass).

There were a greater number of penalty area entries (73 Vs 52) and final third entries (129 Vs 119) observed in the Salzburg/ Blackburn encounters on artificial turf than grass. These findings – together with the isolated shots data and passing direction analysis - suggest that artificial turf pitches may lead to more attacking opportunities in a game. Although analysis of the UEFA Cup average data and Blackburn's league games reveals that indeed the average number of shots per team per game ranges from 10-13 per match demonstrating that the artificial turf match did not produce shooting data that differed hugely from the norm.

Shooting accuracy during both matches was 43%, suggesting that pitch surface did not impact players' ability to find the target. There were slightly more crosses delivered on the grass field at Ewood Park than at the Red Bull Stadium (37 total crosses Vs 31). Blackburn's other away match in Europe on grass (Vs Krakow) reported the same number of crosses as the artificial turf match (31 in total), suggesting that the playing surface does not effect the number of crossing opportunities in games.

The individual data comparison above suggests that this specific player enjoyed the artificial surface more than grass (in terms of number of passes, pass success rate, passes received and shots). Give that not all of the above positional and individual data falls in line with the teams findings, it would be useful to analyse a greater number of games so that statistical trends can be monitored using larger data sets captured from artificial and grass surfaces (including how specific players adapt and how different playing position are affected).





Positional analysis reveals few differences in the data from artificial and grass playing surfaces. For the purposes of the following positional comparisons, centre back data has been chosen as an example:

Average data from Khizanishvili & Ooijer (Blackburn away at Salzburg playing 4-5-1)

| | |
|-------------------|----|
| Minutes Played | 90 |
| Total Passes | 30 |
| Successful Passes | 24 |
| Passing Success % | 78 |
| Passes Forward | 18 |
| Passes Received | 6 |
| Headers | 11 |
| Tackles | 3 |
| Interceptions | 22 |
| Crosses | 0 |
| Shots | 1 |

Average Centre Back data (Blackburn away in League playing 4-5-1)

| | |
|-------------------|----|
| Minutes Played | 90 |
| Total Passes | 26 |
| Successful Passes | 20 |
| Passing Success % | 77 |
| Passes Forward | 16 |
| Balls Received | 22 |
| Headers | 13 |
| Tackles | 3 |
| Interceptions | 24 |
| Crosses | 0 |
| Shots | 0 |

In addition, individual analysis reveals few differences in the data from artificial and grass playing surfaces. For the purposes of the following individual comparison, Left Midfield data has been chosen as an example:

Left Midfield (Artificial) Gamst Pederson Salzburg 14.09.2006

| | |
|-------------------|----|
| Minutes Played | 90 |
| Total Passes | 29 |
| Successful Passes | 24 |
| Passing Success % | 83 |
| Passes Forward | 10 |
| Passes Received | 47 |
| Headers | 12 |
| Tackles | 3 |
| Interceptions | 7 |
| Crosses | 0 |
| Shots | 3 |

Left Midfield (Grass) Gamst Pederson Salzburg 28.09.2006

| | |
|-------------------|----|
| Minutes Played | 90 |
| Total Passes | 29 |
| Successful Passes | 20 |
| Passing Success % | 69 |
| Passes Forward | 12 |
| Balls Received | 38 |
| Headers | 5 |
| Tackles | 3 |
| Interceptions | 4 |
| Crosses | 3 |
| Shots | 2 |

Conclusions

In this study the impact that artificial turf may have on the pattern of football matches was considered. A limitation of the study was that only data from one game played on artificial turf was available (Salzburg Vs Blackburn, 14.09.2006) and hence it is difficult to achieve any statistical significance or draw concrete conclusions.

The most obvious direct comparison was the data captured from Salzburg Vs Blackburn game (artificial) against the Blackburn Vs Salzburg game (grass), although individual game analysis will not provide definitive performance trends given the influence of other game-related factors (formations, injuries, morale, form, weather, mentality, venue etc). Additional data (including averages from the UEFA Cup and domestic league games involving Blackburn) were therefore used to compare the results captured from the single game data played on artificial turf at the Salzburg Stadion.

- In conclusion, early indications are that:
- Artificial turf does not dramatically effect the pattern of a football match with clear similarities in the data from games played on grass turf.
 - Some data captured from the artificial match shows that some differences [to games played on grass] may exist and merit additional multiple game analysis.
 - The data would suggest that players on artificial grass may be able to control the ball easier (less touches per possession); are more comfortable in possession (more passes received and higher pass success rates) and could be more at ease running with the ball (more dribbles).



- The artificial game data may also encourage more attacking play (more final third entries, more penalty area entries and more forward passing).
- The fact that there were less headers recorded (compared to Blackburn's data in the league and the UEFA Cup average) and that there were noticeably more passes made in teams' own halves suggests that artificial turf may encourage a more patient attacking build up (less high balls).
- There were generally less tackles and fouls on artificial turf (compared to the average game on grass) suggesting that players are more likely to stay on their feet rather than slide into challenges.

The current findings provide additional objective tactical information on the effect that artificial turf has on performance, which will influence future implementation of artificial turf playing surfaces in football. Other factors such as formations utilised; home versus away advantage; leniency of the officials; previous results; and the approach of both teams, warrant further investigation incorporating additional data (including physical and tactical) from matches played on artificial turf.

Overall this one game has shown to be very promising in comparing match analysis on artificial turf against matches played at the professional level on grass. FIFA will be continuing to work with Pro Zone to quantify match analysis in relation to professional games on artificial turf.

References

Di Salvo, V., Collins, A., McNeill, B. and Cardinale, M., 2006, Validation of Prozone @: A new video-based performance analysis system. *International Journal of Performance Analysis in Sport*, 6, 108-119.

For appendix and definitions please visit www.fifa.com

